

The A.I. Hotelier

by

ANDREW W. PEARSON

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CONTENTS

ACKNOWLEDGMENT.....	vii
PREFACE	ix
CHAPTER ONE: THE SET UP	1
Overview.....	1
Why AI?	8
Behavioral + Experiential Marketing.....	13
BI + CRM + CX + IoT	20
Revenue Optimization	26
Personalization	28
Going Social	32
Capacity Management.....	36
The Future	39
CHAPTER TWO: PERSONALIZATION.....	44
Overview.....	44
Customer Relationship Management	57
Segmentation	63
Customer Lifecycle	73
Customer Loyalty	81
The Hotel Engagement and Loyalty Platform.....	85
Natural Language Processing	91
Creating a market for feedback.....	94
Reducing Search Friction with A.I.	95
Conclusion.....	97
CHAPTER THREE: ANALYTICS.....	102
Overview.....	102
Data Mining	112
Artificial Intelligence & Machine Learning.....	116
7 Patterns of AI.....	120
Hotel Analytics	124
Analytical Methods.....	129
Decision Trees	129
k-Means Cluster	131
k-Nearest Neighbors	133
Logistic Regression.....	135
A/B Testing	137
Time Series Model.....	139
Neural Networks	140
Discriminant Analysis	142
Survival or Duration Analysis.....	143
Hotelier Analytical Models.....	144

Customer Segmentation	144
Customer Acquisition Model	145
Recency-Frequency-Monetary (RFM) Models	145
Propensity to Respond Model	147
Customer Conversion Model	148
Identify When a Patron is Likely to Return	148
Patron Worth Model	149
Customer Churn Model	150
Optimizing Offers	161
Chronological View of a hotelier Analytics Implementation	162
Clickstream Analysis	165
Conclusion	168
CHAPTER FOUR: MARKETING	174
Overview	174
Data & Marketing	178
Analytics	180
Mobile Marketing	183
Digital Interactive Marketing: The Five Paradigms	186
Website Morphing	189
Psychology of Personalization	195
Social Proof	204
Psychometrics	209
Facial Recognition	214
Affective Computing	217
SEO	224
Content Intelligence	232
Measurement	237
Geofencing Applications	239
Going Viral	245
Conclusion	254
CHAPTER FIVE: SOCIAL A.I.	266
Overview	266
Social Media Analytics	269
Sentiment Analysis	277
Sentiment Analysis Tools	283
Social Media Monitoring	288
Social Media Marketing	292
Conclusion	298
CHAPTER SIX: THE SMART HOTEL	302
Overview	302
Data Governance	305
Capacity and Demand Management	312

Cost of Outages.....	333
Unused Capacity	343
Streaming Analytics	346
Augmented and Virtual Reality	351
Internet of Things (IoT).....	355
Wearables.....	359
Robotics	361
CHAPTER SEVEN: THE A.I. HOTELIER.....	374
Overview.....	374
Text	376
Chatbots	378
Chatfuel.....	378
Botsify	379
Flow XO.....	379
Motion.ai	379
Chatty People	379
QnA bot	380
Recast.ai.....	380
BotKit.....	380
ChatterOn.....	380
Octane AI.....	381
Converse AI	381
GupShup	381
Augmented Search.....	382
Image.....	383
Facial Recognition.....	383
Image Search	386
Video	389
Audio	391
Voice Activated Internet	393
Voice Search	394
Programmatic Advertising.....	397
The Customer Journey	400
Listening.....	401
Rules Engine	409
Automation	410
Moderation.....	410
Messaging	414
Data & Analytics.....	417
Front Office.....	419
Restaurants, Bars and Nightclubs	433
The Future is Now	443
ABOUT THE AUTHOR	456
INDEX.....	458

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ACKNOWLEDGMENT

Shinley Uy – for still keeping the faith

ANDREW W. PEARSON

PREFACE

Under a different name, i.e., *The A.I. Hotelier*, this book could have been the second edition in that predictive series, but I decided to start an entirely new series centered around A.I. because this technology is currently taking the business and retail world by storm. I felt the topic was so in the zeitgeist that it deserved a book all its own. I thoroughly believe a book entirely devoted to how A.I., ML, and deep learning affects the retail and ecommerce industry would be instructive and extremely useful for anyone working in the retail industry today, as well as many who are just interested in how it functions.

I envision *The A.I. Hotelier* to be a series of books. Since this book is mostly about technology and technology, literally, changes by the second, there will surely be another soon. Subjects such as facial recognition, emotional recognition, the psychology of personalization, content intelligence, capacity management, Robotic Process Automation, and programmatic advertising, amongst others, would be a nice addition to some of the topics I wrote about in *The Predictive hotelier*. I've even added a section on marketing virality, which should be helpful for advertisers who want to tap into this type of exponential marketing. It's not easy, but there are steps to increase one's chances of going viral.

Parts of this book have been written on the Macau-Taipa bus, the Macau-Hong Kong ferry, 30,000 feet above both the Pacific and the Dark Continent of Africa, on the Guangzhou-Macau high-speed rail line, on Jeju island off the Korean Peninsula, in a café in Siem Reap, on the Hong Kong-Zhuhai-Macau bridge, within a taxi stuck in the smog-choked streets of Manila, in a Dubai Denny's, as well as on the London Underground, to say nothing of all the hotel and motel rooms I've been scribing in; planes, trains, automobiles, tuk tuks, *and* ferries, too.

If you find this book instructive, please keep up to date with my latest work on social media. A list of sites can be found on my author page at the back of the book. In 2020, I will take a more active social media role and will be tweeting, Facebooking, Instagramming, YouTubing, Slidesharing, Prezing (if that's a word) the latest AI, BI, CX, omnichannel, analytics, IoT, social media, etc., developments worthy of discussion, so feel free to reach out to me on any of those channels.

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CHAPTER ONE: THE SET UP

Overview

Today, it can safely be said, we are living in the age of AI. Everywhere you look, companies are touting their most recent AI, machine learning (ML), and deep learning breakthroughs, even when they are far short of anything that could be deemed a “breakthrough.” “AI” has probably eclipsed “Blockchain”, “Crypto”, and/or “ICO” as the buzzword of the day. Indeed, one of the best ways to raise VC funding these days is to stick ‘AI’ or ‘ML’ at the front of your prospectus and a “.ai” at the end of your website.

Separating AI fact from fiction is one of the main goals of this book; the other is to help retail and etail executives understand AI so that they can utilize this groundbreaking technology in ways that are simple and complex and, hopefully, rather ingenious. Most importantly, in ways that will be recognized by their customers as something that improves the overall customer, employee, and vendor experience.

According to IBM¹, 2.5 quintillion bytes of data are created each day. That is 10 to the power of 18 and it is a number that is growing exponentially each year; 90% of the world’s data was created over the past two years and data creation is certainly not going to slow down any time soon. This data, which has been dubbed “Big Data”, comes from everywhere; our daily financial transactions; our personal online shopping history; our social media uploads; our mobile downloads, our advertising data, even, in some cases, IoT sensor data coming off machines and people.

The social nature of sharing personal content with family, friends and associates may be the driver behind this growth and it is a growth that several studies^{2 3} suggest will soon outpace revenue generated by commercial media, such as music downloads, video clips, and games. This is the kind of growth that a hotel operator ignores at its own peril, but when a hotelier delves into this Big Data world, it needs to ensure that what it’s opening up is a treasure trove of useful information, not a Pandora’s Box full of data pain.

Major tech companies have embraced AI and machine learning as if it was one of the most important discoveries ever invented; Google, whose CEO compares AI to the discovery of fire and electricity, is now an “AI-first” company; Amazon’s entire business is shaped by AI, from its customer personalization, to its warehousing, robotics and logistics capabilities, to its voice-activated smart speakers; IBM has Watson; Facebook has AI and ML algorithms that test out

which of its AI and ML algorithms are most effective and should be rolled-out company-wide; Adobe, a big player in the multi-channel marketing space, runs much of its Experience Cloud marketing platform through its Sensei AI product; even the analytics powerhouse SAS has recently announced⁴ that it will spend US \$1B over the next three years on AI software and initiatives. Even some of the smaller vendors we are partnered with at Intelligencia have embraced AI for fear of missing out on this exploding market.

In its report *Sizing the prize. What's the real value of AI for your business and how you can capitalise*⁵, PWC believes that, "AI could contribute up to \$15.7 trillion to the global economy in 2030, more than the current output of China and India combined. Of this, \$6.6 trillion is likely to come from increased productivity and \$9.1 trillion is likely to come from consumption-side effects."

Because AI is still in its infancy, PWC believes that there are opportunities for emerging markets to leapfrog more developed counterparts with AI as the engine.⁵ Although this is a possibility, the inherent requirements of AI – a highly educated workforce, strong backing from higher learning institutes, a strong legal and regulatory framework, and access to huge sources of data — might limit emerging market successes.⁵ However, this shouldn't make companies in the industrial world too comfy. PWC is probably onto something when it claims that, "within your business sector, one of today's start-ups or a business that hasn't even been founded yet could be the market leader in ten years' time."⁵ AI threatens on both the micro and macro front, which is rare in a technology.

According to PWC's analysis, "global GDP will be up to 14% higher in 2030 as a result of the accelerating development and take-up of AI—the equivalent of an additional \$15.7 trillion."⁵ For PWC, the economic impact of AI will be driven by⁵:

1. Productivity gains from businesses automating processes (including the use of robots and autonomous vehicles).
2. Productivity gains from businesses augmenting their existing labour force with AI technologies (assisted and augmented intelligence).
3. Increased consumer demand resulting from the availability of personalised and/or higher-quality AI-enhanced products and services.⁵

In her article *Gartner Top 10 Strategic Technology Trends for 2018*⁶, Kasey Panetta argues that AI was the number one trend for 2018. Panetta states that, "The ability to use AI to enhance decision making, reinvent business models and ecosystems, and remake the customer experience will drive the payoff for digital initiatives through 2025."⁶ The other nine technological trends were: intelligent apps and analytics, intelligent things, digital twins, cloud to the edge, conversational platforms, immersive experience, blockchain, event-driven, and continuous adaptive risk and trust.⁶

"Given the steady increase in inquiry calls, it's clear that interest is growing. A recent *Gartner* survey showed that 59% of organizations are still gathering

information to build their AI strategies, while the remainder have already made progress in piloting or adopting AI solutions,” states Panetta.⁶ If your competitor isn’t already looking into AI, they probably are about to and, if you aren’t yet looking into AI, then it might already be too late.

“Although using AI correctly will result in a big digital business payoff, the promise (and pitfalls) of general AI where systems magically perform any intellectual task that a human can do and dynamically learn much as humans do is speculative at best,” contends Panetta.⁶ “Enterprises should focus on business results enabled by applications that exploit narrow AI technologies and leave general AI to the researchers and science fiction writers,” says David Cearley, a Gartner vice president and Gartner Fellow.⁶

Panetta claims that, “Over the next few years every app, application and service will incorporate AI at some level. AI will run unobtrusively in the background of many familiar application categories while giving rise to entirely new ones.”⁶ Cearley recommends companies challenge their packaged software and service providers “to outline how they’ll be using AI to add business value in new versions in the form of advanced analytics, intelligent processes and advanced user experiences.”⁶ This is very sound advice.

Panetta says that, “Intelligent apps also create a new intelligent intermediary layer between people and systems and have the potential to transform the nature of work and the structure of the workplace, as seen in virtual customer assistants and enterprise advisors and assistants.”⁶

Cearley recommends that businesses “Explore intelligent apps as a way of augmenting human activity, and not simply as a way of replacing people”⁶ “Augmented analytics is a particularly strategic growing area that uses machine learning for automating data preparation, insight discovery and insight sharing for a broad range of business users, operational workers and citizen data scientists,” adds Panetta.⁶

“Intelligent things use AI and machine learning to interact in a more intelligent way with people and surroundings,”⁶ says Panetta, adding, “Some intelligent things wouldn’t exist without AI, but others are existing things (i.e., a camera) that AI makes intelligent (i.e., a smart camera).”⁶ “These things operate semi-autonomously or autonomously in an unsupervised environment for a set amount of time to complete a particular task,” explains Panetta.⁶ Panetta sees a shift from “stand-alone intelligent things to a swarm of collaborative intelligent things.”⁶ In this model, she explains, multiple devices collaborate together, either with or without human input.

“A digital twin is a digital representation of a real-world entity or system,” explains Panetta.⁶ “In the context of IoT, digital twins are linked to real-world objects and offer information on the state of the counterparts, respond to changes, improve operations and add value.”⁶ With an estimated 21 billion

connected sensors and endpoints in operation by 2020, “digital twins will exist for billions of things in the near future.”⁶ Billions of dollars in cost savings from maintenance repair and operation as well as optimized IoT asset performance are on the table, claims Cearley.⁶

Digital twins offer immediate help with asset management.⁶ As these systems collect enormous amounts of data, they will “offer value in operational efficiency and insights into how products are used and how they can be improved,”⁶ which should prove beneficial not just to the operators but also the companies that build the products that the data is being collected upon.

“Over time, digital representations of virtually every aspect of our world will be connected dynamically with their real-world counterparts and with one another and infused with AI-based capabilities to enable advanced simulation, operation and analysis,” says Cearley.⁶ “City planners, digital marketers, healthcare professionals and industrial planners will all benefit from this long-term shift to the integrated digital twin world,” he adds.⁶

Gartner’s fifth trend—Edge computing—describes “a computing topology in which information processing and content collection and delivery are placed closer to the sources of this information.”⁶ Panette argues that enterprises should begin using edge design patterns in their infrastructure architectures because “Connectivity and latency challenges, bandwidth constraints and greater functionality embedded at the edge favors distributed models.”⁶

Cloud and edge computing should not be seen as competing approaches, argues Panette.⁶ According to her, “Edge computing speaks to a computing topology that places content, computing and processing closer to the user/things or ‘edge’ of the network. Cloud is a system where technology services are delivered using internet technologies, but it does not dictate centralized or decentralized service delivering services.”⁶ “When implemented together, cloud is used to create the service-oriented model and edge computing offers a delivery style that allows for executions of disconnected aspects of cloud service,” concludes Panette.⁶

According to Panette, conversational platforms are currently capable of answering simple questions like “How’s the weather?”, or handling more complicated interactions, like booking a reservation at the Italian restaurant on Parker Avenue, but their capacity is severely limited.⁶ That will soon change. “These platforms will continue to evolve to even more complex actions, such as collecting oral testimony from crime witnesses and acting on that information by creating a sketch of the suspect’s face based on the testimony,” argues Panette.⁶

The challenge that conversational platforms face today “is that users must communicate in a very structured way, and this is often a frustrating experience,”⁶ as anyone who has dealt with the limited range of a Facebook bot understands. “A primary differentiator among conversational platforms will be

the robustness of their conversational models and the API and event models used to access, invoke and orchestrate third-party services to deliver complex outcomes,” contends Panette.⁶ In chapter seven, I explain many of the chatbot platforms that are currently available to hoteliers that contain some highly sophisticated AI capabilities.

Augmented reality (AR), virtual reality (VR) and mixed reality (MR) will combine with conversational platforms to create a user experience reliant on an invisible and immersive experience layer provided by application vendors, system software vendors and development platform vendors, who will all compete to deliver unique and groundbreaking solutions.⁶

Panette argues that, “Over the next five years the focus will be on mixed reality, which is emerging as the immersive experience of choice, where the user interacts with digital and real-world objects while maintaining a presence in the physical world.”⁶ Mixed reality exists along a spectrum and includes head-mounted displays (HMD) for AR or VR, as well as smartphone- and tablet-based AR. “Given the ubiquity of mobile devices, Apple’s release of ARkit and iPhone X, Google’s Tango and ARCore, and the availability of cross-platform AR software development kits such as Wikitude,”⁶ Gartner saw 2018 as a time when the battle for smartphone-based AR and MR really caught fire.⁶

Today’s hoteliers have to be conscious of the complex security environment that their business exists in. The number of hacks and corporate IT hostage taking that is already occurring will only increase as technology increases in sophistication.⁶

In their *MIT Sloan Management Review* article *Winning with AI*⁷, Sam Ramsbotham et al. surveyed more than 2,500 executives and had 17 interviews with leading experts in the hope of providing “a data-driven view of what organizations that succeed with AI are doing and what real success with AI looks like.”⁷ The writers found that, “Companies that capture value from their AI activities exhibit a distinct set of organizational behaviors.”⁷ These businesses:

- Integrate their AI strategies with their overall business strategy.
- Take on large, often risky, AI efforts that prioritize revenue growth over cost reduction.
- “Align the *production* of AI with the *consumption* of AI, through thoughtful alignment of business owners, process owners, and AI expertise to ensure that they adopt AI solutions effectively and pervasively.”⁷
- Unify their AI initiatives with their larger business transformation efforts.
- “Invest in AI talent, data, and process change in addition to (and often more so than) AI technology. They recognize AI is not all about technology.”⁷

“The net effects of these behaviors, and their underlying commitments, are to address difficulties generating value with AI, manage unavoidable competitive and implementation risks from AI, and effectively exploit AI-related opportunities,” argue Ramsbotham et al.⁷

Ramsbotham et al. discovered that, “To a large extent, difficulties with generating value from AI show up in the data as organizational rather than technological,”⁷ which isn’t all that surprising. “Companies that focus solely on the production of AI (data, technology, tools) are less likely to derive value than those companies that actively align business owners, process owners, and AI owners. Leaders enable their organizations to *consume* AI as much as to *produce* AI,” contend Ramsbotham et al.⁷ “Companies that treat AI as a ‘technology thing’ struggle to deliver value: An IT focus on AI tends to generate less value than a broad strategic focus,” note Ramsbotham et al.⁷ Merely developing a strategy for AI is not enough, Ramsbotham et al.’s research found.⁷ Tying a strategy for AI to the company’s overall corporate strategy was essential.⁷

“Aligning AI and strategy requires organizations to look backward from strategy, not forward from AI,” maintain Ramsbotham et al.⁷ “Jeroen Tas, Royal Philips’ chief innovation and strategy officer, explains that AI is integrated into corporate strategy by working ‘our way backward’ from the company’s overall strategy for customer health,” explain Ramsbotham et al.⁷ Philips “then identifies how AI can support this. Philips isn’t starting with AI and looking forward to where it can support the strategy; rather, it finds areas in which the strategy needs support and looks for the best way to provide it.”⁷ “Philips focuses specifically on how AI can provide better consumer experiences, better health outcomes, improved care provider experience, and lower costs of care,” note Ramsbotham et al.⁷

“Those companies that obtain business value from AI build internal teams and rely less on outside vendors; they selectively import experienced AI talent for technical leadership roles; and they upskill their existing workforce to enable AI literacy and understanding of how to manage with AI,” say Ramsbotham et al.⁷ “Despite talent scarcity, companies of all sizes across industries report similarly positive outcomes when they make these three talent investments,” the writers state.⁷ Although acquiring talent is a big issue, AI can assist in automating certain repetitive tasks, especially for creatives. Services like Kaggle can be useful to outsource model building, and AI can be particularly helpful for a company’s CRM and marketing departments. I will provide more details about these opportunities in the ensuing chapters.

Ramsbotham et al.’s research found two broad ways that companies were managing risks that emerged either directly or indirectly from theirs and others’ AI deployments.⁷ “First, companies that have obtained value from AI are more likely to manage proactively: They make bigger, sometimes riskier, investments. These aren’t gambles, however, but rather, calculated strategy,” explain

Ramsbotham et al.⁷ They also add, “Second, in fast-moving market environments, strategic alignment becomes more challenging and more critical to get right. Misalignment, accordingly, becomes a greater and more common risk.”⁷

“Companies that derive value from AI are more likely to integrate their AI strategy with their overall corporate strategy,” argue Ramsbotham et al.⁷ “Organizations that are most effective at obtaining value from AI more likely generate value from AI-driven revenue, rather than from cost savings alone,” note Ramsbotham et al.⁷ They add: “Most executives believe that the highest future value from AI will be on the revenue and growth side rather than on the cost side.”⁷

“Genuine success with AI — over time — depends on generating revenue, reimagining organizational alignment, and investing in the organization’s ability to actually use AI across the enterprise,” conclude Ramsbotham et al.⁷

Shivaji Dasgupta, managing director of Deutsche Bank, “notes a growing concern that there will no longer be ‘a level playing field’ thanks to AI, especially in a highly regulated industry like banking.”⁷ Ramsbotham et al. point out that, “New competitors from industries not bound by rules imposed on incumbents are already creating competitive risks.”⁷ Ramsbotham et al. see Apple with its Apple Pay and recently launched Apple Card and Amazon with its Amazon Cash as two new entrants into the financial sector that could prove daunting competitors to normal banks.⁷ “With massive amounts of data, the ability to apply AI and other technologies to capitalize on that data, and their loyal customer bases, the tech giants’ respective moves into financial services pose formidable threats to traditional banking and financial services companies,” argue Ramsbotham et al.⁷

“Deutsche Bank’s Dasgupta describes an impressive revenue-side achievement: For one consumer credit product in Germany, AI makes a real-time decision on whether or not to extend a loan to a customer as the customer is filling out the loan application,” explains Ramsbotham et al.⁷ “This has generated a lot of interest among consumers,” Dasgupta reports, so much so that, for that specific product, loan issuance shot up 10- to 15-fold in eight months following the service’s launch.⁷ Dasgupta believes it is because, in Germany, an individual’s credit rating is damaged by applying and not receiving a loan.⁷ “Deutsche Bank’s new AI solution removes that risk for customers by telling them whether or not they will be approved for a given amount before they hit ‘apply,’” explains Ramsbotham et al.⁷ “The largest gains haven’t come from better serving those customers who would have applied for loans anyway,” say Ramsbotham et al.⁷ “Rather, the benefit comes from reaching those who would not have applied in the first place.”⁷ This example has a direct relevance to the retail industry, which is often extending credit to its customers.

Why AI?

So why should a hotelier choose to go down the complex AI road? Well, in their article *Artificial intelligence Unlocks the True Power of Analytics*⁸, Adobe explains the vast difference between doing things in a rules-based analytics way and an AI-powered way, including:

- Provide warnings whenever a company activity falls outside the norm. The difference:
 - **Rules-based analytics:** You set a threshold for activity (e.g., “200–275 orders per hour”) and then manually investigate whether each alert is important.
 - **AI-powered analytics:** The AI analytics tool automatically determines that the event is worthy of an alert, then fires it off unaided.
- Conduct a root cause analysis and recommend action. The difference:
 - **Rules-based analytics:** You manually investigate why an event may have happened and consider possible actions.
 - **AI-powered analytics:** Your tool automatically evaluates what factors contributed to the event and suggests a cause and an action.
- Evaluate campaign effectiveness:
 - **Rules-based analytics:** The business manually sets rules and weights to attribute the value of each touch that led to a conversion.
 - **AI-powered analytics:** The AI analytics tool automatically weights and reports the factors that led to each successful outcome and attributes credit to each campaign element or step accordingly.
- Identify customers who are at risk of defecting:
 - **Rules-based analytics:** You manually study reports on groups of customers that have defected and try to see patterns.
 - **AI-powered analytics:** Your tool automatically identifies which segments are at greatest risk of defection.
- Select segments that will be the most responsive to upcoming campaigns:
 - **Rules-based analytics:** You manually consider and hypothesize about the attributes of customers that might prove to be predictive of their response.
 - **AI-powered analytics:** Your tool automatically creates segments based on attributes that currently drive the desired response.
- Find your best customers:

THE A.I. HOTELIER

- **Rules-based analytics:** You manually analyze segments to understand what makes high-quality customers different.
- **AI-powered analytics:** Your tool automatically identifies statistically significant attributes that high-performing customers have in common and creates segments that include these customers for the business to act on.

Beyond the reasons listed above, this book will explain how AI can be used in website morphing, customer and media recommendations, purchase prediction, demand forecasting, programmatic advertising, as well as social listening.

GENERAL USE CASE	INDUSTRY
Sound	
Voice recognition	UX/UI, Automotive, Security, IoT
Voice search	Handset maker, Telecoms
Sentiment analysis	CRM for most industries
Flaw detection	Automotive, Aviation
Fraud detection	Finance, Credit cards
Time Series	
Log analysis/Risk detection	Data centers, Security, Finance
Enterprise resource planning	Manufacturing, Auto, Supply Chain
Predictive analytics using sensor data	IoT, Smart home, Hardware manufacturing
Business and Economic analytics	Finance, Accounting, Government
Recommendation engine	E-Commerce, Media, Social Networks
Text	
Sentiment analysis	CRM, Social Media, Reputation mgmt.
Augmented search, Theme detection	Finance
Threat detection	Social Media, Government
Fraud detection	Insurance, Finance
Image	
Facial recognition	Multiple industries
Image search	Social Media
Machine vision	Automotive, Aviation

GENERAL USE CASE	INDUSTRY
Photo clustering	Telecom, Handset makers
Video	
Motion detection	Gaming, UX, UI
Real-time threat detection	Security, Airports

Table 1: A.I. use cases

Source: *skymind*⁹

Table 1 shows the general use cases for AI broken down by industry. This is a general list and many of these use cases can be utilized by industries other than the ones specified.

Terry Gou, the chairman of the Taiwanese electronics manufacturer Foxconn, says the company plans to replace 80 percent of its workforce with robots in the next five to 10 years.¹⁰ Richard Liu, the founder and CEO of Chinese e-commerce company JD.com, hopes to one day have a completely automated company — 100% operated by AI and robots — and the company has invested \$4.5 billion to build an AI center in Guangdong, China, to implement such a strategy.¹¹

Automation doesn't just have to be about robots and factories; however, it can also remove the day-to-day drudgery work that humans spend so much time doing. As I will explain later in the book, there are AI tools out there that can automate away repetitive processes, like cataloging images or video and let human do what humans do best — create.

Google Duplex has shown that AI bots can do things like make reservations at hair salons¹² and this is one of deep learning's futures. Hoteliers need to develop voice and speech understanding technology or they risk being left behind by their competitors. In particular, voice is a technology waiting for mass use. We communicate through voice as much as any other sense and the companies that win the battle in voice will win the battle for the 21st century consumer. One of the most important stats about voice is the fact that voice searches on Google are now 30 times more likely than text searches to be action queries.¹³

74% of adults use their smart phones to get directions and other information based on their current location.¹⁴ In addition, 30% of adults who have a social media account say that at least one of those accounts will include their current location when they post.¹⁵ Even if we ignore hand held devices, as many as 96% of cars produced in 2013 are built with event recorders that include GPS.¹⁶

Bonchi and Wang give the troubling example of a politician in Germany who “went to court to find out how often and what kind of data was collected by his cell phone company. The results were staggering. In just a six-month period, his coordinates were recorded and stored over 35,000 times.”¹⁷

In a March 2017 note to clients¹⁸, RBC Capital argued that Amazon's voice assistant Alexa “could bring the U.S. e-commerce giant \$10 billion of revenues by 2020 and be a ‘mega-hit.’” According to Arjun Kharpal, “The investment bank has dubbed the technology ‘voice-activated internet (VAI)’ and said it represents a ‘material opportunity’ for both Amazon and Google, which has its own technology called Google Assistant.”¹⁸

RBC breaks down the impressive numbers as follows¹⁸:

- Alexa device sales, which could reach \$60 million by 2020.
- Voice driven shopping sales, which could reach \$400 per customer by 2020.
- Platform revenues: If Amazon reaches over 100 million installed Alexa devices then it could create an app store and tap into “platform revenue.”
- Amazon Web Services (AWS) tailwind.¹⁸

RBC Capital notes that, “As the number of skills rises, Amazon will create a marketplace that will allow them to charge companies to appear more prominently in its app store.”¹⁸ Paid skills on Alexa could be lucrative and Amazon could collect revenue sharing payments accordingly.

Of course, Amazon is not alone in the voice activated internet (VAI) market.¹⁸ Google has its own voice assistant built into Android smartphones and its own smart speaker called Google Home.¹⁸ According to Kharpal, “RBC was surprised by the popularity of Google Home since it was only launched in October 2016 in the U.S.”¹⁸ Apple and Microsoft are also highly involved in this space. Siri hasn’t been the success Apple hoped it would be, but they still believe it has an integral part of their VAI future.

“Awareness of Google Home among 1,748 Amazon customers surveyed by RBC was 60 percent. Whereas when RBC did a similar survey in September 2015, just shortly after the Echo had launched widely in the U.S., only 33 percent of respondents had heard of Alexa. Google however still only has around 80 Actions, which are like Alexa's skills, which total above 10,000,” notes Kharpal.¹⁸

All-in-all, *The A.I. hotelier* should not concern itself with who might win the VAI battle as any of these platforms can bring considerable eyeballs to the table (or the store). However, any money spent to reach these eyeballs should produce a healthy ROI. The app market that Amazon could build atop Alexa could also be a hidden opportunity for creative hotelier marketers.

In chapter two, I discuss Milgrom and Tadelis’ study¹⁹ that utilizes natural language processing (NLP) to create an environment that promotes trust, similar to the way institutions emerged in the medieval trade fairs of Europe that helped foster trust amongst traders.¹⁹ Milgrom and Tadelis believe that AI

can be applied to today's marketplaces like eBay to help foster a more trustworthy and better buying experience for their customers.¹⁹

One of the major use cases for AI is sentiment analysis, which uses NLP to gain insight into how a business is seen on social media. According to skymind.ai²⁰:

“Natural language refers to language that is spoken and written by people, and natural language processing (NLP) attempts to extract information from the spoken and written word using algorithms. NLP encompasses active and a [sic] passive modes: natural language generation (NLG), or the ability to formulate phrases that humans might emit, and natural language understanding (NLU), or the ability to build a comprehension of a phrase, what the words in the phrase refer to, and its intent. In a conversational system, NLU and NLG alternate, as algorithms parse and comprehend a natural-language statement and formulate a satisfactory response to it.”

Another important area for AI is text analytics. In his article *Text Analytics: How to Analyse and Mine Words and Natural Language in Businesses*²¹, Bernard Marr states that, “Text analytics, also known as text mining, is a process of extracting value from large quantities of unstructured text data.”

Marr elucidates: “While the text itself is structured to make sense to a human being (i.e., a company report split into sensible sections) it is unstructured from an analytics perspective because it doesn't fit neatly into a relational database or rows and columns of a spreadsheet. Traditionally, the only structured part of text was the name of the document, the date it was created and who created it.”²¹ “Access to huge text data sets and improved technical capability means text can be analysed to extract high-quality information above and beyond what the document actually says,” argues Marr.²¹ “Text can be assessed for commercially relevant patterns such as an increase or decrease in positive feedback from customers, or new insights that could lead to product tweaks, etc.”²¹ This means text analytics can help us discover things we didn't already know but, perhaps more importantly, had no way of previously knowing.²¹ These could be incredibly important insights for a business both about itself and, potentially, about its competitors.²¹

For Marr, “Text analytics is particularly useful for information retrieval, pattern recognition, tagging and annotation, information extraction, sentiment assessment and predictive analytics.”²¹ It could both reveal what customers think about a company's products or services, or highlight the most common issues that instigate customer complaints.²¹

Behavioral + Experiential Marketing

The great advertising executive David Ogilvy once said, “There isn’t any significant difference between the various brands of whiskey, or cigarettes or beer. They are all about the same. And so are the cake mixes and the detergents, and the margarines... The manufacturer who dedicates his advertising to building the most sharply defined personality for his brand will get the largest share of the market at the highest profit.”²² This is truer for the retail industry than most other industries.

Although the great behaviorist B.F. Skinner once said, “The major difference between rats and humans is that rats learn from experience,” human beings are, first and foremost, creatures of habit. If a hotelier can understand these habits on both a micro and macro level, it can both predict what its customers are going to want, and also what they will do, so a business can, potentially, shape that behavior. Smart businesses can utilize all this behavior in a predictive way and optimize multiple parts of their operations, including labor management.

Marketing has always been about influencing people’s behavior and what could be different here is *The A.I. Hotelier’s* ability to understand how one customer’s actions will affect the company’s entire operation. With this insight extrapolated over a million customers over 365 days of the year, the brand can take the most appropriate — and optimized — action to reap the highest profit.

In his article *How Real-time Marketing Technology Can Transform Your Business*²³, Dan Woods makes an amusing comparison of the differing environments that today’s marketers face compared to what their 1980s counterparts did. He says:

“Technology has changed marketing and market research into something less like golf and more like a multi-player first-person-shooter game. Crouched behind a hut, the stealthy marketers, dressed in business-casual camouflage, assess their weapons for sending outbound messages. Email campaigns, events, blogging, tweeting, PR, ebooks, white papers, apps, banner ads, Google Ad Words, social media outreach, search engine optimization. The brave marketers rise up and blast away, using weapons not to kill consumers but to attract them to their sites, to their offers, to their communities. If the weapons work, you get incoming traffic.”

As behavioral economist Susan Menke explains in her paper *Humanizing Loyalty*²⁴, “Decision fatigue and cognitive fatigue are the opposite of flow and seamlessness. We are making too many decisions that tax our cognitive bank account. We dole it out on important things and not on things that are already operating well.”

In her paper, Menke touches upon the concept of psychological scripts — the idea that the mind doesn't have to focus on many day-to-day activities as they can be handled without much thought.²⁴ The more seamless a company can make the customer interaction process, the more likely a customer will continue to do business with it.²⁴

Tom Fishburne, the founder of Marketoonist, says “the best marketing doesn't feel like marketing,” and his words are a good motto for today's digital marketer. AI can help make marketing so personalized and wanted that customers enjoy receiving it and have no qualms positively responding to it. The seamlessness of the marketing is paramount.

We live in an instant gratification world and the companies that will thrive in this new environment will be the ones who can both keep up with the requirements of their discerning and demanding customers as well as predict what these customers will be wanting throughout their customer journeys. Today, companies need every advantage they can get so that they can provide better service than their competitors.

Being able to accurately predict not only who a marketer's best leads and prospects are, as well as how and when it is best to engage those leads is nice, but understanding how their acceptance of these marketing offers will affect the overall bottom line is what *The A.I. hotelier* is all about.

This ability will not only empower marketers and salespeople in the coming years to be radically more productive and profitable than they are today, but also give multiple corporate departments visibility on their micro and macro needs. Used properly, predictive analytics and AI can transform the science of sales forecasting from a dart-throwing exercise to a precision instrument.

The concept of sales and marketing automation has already produced some of the highest-flying successes in high-tech. Companies like Salesforce.com have been wildly successful in automating the sales process for salespeople and sales managers. Big software vendors like SAP, SAS, IBM, Microsoft, and Oracle are vying for supremacy, while smaller players like Pega Systems, SugarCRM, Netsuite, and Sage are offering interesting products at highly affordable prices.

In their article *10 Principles of Modern Marketing*²⁵, Ann Lewnes and Kevin Lane Keller argue that, “Technology has changed everything. Fundamentally, it allows for new ways to create customer experiences, new mediums to connect with customers and other constituents, and trillions of data points to understand customer behavior and the impact of marketing programs and activities. Yet, with all that progress, we are still only at the tip of the iceberg in terms of the profound impact technology will have on the future of marketing.”

In their *AI: Your behind-the-scenes marketing companion*²⁶, the Adobe Sensei Team claims that, “The battle to win customer hearts and minds is no longer

simply about your product. It's about the experience. Because that's what keeps customers coming back. To compete on experience, you need to understand what customers want now while anticipating what they'll do next. And because your customers have lots of choices, you don't have a lot of time to get it right."

"But many times, the knowledge you need to personalize interactions and compel customers to act is locked up in huge amounts of data," warns the Adobe Sensei Team.²⁶ "This means someone has to sift through it all to recognize patterns, trends, and profiles, so you can quickly act on insights. The problem is, it's too much data for humans to sort through alone. That's where artificial intelligence and machine learning come in," the team says.²⁶

"Customers will always expect a human touch in their interactions," claims the Adobe Sensei Team.²⁶ "These new technologies won't replace marketing jobs, but they will change them," the team adds.²⁶ Brands should think of AI and machine learning as their behind-the-scenes marketing assistant who helps unlock insights in volumes of data, develops a deeper understanding of what customers want, a forecasting tool that predicts trends, as well as monitors unusual activity, such as spikes or drops in sales — all while giving brands more time to make decisions that matter.²⁶

"To fully realize the potential of technology," Lewnes and Keller argue that, "it takes transformation across people, processes, *and* technology. Only by recognizing all three forces will modern marketers reap the full benefits that technology can have on marketing transformation."²⁵

"To thrive in this new era, it is imperative that marketers embrace developments in technology and test and adopt new advancements that fit their business — whether AI, or voice, or augmented reality — before they lose a competitive edge," claim Lewnes and Keller.²⁵ "At the same time, mastering technology is not the only criterion for success in the modern marketing era — the right people and processes must also be put in place to properly develop, manage, and nurture the benefits of that technology," they add.²⁵

"In terms of people, today's marketers must possess many traits. They must be curious, flexible, agile, and nimble. They must be willing to be change agents, always looking around the corner and helping to scale transformation as champions for change," say Lewnes and Keller.²⁵ The status quo no longer works — continuous development of new skills for all marketers is critically important.²⁵

Today's marketing organization needs people with diverse skill sets and expertise in key areas.²⁵ "Managers should ensure their marketing teams include members who bring creative and analytical capabilities, as well as individuals who can play newly evolved roles on a team — whether that's someone skilled in web development, data analytics, e-commerce, or new media," argue Lewnes and Keller.²⁵ Marketing organizations almost have an impossible task as many of

the needed skills for these new jobs “didn’t exist four or five years ago, and even if they did, they have changed dramatically in recent years.”²⁵

Furthermore, while these new, specialized jobs have emerged, marketers must keep in mind the broadening marketing ecosystem.²⁵ “The dynamic cross-channel nature of marketing today requires that campaigns be integrated and connected across every channel,” explain Lewnes and Keller.²⁵

“Processes must also change for technology organizations. Today, the customer-decision process is becoming more complex and varied. As the customer journey becomes increasingly nonlinear, the organization must change to reflect that,” warn Lewnes and Keller.²⁵ “In a more complex marketplace, internal organizational lines need to be redrawn. Silos must be broken down and cross-functional relationships established so that marketing works seamlessly across other groups in the organization such as IT, finance, sales, and product management,” say Lewnes and Keller.²⁵

“Marketing can benefit from the output of these other groups and also contribute to the groups’ effectiveness and success at the same time,” claim Lewnes and Keller.²⁵ “For example, to improve the reliability of financial forecasting, marketing can share early-warning lead indicators that have been shown to affect bottom-of-the-funnel behaviors and ultimately revenue (for example, the number of customer visits to company-controlled websites).”²⁵ The marketing department can show its growing worth and value by demonstrating “its impact on the business, validating the ROI of every dollar to peer groups in the organization and becoming a strategic driver of the business.”²⁵

All these changes, however, require that organizations adapt to this new marketing and technological environment. Lewnes and Keller argue that marketers “must learn to be agile, take risks, fail fast, and apply lessons.”²⁵ They must also learn how to get the most out of a data-rich world by testing, optimizing, and activating.²⁵

Lewnes and Keller claim “experience is the new brand.”²⁵ They are right, experience will be one of the big differentiators for companies going forward.²⁵ “With traditional marketing, the customer-decision and company-selling process was comparatively simple with customers entering into a company’s sales and marketing funnel and making various choices along the way to becoming loyal, repeat customers,” explain Lewnes and Keller.²⁵ Today, every “customer touch point online and offline — as wide-ranging as a tweet, product download, in-store purchase, the company’s social purpose, its executives’ behavior, and the corporate culture — can shape experiences that define a brand for customers,” contend Lewnes and Keller.²⁵

“Marketers operate at the intersection of many of these customer experiences and are uniquely positioned to help steer the future directions for brands,” claim Lewnes and Keller.²⁵ “In doing so, marketers of technology products cannot just

worship the product alone and be transactional in their customer interactions. They must create full-on, immersive experiences for customers that build strong ties to the company and the brand as a whole. Experiences are the new competitive battlefield and a means to create powerful differentiation from competitors,” argue Lewnes and Keller.²⁵

A new acronym that is making the software rounds these days is CXM — Customer Experience Management — and it helps businesses collect and process real-time data from across an organization. A CXM platform activates content based on customer profiles, allowing personalized experiences to be delivered in real time. This is the future of both AI and retail brand marketing.

In chapter two, I lay the foundation for how a hotelier can utilize both AI and ML, while in chapter seven I detail specific examples of how these technologies can be utilized on several different fronts. Certainly, many hoteliers are already using these technologies for things like customer segmentation, market forecasting, recommendation engines, as well as in target marketing, but they can also be used to weed out problem or addicted gamblers, as well as increase employee productivity.

The A.I. Hotelier is a hotelier that takes into account all kinds of data that can be created at a retail store or on an ecommerce website. Data created by its employees, vendors, patrons, and customers (we’ll consider these the people who haven’t signed up for a loyalty card yet and aren’t, therefore, as trackable as patrons who are in the hotelier’s database) are also quantified and optimized.

The A.I. Hotelier utilizes all the data associated with the business to make better business decisions for the company as a whole. *The A.I. Hotelier* is viewed holistically and the proverbial butterfly’s wing that flaps somewhere inside the company can set off a chain of events that either helps or hurts the company’s bottom line, potentially weeks or months down the line; captured and analyzed the data will be, so that surprises and negative impacts can be mitigated, if not reversed.

Descriptive analytics, diagnostic analytics, predictive analytics, prescriptive analytics and the newest field of analytics — edge analytics — are exploited throughout *The A.I. Hotelier* to try to reach as real-time an IT environment as possible. The data I will be focusing on throughout this book will be culled from mostly the following sources:

- Operational systems.
- Customer Relationship Management (CRM) or CX software.
- Business Intelligence (BI) systems.
- Transaction data from Point-of-Sales (POS) systems.
- Clickstreams from the hotelier’s website.
- Call center systems.

- Surveillance and security systems, including facial recognition datasets.
- Emotional recognition datasets.
- Geo-location data from in-house Wi-Fi systems.
- Social media data from WeChat, Facebook, Weibo, Twitter, Jiebang, Instagram, YouTube, Twitch, and other mobile and social media apps.
- Customer management systems.
- Social media listening hubs.
- Google analytics and web tracking information.
- Programmatic advertising information.
- HR and ERP systems.

All of this information can be fed into an Enterprise Data Warehouse (EDW), where it can be utilized by a multitude of departments, including call center/customer service, marketing, social media marketing, patron management, affiliate marketing, all the way up to the top executive branches, including individuals in the C-level suite.

In recent years, businesses in general and hoteliers in particular have come to the realization that data warehouses, while perfectly able to handle the BI and analytics needs of yesterday, don't always work in today's complex IT environments, which contain structured, unstructured, and semi-structured data.

Normal relational databases worked fine when business users were restricted to proprietary databases and the scope of work was confined to canned reports and modest dashboards that included limited drill down functionality. Today, however, with the inclusion of so much unstructured data coming from mobile, social, web logs, etc., and semi-structured data originating from a multitude of sources, limitations abound. Standard data warehouses require built-in, understandable schemas, but unstructured data, by definition, doesn't have a definable schema that is accessible and understandable in every case.

Today's IT environment is nothing like the IT environment of even three years ago. Real-time data management capabilities have brought a whole new level of data available to customer intelligence, customer interaction, patron management and social media systems.

One of the biggest challenges for IT departments today is scalability. With the multitude of data warehouse and cloud offerings available today, hoteliers can dynamically scale up or down according to their storage needs. Over the past few years, the cost of storage has plummeted, and virtual servers can be spun up almost instantaneously, as well as quite inexpensively (relative to the outright purchase of hardware). With this instant access to data, a whole new world of real-time interactions can flourish.

The concept of "Edge Analytics" — i.e., the processing of analytics at the point

or very close to the point of data collection — exponentially increases the ability to use predictive analytics where it can be utilized best — at the point of interaction between the business and the consumer. In short, edge analytics brings analytics to the data rather than vice-versa, which, understandably, can reduce cost and increase its usage as the data is analyzed close to where it can best be utilized. This also reduces latency, which could be the difference between useful and useless analytics.

Today, the analytics space is more crowded than ever before; standard ETL-solution providers are adding analytics to their multitude of offerings. Many new players in the Master Data Management (MDM) field have BI platforms that combine integration, preparation, analytics and visualization capabilities with governance and security features. Such standard analytics processes as column dependencies, clustering, decision trees, and a recommendation engine are all included in many of these new software packages.

Instead of forcing clients to frustratingly purchase module on top of module on top of module, new software companies are creating packages that contain many pre-built analytical functions. Open source products like R, Python, and the WEKA collection in Vantara can easily be added to many of these software solutions as well, thereby reducing the need for expensive analytics layers.

The fact that many of these analytical packages are open source is a further advantage because, since they are free to download and use, they have a robust user base and consultants are sometimes easier to find than analysts with highly developed analytics skills.

Before going any further, I believe one of the first questions that needs to be answered here is, “What exactly is analytics?” The standard answer is that there are four types of analytics and they are:

- Descriptive analytics — What happened?
- Diagnostic analytics — Why did it happen?
- Predictive analytics — What will happen?
- Prescriptive analytics — How can we make it happen again?

For a hotelier, descriptive analytics could include pattern discovery methods such as customer segmentation, i.e., culling through a patron database to understand a patron’s preferred game of choice. Simple cluster segmentation models could divide customers into their preferred sizes and styles.

Market basket analysis, which utilizes association rules, would also be considered a descriptive analytics procedure. hoteliers can use market basket analysis to bundle and offer promotions as well as gain insight into a customer’s buying habits. Detailed patron shopping and purchasing behavior could also be used to develop future products.

In her article *How Much ROI Can Data Analytics Deliver?*²⁷, Annie Eissler points

out that, according to Nucleus Research “analytics and business intelligence solutions deliver, on average, \$13.01 for every dollar spent” and leading companies have been achieving double-digit return on investment (ROI) from their analytics investments for several years now.” In chapter three, I will delve deeper into how a hotelier can utilize analytics to both reduce costs and, by delivering personalized marketing, increase customer satisfaction.

In his article *Will ‘Analytics on The Edge’ Be The Future Of Big Data?*²⁸, Bernard Marr ponders the question: “Rather than designing centralized systems where all the data is sent back to your data warehouse in a raw state, where it has to be cleaned and analyzed before being of any value, why not do everything at the ‘edge’ of the system?”

Marr uses the example of a massive scale CCTV security system that is capturing real-time video feeds from tens of thousands of cameras.²⁸ “It’s likely that 99.9% of the footage captured by the cameras will be of no use for the job it’s supposed to be doing — i.e., detecting intruders. Hours and hours of still footage is likely to be captured for every second of useful video. So what’s the point of all of that data being streamed in real-time across your network, generating expense as well as possible compliance burdens?”²⁸

The solution to this problem, Marr argues, is for the images themselves to be analyzed within the cameras at the moment the video is captured.²⁸ Anything deemed out-of-the-ordinary will trigger alerts, while everything considered to be unimportant will either be discarded or marked as low priority, thereby freeing up centralized resources to work on data of actual value.²⁸

For a hotelier, the CCTV security systems could be set up to alert a clerk that a VIP has stepped onto the property.

Using edge analytics and real-time stream processing engines, hoteliers could “analyze point-of-sales data as it is captured, and enable cross selling or up-selling on-the-fly, while reducing bandwidth overheads of sending all sales data to a centralized analytics server in real time.”²⁸

Edge analytics, of course, goes hand-in-hand with the Internet of Things—“the network of physical objects that contain embedded technology to communicate and sense or interact with their internal states or the external environment.”²⁹

BI + CRM + CX + IoT

The term “Big Data” has become a way-too-common and enormously prevalent term and it is being bandied about a lot in the world of IT these days because it has become a kind of catch-all for analytics, IoT, social media data, etc., etc.

Although not a comprehensive list, Big Data analytics techniques can include association, classification, cluster analysis, crowdsourcing, data fusion, data

mining, machine learning (ML), modeling, network analysis, optimization, predictive, regression, rule learning, special analysis, text analytics, time series analysis, amongst many, many others. Which techniques should a hotelier use? Well, that all depends on what type of data is being analyzed, the technology available to it, the skills of the business users, and the business problems it is trying to solve.

In chapter three, I break down how these analytical techniques would work in the concept of the customer journey, and I will specifically explain in what circumstances decision trees, time series, discriminant analysis, *K-means clustering*, and *K-Nearest Neighbor* processes, amongst others, should be utilized.

None of these techniques, however, will amount to anything if the underlying data environment isn't robust and properly cleansed; "junk in, junk out", as most analysts warn. The quality and quantity of the data gathered will be directly proportional to the accuracy of the predictive model. Enormous attention must be paid to ensure the data is prepped and cleansed, otherwise nothing of value will be achieved, no matter how fast and/or robust your analytics software might be able to crunch the underlying numbers.

In his seminal 2009 article for the *RFID Journal*, *That 'Internet o Things' Thing*³⁰, Kevin Ashton made the following assessment:

Today computers — and, therefore, the Internet — are almost wholly dependent on human beings for information. Nearly all of the roughly 50 petabytes (a petabyte is 1,024 terabytes) of data available on the Internet were first captured and created by human beings — by typing, pressing a record button, taking a digital picture, or scanning a bar code. Conventional diagrams of the Internet include servers and routers and so on, but leave out the most numerous and important routers of all — people. The problem is, people have limited time, attention and accuracy — all of which means they are not very good at capturing data about things in the real world. And that's a big deal. We're physical, and so is our environment. Our economy, society and survival aren't based on ideas or information — they're based on things. You can't eat bits, burn them to stay warm or put them in your gas tank. Ideas and information are important, but things matter much more. Yet today's information technology is so dependent on data originated by people that our computers know more about ideas than things. If we had computers that knew everything there was to know about things — using data they gathered without any help from us — we would be able to track and count everything, and greatly reduce waste, loss and cost. We would know when

things needed replacing, repairing or recalling, and whether they were fresh or past their best. The Internet of Things has the potential to change the world, just as the Internet did. Maybe even more so.

IoT technology costs are coming down, broadband's price has dropped, while its availability has increased, and there is a proliferation of devices with Wi-Fi capabilities and sensors built into them. Smart phone penetration is also exploding. 5G is rolling out worldwide. All of these individual technological advances were good for the IoT environment; together, however, they have created a perfect storm for it.³¹ With less than 0.1% of all the devices that could be connected to the Internet currently connected³¹, there is tremendous growth potential here and those who embrace it now should have the first mover advantage that could prove enormously valuable in terms of ROI over the long term.

For this book, I will consider CRM as a two-part process that allows a hotelier to track and organize its current and prospective customers, as well as to manage the endpoints of customer relationships through its marketing promotions. When done right, CRM systems enable data to be converted into information that provides insight into customer behavior and, from these insights, some form of behavioral influencing can occur.

Although widely recognized as an important element of most business' customer experience platform, there is no universally accepted definition of CRM. In his paper *Accelerating customer relationships: Using CRM and relationship technology*³², R. Swift defines CRM as an "enterprise approach to understanding and influencing meaningful communications in order to improve customer acquisition, customer retention, customer loyalty, and customer profitability." J. Kincaid adds that CRM is "the strategic use of information, processes, technology and people to manage the customer's relationship with your company (Marketing, Sales, Services, and Support) across the whole customer lifecycle."³³

In their paper *Customer Relationship Management: Emerging Practice, Process, and Discipline*³⁴, Parvatiyar and Sheth claim CRM is, "a comprehensive strategy and process of acquiring, retaining, and partnering with selective customers to create superior value for the company and the customer. It involved the integration of marketing, sales, customer service, and the supply chain functions of the organization to achieve greater efficiencies and effectiveness in delivering customer value."

In their comprehensive article on the subject, *Application of Data Mining Techniques in Customer Relationship Management: a Literature Review and Classification*³⁵, Ngai et al. argue that these varying definitions emphasize the importance of "viewing CRM as a comprehensive process of acquiring and retaining customers, with the help of business intelligence, to maximize the

customer value to the organization.”

In this book, we will consider CRM as a two-part process that allows a hotelier to track and organize its current and prospective customers, as well as to manage the endpoints of customer relationships through its marketing promotions. When done right, CRM systems enable data to be converted into information that provides insight into customer behavior.

The process of segmenting a market is deceptively simple; seven basic steps describe the entire process, including segmentation, targeting, and positioning. In practice, however, the task can be very laborious since it involves poring over enormous amounts of data, and it requires a great deal of skill in analysis, interpretation and some personal judgment.

Today, personalized web pages can be rendered during a web page load and elements of the page can take into account past purchase history, clickstream information, as well as a whole host of other personal customer details. In chapter four, I will delve into the how and why of these systems in deep detail, explaining both how website morphing works, as well as how advertisers should utilize the psychology of personalization in their marketing.

Data coming from mobile and social media sources like WeChat, Weibo, Facebook, YouTube, Twitter, YouKu, etc., tend to be highly unstructured, while data coming from CSVs, XML and JSON feeds are considered semi-structured.

NoSQL databases are also considered semi-structured, while text within documents, logs, survey results, and e-mails also fall into the unstructured category. Structured data coming in from the plethora of retail source systems, undoubtedly, can feed into a data warehouse, where it can be merged with unstructured data and then utilized in ways that are almost impossible for a normal relational DW to handle.

Highly structured customer data could be combined with unstructured data coming in from social media to reveal deep customer insights. Setting up JSON feeds for Twitter user accounts is a simple process and many other social media companies offer APIs that allow access to customer accounts. These are two-way systems as well, and the hotelier’s marketing department could include social media as a channel to connect with customers and potential customers.

How does a hotelier get a player’s WeChat, RenRen, Facebook, Twitter, Weibo, YouTube, or even Twitch account? Easy, just make the customer an offer he or she can’t refuse, and, in most cases, that offer probably wouldn’t have to be much more than a coupon for a percentage off their next purchase.

With quick and easy accessibility to a hotelier’s data, customer conversion rates can be improved, revenue can be increased, and customer churn can be predicted and, hopefully, mitigated as much as possible. Customer acquisition costs can also be lowered. By utilizing the complex web of customer data coming

in from several different channels — mobile, social media, customer loyalty programs, transaction data, e-commerce weblogs, sensors, amongst others — a hotelier can also work more productively.

As Kai Wähler explains in his article *Real-Time Stream Processing as Game Changer in a Big Data World with Hadoop and Data Warehouse*³⁶, “Stream processing is required when data has to be processed fast and/or continuously, i.e. reactions have to be computed and initiated in real time.” Wähler continues³⁶:

“‘Streaming processing’ is the ideal platform to process data streams or sensor data (usually a high ratio of event throughput versus numbers of queries), whereas ‘complex event processing’ (CEP) utilizes event-by-event processing and aggregation (e.g. on potentially out-of-order events from a variety of sources — often with large numbers of rules or business logic). CEP engines are optimized to process discreet ‘business events’ for example, to compare out-of-order or out-of-stream events, applying decisions and reactions to event patterns, and so on. For this reason multiple types of event processing have evolved, described as queries, rules and procedural approaches (to event pattern detection).”

Stream processing acts on real-time streaming data feeds, using “continuous queries” (i.e., SQL-type queries that operate over time and buffer windows).³⁶ With its ability to continuously calculate mathematical or statistical analytics on the fly within the stream, streaming analytics is an essential part of stream processing.³⁶ “Stream processing solutions are designed to handle high volume in real time with a scalable, highly available and fault tolerant architecture,” adds Wähler³⁶

“In contrast to the traditional database model where data is first stored and indexed and then subsequently processed by queries, stream processing takes the inbound data while it is in flight, as it streams through the server,” explains Wähler.³⁶ Stream processing can also connect to an external data source, thereby adding a whole new dimension to analytical processes. Think social media, geo-location, facial recognition, shelf sensor data, RFID inputs, or a whole host of other data streams.

Real-time stream processing is an integral part of this rapidly changing marketing environment and if hoteliers don’t join the real-time marketing world, they will certainly be left behind, I have no doubt.

For hoteliers, real-time streaming can help in the following ways:

- Customer Service:
 - Geo-locating a customer when he or she signs onto the hotelier’s Wi-Fi.

- Video analytics with facial recognition technology can spot and/or confirm a customer's identity and perhaps cross-reference him or her against a VIP list or known shoplifters.
- Social media customer service can cut down on normal customer service expenses, as well as connect with customers on the channels that they prefer.
- E-Commerce:
 - Clickstream analysis could allow personalized offers to potentially returning customer when they are browsing a hotelier's website.
- Human Capital Management:
 - Employee schedules can be adjusted in real time according to labor management's needs, as well as its predictive and anticipatory needs.
 - hoteliers can take the guesswork out of hiring employees by building templates that show what a model employee should possess in terms of skills and experience.
- Patron Management:
 - The ecommerce department can get more accurate attribution analysis — "the process of identifying a set of user actions ('events') that contribute in some manner to a desired outcome, and then assigning a value to each of these events"³⁷ — so that it understands which advertising is associated with which user, making it more quantifiable and, therefore, more actionable.
 - Customer Relationship Management (CRM) systems can add social media as a channel to feed targeted messages to only those customer who are most likely to respond to a promotion.
 - The amount of promotions available and channels through which to market through increases considerably as campaign lift can be assessed in terms of hours rather than in days or weeks.
 - Customer acquisition is accelerated because business users throughout can quickly be questioned on the following:
 - Which combinations of campaigns accelerate conversion?
 - What behavior signals churn?
 - Do web search key words influence deal size?
 - Which product features do users struggle with?
 - Which product features drive product adoption and renewal?
 - What drives customers to use costly sales channels?

- Customer interaction data can quickly be turned into business opportunities.
- Powerful recommendation engines can ingest data from a multitude of sources and then be made available to frontline staff, who can react in near real time.
- Security:
 - Uncover AML activity.
 - Spot shoplifters.
 - Spot VIPs.

How can a hotelier utilize IoT technology? IoT sensors can be used for smart parking or smart lighting. They can also be used for silo stock calculation — measuring the emptiness level and weight of goods — as well as waste management, and perimeter access control tools.

Liquid presence detection in places like data centers can help ensure the integrity of the company's IT backbone. For the hotelier, IoT can help with supply chain control, NFC payment systems, inventory shrinkage, as well as smart product management. For the hotelier's logistics department, IoT aids quality of shipment conditions, item location, storage incompatibility detection, and fleet tracking.

Combining IoT data together with other structured and unstructured data isn't easy, though. Previous attempts at broad-based data integration has forced users to build data sets around common predetermined schema, or a unifying data model, but this becomes impossible when unstructured and semi-structured data are included in the mix.

Revenue Optimization

According to Nguyen Hanh Huyen My in her thesis *Optimizing the Role of Hotel Front Office Staff in Modern-Day Revenue Management*³⁸, “The concept of Revenue Management refers to a planning system, especially for capacity-constrained service industries such as airlines and hotels, to optimize revenue and profit from a fixed supply of perishable goods or services.” Miss My builds upon the revenue management body of work of writers like Ivanov³⁹, Kimes & Wirtz⁴⁰, and Padhi & Aggarwal.⁴¹

“In practice, revenue management is an umbrella term for numerous strategies and tactics, including but not limited to pricing strategies, to allocate the right (proportion of) capacity to the right end-user at the right price at the right time,” says My.³⁸ “These strategies,” contends My, “are developed based on an understanding and forecast of demand and behavior of different customer segments with different levels of willingness to pay.”³⁸

For the hotel businesses, revenue management “has traditionally implied short-

term techniques of varying room rates according to projected demand and supply patterns.”³⁸ For instance, Orkin proposed “that when demand is high, maximize room rates, restrict availability of low-rate categories, and give priority to groups that are willing to pay higher rates; when demand is low, maximize room sales, open all rate categories and provide promotional rates to price-sensitive customers;”⁴² pretty standard stuff. However, some significant shifts of focus in revenue management have been discussed in more recent literature, such as in Kimes’ *The Future of Hotel Revenue Management*⁴³, “which suggests a shift from short-term revenue management tactics towards a more strategic and holistic revenue management approach, which would involve all revenue centers in a hotel beyond the guestrooms.” Several integrated resorts are already following this practice when they take a factor like a customer’s gaming play/value into account. In their paper *Revenue Management: Progress, Challenges, and Research Prospects*⁴⁴, Wang et al. propose developing a business-wide revenue management culture, as well as a shift from a revenue-centric approach to a customer-centric approach.

Before embarking on a deep analysis of the role of the hotel front office staff in practicing revenue management, a review of the functions of the officially designated revenue manager or revenue management team is necessary.³⁸ Ivanov infers that revenue managers or revenue management teams are crucial to the success of a revenue management system.³⁹ My, Ivanov and Wang et al. argue that, whereas revenue management specialists can have different job descriptions, they usually come from the hotel management board, the reservation department, the sales and marketing department, as well as from the front office staff.^{38 39 44} Since, Padhi and Aggarwal believe, market segmentation, timing (matching demand and supply) and pricing are considered the bedrock of revenue management⁴¹, the revenue management team’s functions “center around forecasting each market segment’s demand, setting and adjusting room rates, and managing room inventory and booking channels.”⁴⁴ Decisions such as “how many rooms should be available for each rate, whether to take transient guests or business groups, when a rate restriction is needed, or when a discounted rate would be more profitable, typically rest with a hotel’s revenue management team.”³⁸

The revenue management team can optimize their decision-making process by using various revenue management techniques, several of which I detail later in this book, and “based on historical and current data from the hotel’s property management system (PMS), other departments, and their own insights or judgement, such as predicted occupancy, no-shows or cancellations for a given period.”³⁸

My’s research attempts to answer “the question as to why involving and empowering the front office team in revenue management activities is important to the success of a hotel’s revenue management program.”³⁸ My sees

this primary question being broken down into the following specific research questions³⁸:

- (1) How are hotel companies tapping the potential of their front office staff to practice revenue management?
- (2) “In what ways can front office staff contribute to their hotel’s revenue management’s strategies and integrate revenue management’s practices into their daily working routine?”³⁸
- (3) “How can the front office team influence a hotel’s approach to a more holistic and customer-centric revenue management model?”³⁸
- (4) “How can front office staff be trained and incentivized to become efficient revenue generators within the constraints of their conventional task profile?”³⁸

In their *Hotel Revenue Management – A Critical Literature Review*⁴⁵, Ivanov and Zhechev claim that modern hotel RM systems have acknowledged a broader range of profit sources, or “revenue centers”, which encompass both rooms and other service outlets such as restaurants, bars, casino, spa, room service, and meeting facilities. “Connected with the *hotel revenue centers* element in the conceptual framework, ‘total RM’ is one of key concepts or trends that are defining the future of RM practices.” Says My.³⁸ While RM has focused largely on the Rooms Division as a hotel’s main source of revenues, the concept of total RM brings into focus the need to optimize all revenue streams within the hotel beyond the guestrooms,” she argues.³⁸

These and other questions will be discussed and answered generally throughout this book and more specifically in deep detail in chapter seven.

Personalization

Successful mobile advertising requires three things — reach, purity and analytics; reach can be fostered by accessing accounts through multiple platforms like blogs, geofencing applications, OTT services, mobile apps, QR codes, push and pull services, RSS feeds, search, social media sites, and video-casting, amongst others.⁴⁶ “Purity” refers to the message and its cleanliness; if the data is unstructured and untrustworthy it is, basically, useless and data governance is paramount for real-time advertising to work properly.⁴⁶ The third ingredient, analytics, “involves matching users’ interests – implicit and explicit, context, preferences, network and handset conditions – to ads and promotions in real time.”⁴⁶

Knowing what might interest a consumer is only half the battle to making the sale and this is where customer analytics shines. Customer analytics have evolved from simply reporting customer behavior to segmenting a customer based on his or her profitability, to predicting that profitability, to improving

those predictions (because of the inclusion of new data), to *actually manipulating customer behavior* with target-specific promotional offers and context-aware marketing campaigns. These are the channels that real-time thrives in and this is where a hotelier can gain a powerful competitive advantage. Think about how much more powerful a marketing offer would be if it was sent to a customer as he was entering a retail store.

Composing the marketing message, however, is probably the easiest part of the process. In its *Delivering New Levels of Personalization In Consumer Engagement*⁴⁷, *Forrester Research* found that survey participants believed that personalization had the potential to increase traffic, raise customer conversion rates, and increase average order value. Surveyed marketers felt that personalization capabilities could improve a variety of business metrics, including customer retention (75%), lifetime customer value (75%), and customer conversion rates (71%).⁴⁷

Today, “Personalization” is becoming the optimum word in a radically different business environment and even though this personalization comes at a price — privacy — it is a price most consumers seem more than willing to pay if a recognized value is received in return. For the hotelier, “personalization” requires an investment in software analytics, but hoteliers should recognize that this price must be paid because highly sophisticated consumers will soon need an exceptional shopping and entertainment experience to keep them from switching to a competitor. This kind of personalization also gives the hotelier powerful information to build optimization models that can reduce cost and increase productivity down the line.

These survey participants see email, call centers, corporate websites, mobile websites and physical locations (such as stadiums, sporting venues and hospitality sites) as today’s key customer interaction channels, but any future marketing efforts to reach them should be “focused on mobile websites, applications, and social media channels.”⁴⁷ hoteliers should keep these channels in mind while devising their customer experience (CX) campaigns.

Understanding customer-specified preferences is imperative for personalization; “80% of marketing executives currently use them in some or all interaction channels. In addition, 68% of marketers personalize current customer interactions based on past customer interaction history. Other commonly used personalization methods used by nearly 60% of firms in some or all of their interaction channels are based on the time of day or day of the week of customer interactions.”⁴⁷ *Forrester Research* states that the difficulties of personalization include⁴⁷:

1. Continuously optimizing campaigns in response to a customer’s most recent interactions.

2. Optimizing content or offers for each person by matching identities to available products, promotions, messages, etc.
3. Creating a single repository containing structured and unstructured data about a consumer.
4. Delivering content or offers to a customer's chosen channel in real time for purposes of conversion.
5. Analyzing all available data in real time to create a comprehensive, contextually sensitive consumer profile.

The executives pooled by *Forrester Research* expected there to be a “huge rise in personalization using consumer’s emotional state, social media sentiment, and context”⁴⁷ as well. “Only 29% of respondents claim today to use inferences about the consumer’s emotional state in some or all channels. But 53% expect to do this in two to three years’ time.”⁴⁷ *Forrester’s* report adds that, “Only 52% of marketers currently use sentiments that consumers express in social media to personalize interactions today, but fully 79% expect to do this in two to three years. In addition, only 54% capitalize on the consumer’s current contextual behavior, but 77% expect to do so in two to three years’ time.”⁴⁷

Today, mobile apps, mobile commerce, mobile chat, and mobile gaming have revolutionized the way people do business, seek entertainment, and gamble. Mobile commerce has evolved into what has become known as “omni-commerce”, a seamless approach to selling that puts the shopper’s experience front and center, giving that shopper access to what he or she wants through these multiple channels.

Mobile marketing via Bluetooth, OTT, SMS, MMS, CSC and/or QR codes has become some of the most effective marketing around, while social media has turned the normal customer channels — and even the idea of marketing — on its head.

By accessing the web through a wireless connection, mobile users can surf the Internet as seamlessly as if they were using a PC at home. At the touch of a button, photos and videos can be uploaded seconds after they are taken, then shared with the most intimate of friends or the most distant of peoples. Live streaming channels allow cheap video streams that can be viewed almost anywhere on the planet as well.

The mobile platform is so robust and it has so much capability that if a marketing executive had been asked to dream up the perfect device to connect to, market to, and sell its company's products and/or services to its customers and potential customers, he could hardly have come up with something more superior to it. One of mobile’s best features is its ability to cross-pollinate the marketing message through several mediums, which include social media — and I will expound upon this throughout the book.

In its paper *5 E-Commerce Marketing Prediction For the Next 5 Years*⁴⁸, the B2C

marketing cloud company Emarsys argues that, “Smart marketers need real-time insights into mobile marketing performance in order to understand how end users are (or aren’t) engaging with their mobile marketing programs or applications.”

Emarsys adds that⁴⁸:

“We will move from a world focused on designing for mobile as a secondary approach, to designing for mobile first. E-commerce organizations will finally fully alter the online shopping experience from responsive to completely mobile experiences. This mobile-only approach will be different, as it won’t just be a smaller design but will also include more responsive websites and shopping experiences. The mobile-only experience will lead to fully tailored shopping experiences primarily designed for engagement on a mobile device.”

Emarsys adds that, “Within the next five years, consumers will be able to swipe right, up, and down to make their selections, all via their mobile devices. And when the consumer is ready to complete the transaction? Easy. It just takes one click; the purchase is complete, and the items arrive at the consumer’s house.”⁴⁸

The stakes couldn’t be any higher. In its paper, Emarsys concludes that, “In an effort to remain competitive and innovative in today’s digital and always-connected world, marketers should continually be piloting and testing mobile strategies with a small subset of their users or target audience.”⁴⁸ However, “If a brand slows mobile innovation, or pauses testing and optimization for mobile devices, the brand is risking the loyalty of current users as well as jeopardizing new user acquisition,” warns Emarsys.⁴⁸

Much more than a wireless transmitter optimized for voice input and output, a mobile phone, a tablet, or a phablet is an always-on, anytime, anywhere marketing and sales tool that follows a mobile user throughout his or her digital day.⁴⁸ It is also an entertainment, CRM, and social networking tool, which makes it, potentially, the most powerful device in the history of marketing and customer relations.⁴⁸ The mobile device is, literally, a marketing tool that can — and usually is — personalized by its owner, and it is within reach of that owner almost every hour of every single day; in essence, a marketer’s dream.⁴⁸

Push technology even puts the power of communication into the hands of the marketer, allowing hoteliers to both initiate contact with an opted-in customer and then sending him or her a wide variety of products and content. Many hoteliers now have mobile apps in which they can connect to their patrons. As long as a customer is opted into a CRM system, a hotelier can foster a two-way dialogue with that customer and this dialogue can grow more sophisticated over time as more is learned about the customer’s wants, desires, habits, and needs.

Push technology has moved from clumsy blanket SMS blasts to the sophisticated use of mobile apps that allow customers to interact with their personal patron points balance information.

Going Social

One of the most important elements of social media is its inter-connectedness. An upload to YouTube can go viral through Twitter, Facebook, LinkedIn, WeChat, WhatsApp, Youku, as well as a whole host of other social media and mobile media platforms instantly.

Within seconds, something uploaded onto a social media website in the US can end up on a mobile application in China or Japan or Korea, or almost anywhere else in the world that has mobile or Wi-Fi access. We are truly living in an interconnected world and this interconnectedness is creating a whole host of ways to market a product, a service, or even a Hotel.

Social media will also be explored in depth throughout this book. It is quite ironic that, in one sense, engaging in social media can be one of the most anti-social behaviors one can do; sitting alone in a room, typing away on a computer was once the realm of solitary computer geeks, but it has now become an activity that most people engage in almost every single day. Perhaps this is because human beings are, first and foremost, social beings and we crave a connectedness that social media offers, even if it is only a virtual connection. The use of social media on mobile has expanded its reach exponentially as well, making it the perfect place to market a hotel's rooms, its restaurants and perhaps on-property shops.

It should be of no surprise that one of the greatest inventions of the twentieth century – the internet – would become the watering hole of the twenty-first century; a place where human beings can quickly gather to socialize and connect with friends, family members, and acquaintances in a way that was almost inconceivable only 20 years ago. Smart hotel marketers can tap into this interconnectedness to get out their marketing message far and wide.

Almost a decade ago, “most consumers logged onto the internet to access e-mail, search the web, and do some online shopping. Company websites functioned as vehicles for corporate communication, product promotion, customer service, and, in some cases, e-commerce. Relatively few people were members of online communities”⁴⁹ and “Liking” something had no social context at all. How times have changed.

In his article *Understanding social media in China*⁴⁹, C.I. Chui argues that the secret to social media's growth is right there in its name — “Social” — as in the fundamental human behavior of seeking “identity and ‘connectedness’ through affiliations with other individuals and groups that share their characteristics,

interests, or beliefs.”⁴⁹ For Chui, “Social media taps into well known, basic sociological patterns and behaviors, sharing information with members of the family or community, telling stories, comparing experiences and social status with others, embracing stories by people with whom we desire to build relations, forming groups, and defining relationships to others.”⁴⁹

“Today, more than 1.5 billion people around the globe have an account on a social networking site, and almost one in five online hours is spent on social networks — increasingly via mobile devices.”⁴⁹ In little more than a decade, social technology has become a cultural, social, political and economic phenomenon.⁴⁹ Most importantly, “hundreds of millions of people have adopted new behaviors using social media — conducting social activities on the Internet, creating and joining virtual communities, organizing political activities”⁴⁹, even, as with the case of Egypt’s “Twitter Revolution”, toppling corrupt governments.

Social technologies allow individuals to interact with large groups of people at almost any location in the world, at any time of the day, at marginal, if not no cost at all.⁴⁹ With advantages like these, it is not surprising that social media has become so widespread that almost one-in-four people worldwide uses it. It is actually surprising that the figure is so low, although with mobile and 5G technology rolling out in some of the most remote locations on earth, that figure is sure to rapidly climb over the next few years.

Businesses are also quickly recognizing the power of social media. In his article *The social economy: Unlocking the value and productivity through social technologies*⁵⁰, Chui et al. argue that, “Thousands of companies have found that social technologies can generate rich new forms of consumer insights — at lower cost and faster than conventional methods.”⁵⁰ In addition to this, businesses can watch what “consumers do and say to one another on social platforms, which provide unfiltered feedback and behavioral data (i.e., do people who “like” this movie also “like” this brand of vodka?).”⁵⁰ This can be a treasure trove of company competitive analysis and I believe hoteliers would profit from spending more on these types of social media listening efforts. In chapter five and seven, I provide information on platforms and methodologies in which to utilize social media as a powerful marketing channel.

Social technologies also “have enormous potential to raise the productivity of knowledge workers,”⁵⁰ a very significant development in a world where knowledge workers are becoming highly sought-after assets. “Social technologies promise to extend the capabilities of such high-skill workers (who are increasingly in short supply) by streamlining communication and collaboration, lowering barriers between functional silos, and even redrawing the boundaries of the enterprise to bring in additional knowledge and expertise in ‘extended networked enterprises.’”⁵⁰

In this book, I will use Chui et al.’s definition of “social technologies” as the

“products and services that enable social interactions in the digital realm, and thus allow people to connect and interact virtually.”⁵⁰ These include⁵⁰:

“A message to be communicated (a tweet or a blog), adding content to what is already online, or adding information about content (‘liking’ a piece of content). Content creation also includes performing an action that an individual knows will be automatically shared (e.g., listening to a piece of music when you know your music choice will be displayed to others). Social technologies allow anyone within a group to access and consume content or information. They include technologies that also have been described as ‘social media,’ ‘Web 2.0’ and ‘Collaboration tools’.”⁵⁰

In China, users spend more than 40 percent of their time online on social media websites, a figure that is expected to continue its rapid rise over the next few years.⁴⁹ “This appetite for all things social has spawned a dizzying array of companies, many with tools that are more advanced than those in the West: for example, Chinese users were able to embed multimedia content in social media more than 18 months before Twitter users could do so in the United States.”⁴⁹

Companies like WeChat are revolutionizing social networks, adding malls as part of their platforms, while Taobao has teamed up with Weibo to allow instant commentary and blogging on purchased items. yy.com inverted the concept of reality TV, by taking a singing competition and broadcasting it over the Internet, while allowing viewers to directly remunerate the contestants.

China is also making big strides in AI. The big four as they are called – Alibaba, Baidu, WeChat, Ten Cent – are working on some very cutting-edge AI technology that will probably be replicated in the west shortly. The Chinese characters for “Artificial Intelligence” are actually “人工智能”, the first two of which, amazingly, look like the acronymed version of the English AI; perhaps if there’s some kind of international human cosmic convergence coming, AI will be leading the way...

Facebook might be the biggest social network in the world, but its penetration in China is minimal and it will probably remain so for a long time to come, not only because China sensors Facebook, but also because Facebook’s Chinese competitors are actually creating some very technologically savvy products.

WeChat, in particular, has proven to be highly successful, and it is growing rapidly, both in China and throughout the rest of the world, but companies like QQ, Weibo, Hexun, Youku, Huya, Jiebang, Qieke, Ushi and Ku6 have all experienced exponential growth. With a base of 1.3 billion people, it isn’t too hard for services that catch on in China to rapidly get to tens of millions of users within a year or even sooner.

In August 2017, Steven Millward noted in his article *Facebook's new China app is reliant on WeChat*⁵¹ that Facebook launched a photo-sharing app to test the waters in a market that Facebook has been locked out of since 2009. As Millward writes, "Facebook's new app, a China-segregated photo-sharing service called *Colorful Balloons*, is reliant on WeChat for its viral growth.⁵¹ The app is not connected to Facebook and it cannot tap into a user's Facebook contacts.⁵¹ "Hit the WeChat button, and you will send your friend an invite to your photo album within Facebook's new app. It's made up of an album preview plus a QR code, sent via a WeChat message, which takes your buddy either to the Colorful Balloons app or to the iOS App Store," notes Millward.⁵¹

There is an old adage in social media marketing that says, "Content is king" and, with social media, that adage has never been truer. Those destined to succeed in the social media sphere won't be the ones with the most content; they will be the ones with the best and most searchable content. And that content will drive eyeballs unlike any other form of marketing in the history of advertising. To succeed in this new environment, hoteliers should think of themselves first and foremost as creators and syndicators of content.⁵² But "If content is king, then 'conversion is queen,'" argues John Munsel, CEO of Bizzuka, and he has an important point there; social media is about converting customers, driving eyeballs, and building channels to reach them.

Starbucks has even also developed a metric it believes quantifies the value of its social media marketing in terms of media spend — the "company's 6.5 million Facebook fans are worth the equivalent of a US \$23.4 million annual spend, according to calculations by social media specialists Virtue, reported in *Adweek*."⁵³

Virtue claims that, on average, "a fan base of 1 million translates to at least \$3.6 million in equivalent media over a year, or \$3.6 per fan. Virtue arrived at its \$3.6 million figure by working off a \$5 CPM, meaning a brand's 1 million fans generate about \$300,000 in media value each month."⁵³ That's quite a significant amount of money and, if a coffee company can find success in social media, hotel companies should be able to get a similar, if not higher, ROI.

Chapter five delves into the world of social media, including a discussion of Kaplan and Haenlein's six types of social media.⁵⁴ In their influential article *Users of the world, unite! The challenge and opportunities of Social Media*⁵⁴, Kaplan and Haenlein show how all social media websites can be broken down into one of six different types; collaborative projects; blogs and micro-blogs; content communities; social networking sites; virtual game worlds; and virtual social worlds.⁵⁴ Anyone devising a social media marketing plan for a hotelier should find this chapter particularly helpful in understanding how to use each separate channel and platform, both singularly and combined together.

Google Analytics defines six sources of traffic – direct, referral, paid search,

display advertising, social, and email and I will detail how AI can utilize some of these.⁵⁵

Private messaging platforms such like Messenger, WeChat, WhatsApp, Snapchat in Western markets and Line, Viber, and Telegraph in Asian countries create click-through traffic from links shared in those networks, which go under the Google Analytics radar. Today, a company's social media marketing plan must include the dark social channels like WhatsApp, Facebook Messenger, WeChat, LINE, Viber, and Telegraph, et al.

In his *Dark Social: We have the whole history of the web wrong*⁵⁶, Alexis Madrigal of *The Atlantic* coined the term "Dark Social" to describe these channels. Madrigal claims that the "vast trove of social traffic is essentially invisible to most analytics programs." "It shows up variously in programs as 'direct' or 'typed/bookmarked' traffic, which implies to many site owners that you actually have a bookmark or typed in www.theatlantic.com into your browser. But that's not actually what's happening a lot of the time. Most of the time, someone Gchatted someone a link, or it came in on a big email distribution list, or your dad sent it to you," claims Madrigal.⁵⁶

Gilliland calls dark social today's "biggest missed opportunity in marketing"⁵⁷ and these are platforms that are growing bigger and more important by the day. hoteliers need to tap into this opportunity quickly and I will provide examples of how to do that in chapters four and five.

I have also added a section that discusses marketing virality and lays out Kaplan and Haenlein's feeling that "viral marketing is as much an art as it is a science."⁵⁸ Companies wishing to go viral should firmly understand that, even with the best laid plans, there's a fair amount of luck in it.

Capacity Management

In chapter six, capacity management and planning take center stage. Today, a single amusement park ride can cost more than the production cost of a Hollywood blockbuster movie.⁵⁹ A cruise ship in the Caribbean Princess class recently cost approximately US\$500 million, with a berth cost of US\$200,000.⁶⁰ The value of a 150-room hotel can be as much as £13.6 million, with a cost per square meter of £1,300.⁶¹ However, as Pullman and Rodgers lament in their *Capacity Management for hospitality and tourism: a review of current approaches*⁶², "enterprises often make important capital investment decisions without taking advantage of the full range of sophisticated quantitative tools developed in the field of operations management." There are several capacity models that represent a valuable and often untapped resource for firms in the tourism and hospitality industries to use and I will detail them throughout chapter six.⁶²

In her article *Connectivity helps hotels manage energy use*⁶³, Esther Hertzfeld writes that, “Connectivity is at the forefront of many technologies these days and with good reason. Artificial intelligence can greatly help hotels manage their energy costs by automating tasks that traditionally were performed by property staff.” For example, the obvious one: “energy-management thermostats automatically set temperatures back in unoccupied rooms to save energy.”⁶³ Machine learning is also used “to understand how quickly a guestroom can be heated or cooled at any given time in order to recover to the guest’s preferred temperature in a predetermined amount of time.”⁶³

“Integrated connectivity will continue to evolve and will allow hotels to manage energy costs more precisely with greater ease and convenience than ever,” said TJ Wheeler, VP of marketing and product management at Friedrich Air Conditioning.⁶³ “However, guest expectations may well play into this as well,” said Wheeler.⁶³ “As guests become accustomed to smart devices in their own homes, they may expect to be able to control room temperature, TVs, lights and more through a smart device or app,” added Wheeler.⁶³

“Energy-management technologies can reduce hotel energy consumption 25 percent to 35 percent by automatically responding to guestroom occupancy patterns and adjusting the thermostat to conserve energy for heating and cooling needs when a guest is not in the room, which, according to industry statistics, is about 50 percent of the time in most hotels,” explains Hertzfeld.⁶³

“Companies are making significant efforts to improve building automation and control systems to optimize performance as well as increase guest comfort, said Ryan Gardner, product marketing manager for Honeywell/Inncom.”⁶³ “However, it is important to keep in mind that as Internet of Things systems proliferate in hospitality and the number of property sensor networks increase, the complexity of managing these systems will also increase,” argues Hertzfeld.⁶³

“Gone are the days when a straightforward mechanical fix was all that was needed to solve an efficiency or comfort issue,” said Gardner.⁶³ “For this reason, Honeywell is working on making the management of these complex systems easier for property staff using IoT. For too long, technology vendors have focused on providing advanced technology offerings, but have not made these systems easy to manage, or even to be self-managed,” he added.⁶³

“Gardner said utilizing systems that provide predicative analytics will help hoteliers identify when the system is not performing optimally.”⁶³ “The best systems monitor real-time savings and offer insights on how an inefficient system can get back on track,” contends Hertzfeld.⁶³

“The rise of Amazon Echo, Google Home and other devices can greatly help hoteliers because they eventually will allow guests to control all the devices in their room via voice command,” explains John Attala, marketing director at Verdant Environmental Technologies.⁶³ “Verdant is currently testing technology

to allow guests to adjust the temperature in the room without getting out of bed. Guests will also eventually be able to order room service without having to pick up the phone,” he said.⁶³

“The ability to include a developed application programming interface into the guest loyalty app gives the hotelier the ability to integrate mobile key, temperature control, lighting control and other control features tied to the guest preferences or patterns,” said Chad Burrow, director of sales at Telkonet.⁶³

“In other words, when the room recognizes my mobile key, the room can automatically set preferred temperature, lights on or shades open, and the TV on with a welcome message to me personally,” said Burrow.⁶³ “Combine this with a geofencing component and the room will not only revert to an unoccupied status with lights off, temperature set-back, but start reverting back to occupied when I am back in range.”⁶³

“Sometimes the pursuit of efficiency gives hoteliers and technology vendors a black eye if they give the illusion that these solutions sacrifice guest comfort for profits,” argues Hertzfeld.⁶³ “Nothing could be further from the truth when hoteliers deploy systems and technologies,” Gardner said.⁶³ “It can be easy to forget that the focus of hospitality is on the guest,” he adds.⁶³

“Many guests are concerned with energy usage and the impact that energy consumption has on the environment so being at the forefront in terms of reducing energy usage is always a good thing,” said Wheeler.⁶³ “Part of that is perception — that the hotel property is a good corporate citizen but also that it shows responsibility in the use of resources,” he said.⁶³ “The best solutions will balance reduced energy consumption with optimum comfort and convenience for the guest.”⁶³

More and more guests are sustainability focused consumers, agrees Burow.⁶³ “Leadership in Energy and Environmental Design certification is one of many ways to market a sustainable property,” argues Burow.⁶³ “A hotel’s loyalty app is also a great place to put the power of sustainability into the guests’ hands with proper marketing,” said Burow.⁶³

“Common areas are often forgotten as a source of potential energy savings,”⁶³ contends Hertzfeld, adding “Hallways, ballrooms, gyms, spas and pools are all areas where hotels can reduce energy consumption.”⁶³ “Meeting rooms are prime candidates for energy savings because they generally have larger surface areas than guestrooms and are used intermittently,” says Attala.⁶³ “Burow believes common spaces like ballrooms can benefit by utilizing intelligent plug loads and switches. The same can be said for office spaces, kitchens and other back-of-house spaces.”⁶³

“Zone cooling and heating systems are ideal for gyms and common areas that are extremely busy in the morning and evening hours but see a reduced number

and frequency of guests during the daytime,” says Gardner.⁶³ “They operate quietly and can be part of a multizone system where each unit can be independently controlled. They are also very efficient in both cooling and heating mode.”⁶³

Hotel kitchens can be big energy-wasting areas as well.⁶³ “With the big commercial appliances working continuously to prepare breakfast, brunch, lunch and dinner for hundreds of guests on a daily basis, the final electricity bill can be quite discouraging,” Hertzfeld.⁶³

The Future

My hope is this book can be a blueprint for a hotelier to step into the AI, Big Data, CX, IoT, ML, predictive analytics world, so that it can both understand its customers on a truly intimate level and also shape the experiences of those customers so that a healthy ROI can be extracted from any investment.

Every hotelier must ask the question: “When will we reach the point of diminishing returns?”, and “Where does the incremental cost of improved performance equal or exceed the incremental value created?” Having a data driven organization is imperative in today’s world of demanding customers, who expect highly sophisticated technology to be available to them 24 hours a day, seven days a week, 365 days a year.

When it comes to analytics and Big Data, Caesars was the first casino company to collect and analyze data for Customer Intelligence (CI) purposes and, since the inception of its Total Rewards programme, the company has grown from “being able to trace the journey of 58% of the money spent in their hotels to 85%.”⁶⁴ Caesars also credits the widespread adoption of Big Data analytics as the driving force behind its rise from an “also ran” chain to one of the largest casino groups in the U.S.⁶⁵

In chapter seven, I also attempt to create a holistic view of how the hotelier of the future — *The A.I. Hotelier* — would operate. I have added some real-world examples of how a hotelier IT department would build an A.I. system that could surface information from facial recognition cameras, angel eye and POS systems, geo-locating devices, on-floor patron card swipes, etc., etc. This data would quickly become actionable intelligence once it is put into the hands of the front-line staff.

In their *MIT Sloan Management Review* article *Winning with AI*⁷, Ramsbotham et al. provide the following caution:

“Most AI success stories focus on improving existing business processes, whether in sales, marketing, pricing, servicing, forecasting, manufacturing, or the like. But these

improvements are comparable to improving the gas mileage of combustion engine vehicles in an era of new transportation possibilities. Business executives need to consider how they can reinvent and reimagine many of those processes in the context of what AI enables. This is where AI's true potential will emerge: not in doing the same thing better, faster, and cheaper but by doing new things altogether. This is where AI will disrupt industries the most."

"As business leaders look to the future, they must also carefully consider how AI may affect their talent strategy," warn Ramsbotham et al.⁷ "In most companies, the skill sets and success profiles of the workforce (and the talent pools from which they will come) will be materially different in the next decade or two than they are today; the effect of this change on a company's long-term HR strategy will be nothing short of massive," the writers note.⁷

One thing is certain, Ramsbotham et al. argue, "If AI initiatives are not core to a company's business strategy, they are unlikely to create meaningful value and scale."⁷ On an ending note, the writers argue that, "if a company's current business strategy ignores AI as a risk or as an opportunity, it probably needs revisiting."⁷

Big Data can either provide a useful treasure trove of information or it can release a Pandora's Box full of pain. It can certainly be either one but going down the Big Data road requires a commitment that is all encompassing and difficult to implement. State of the art technology is required and that always means the potential for severe bumps in the road along the way. However, it is a road that must be traversed as today's consumer have become highly sophisticated and they demand a level of personalization for their continuing patronage; if a company's marketing efforts aren't personal enough, these consumers will find another company that will provide the level of service they insist upon.

Throughout the book, I will try to avoid what has become known as "wishcasting", a useful term that the field of meteorology has recently given us. As Rob Tracinski explains in his article *How Not to Predict the Future*⁶⁶, "It started with the observation that weathermen disproportionately predict sunny weather on the 4th of July and snow on Christmas Day. Their forecasts are influenced not just by the evidence, but by what they (or their audience) want to hear." The writer of any book that delves into current and future technology will, obviously, be susceptible to wishcasting, but I will try to temper my enthusiasm and add a dash of skepticism to all I write here.

I will also try to avoid "Zeerust" — "The particular kind of datedness which afflicts things that were originally designed to look futuristic."⁶⁷ Taken from *The Meaning of Liff* by Douglas Adams, TV Tropes explains it this way: "datedness behind zeerusty designs lies in the attempt of the past designers to get an

advantage over the technology of their time, only to find out that more mundane designs are actually far more efficient if advanced engineering and craftsmanship are used on them.”⁶⁷

In his *100+ Hotel Trends to Watch in 2020*⁶⁸, Jordan Hollander outlines 100+ trends that he believes will radically alter the hotel and IR landscape. Hollander breaks the list up into nine overarching themes, including⁶⁸:

1. Smart Rooms
2. Going Green
3. Changing Workforce
4. Alternative Accommodations
5. Technology
6. Traveler Preferences
7. Hotel Business
8. Hotel Design
9. Globalization

I will explain how hoteliers can implement these technologies and themes throughout this book, with detailed and specific examples, including naming companies that are leading in their particular fields. I will also offer my honest assessment of the technology I discuss, trying to be as agnostic and objective as possible. Personally, I prefer not to go down rabbit holes of technology that, while proving to be quite colorful, exciting and interesting, really lead nowhere, so I will try to point out paths that I think advisable to both take, as well as those not to take, always keeping a firm eye on the hotelier company’s financial bottom line.

Although the focus of this book is the hotel industry, some examples I provide are for industries other than the hospitality. Many of the business use cases I discuss won’t be from the hospitality industry because there are no few cases, but explanations of how they are being utilized in the casino, retail, property management, and advertising industries will still be relevant for a hotelier executive, I believe.

Although this book was written for hospitality executives mostly in the IT and analytics space, they might view the following story from *The Economist* as instructive. Bartleby’s article *What businesses can learn from the arts*⁶⁹ describes a unique MBA class visit at Oxford’s Saïd Business School. As Bartleby explains: “Some of the students had to try conducting the choir. The first to take the challenge was a rather self-confident young man from America. It didn’t take long for him to go wrong. His most obvious mistake was to start conducting without asking the singers how they would like to be directed, though they had the expertise and he was a complete tyro.”⁶⁹

“The session, organised by Pegram Harrison, a senior fellow in entrepreneurship, cleverly allowed the students to absorb some important leadership lessons. For

example, leaders should listen to their teams, especially when their colleagues have specialist knowledge. All they may need to do, as conductors, is set the pace and then step back and let the group govern itself,” says Bartleby.⁶⁹

“It was noticeable, too, that the choir managed fairly well even if the conductors were just waving their batons in an indeterminate fashion. The lesson there, Mr. Harrison said, was that leaders can only do so much damage — provided they do not attempt to control every step of the process. The whole exercise illustrated it is possible for a lesson to be instructive and entertaining at once,” concluded Bartleby.⁶⁹ This is a good lesson for executives in a business as complicated as IT and analytics, which requires employees highly skilled in extremely unique subjects, whose work often needs to be augmented by outside consultants who are skilled in even more unique aptitudes.

A modern full-scale symphony orchestra consists of approximately one hundred permanent musicians, including 1st violins, 2nd violins, violas, cellos, double basses, flutes, oboes, clarinets, bassoons. In theory, all woodwind players are expected to be able to play all auxiliary instruments in addition to their main instrument, something many an IT person can relate to. Furthermore, there is a horn section that includes trumpets, trombones, a tuba, a kettledrum player, several percussionists, a harp or two and a keyboard player.

Saxophonists, guitarists, bass oboists, and synthesizer players are brought for special projects, kind of like how outside consultants can be brought in to add to an IT team to add something the company lacks and, hopefully to create a fuller harmonic whole. An orchestra is an excellent analogy for an IT department as it contains so many singular pieces that must work together – in concert, if you will – to produce something that is, at times, almost magical.

In French, “ROI” (or “Roi” more precisely) literally means “King” and in this book, ROI is king; every piece of technology I discuss will be looked at through the lens of ROI. As I detail in this book, positive ROI can be created with AI and machine learning, all forms of analytics, marketing, and social media, amongst other things. Detailed examples will be provided throughout.

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CHAPTER TWO: PERSONALIZATION

“Personalization is table stakes for today’s hoteliers, who are increasingly competing to be relevant in the hearts and minds of shoppers.”

~Giselle Abramovich, Adobe

Overview

Today, “Personalization” — the process of utilizing geo-location, mobile app, Wi-Fi, and OTT technology to tailor messages or experiences to an individual interacting with them — is becoming the optimum word in a radically new customer intelligence environment. Even though this personalization comes at a price — privacy — it is a price most consumers seem more than willing to pay if a recognized value is received in return.

For a hotel, “personalization” requires an investment in software analytics, but hospitality companies should recognize that this price must be paid because highly sophisticated consumers will soon need an exceptional hotel and/or shopping experience to keep them from visiting a rival’s hotels (that will, undoubtedly, offer such services).

To get ahead in this highly competitive industry, hospitality companies are recognizing the importance of personalization when it comes to customer interactions. Most hotels these days have customer loyalty programs that are a part of a CRM and/or a SCRM initiative that provides its guests with an intimate experience that will make them want to return to the hotel again and again and again.

Currently, however, there is a big disconnect between what companies think they are delivering in terms of personalization and what consumers are actually experiencing. In his article *Study finds marketers are prioritizing personalization... but are further behind than they realize*⁷⁰, Andrew Jones argues that, “Although two-thirds of the marketers surveyed rate their personalization efforts as ‘very good’ or ‘excellent,’ just 31 percent of consumers reported that companies are consistently delivering personalized experiences.”⁷⁰ Although these numbers might look bad, they offer a lot of potential and opportunity for companies that get personalization right.

“Aside from this disparity, the report finds that personalization strategies today are immature. It shows that 91 percent of the marketers surveyed are prioritizing personalization over the coming year, yet many still rely on basic segmentation

strategies,” notes Jones.⁷⁰ This isn’t that surprising as many companies are struggling with the ability to not just capture the information necessary for personalization, but also creating DWs that can silo the data properly, then deliver it to highly complex analytical programs that can make sense of all that data. It’s like finding a needle in a haystack for each and every customer in a massive database; an herculean task, no doubt.⁷⁰

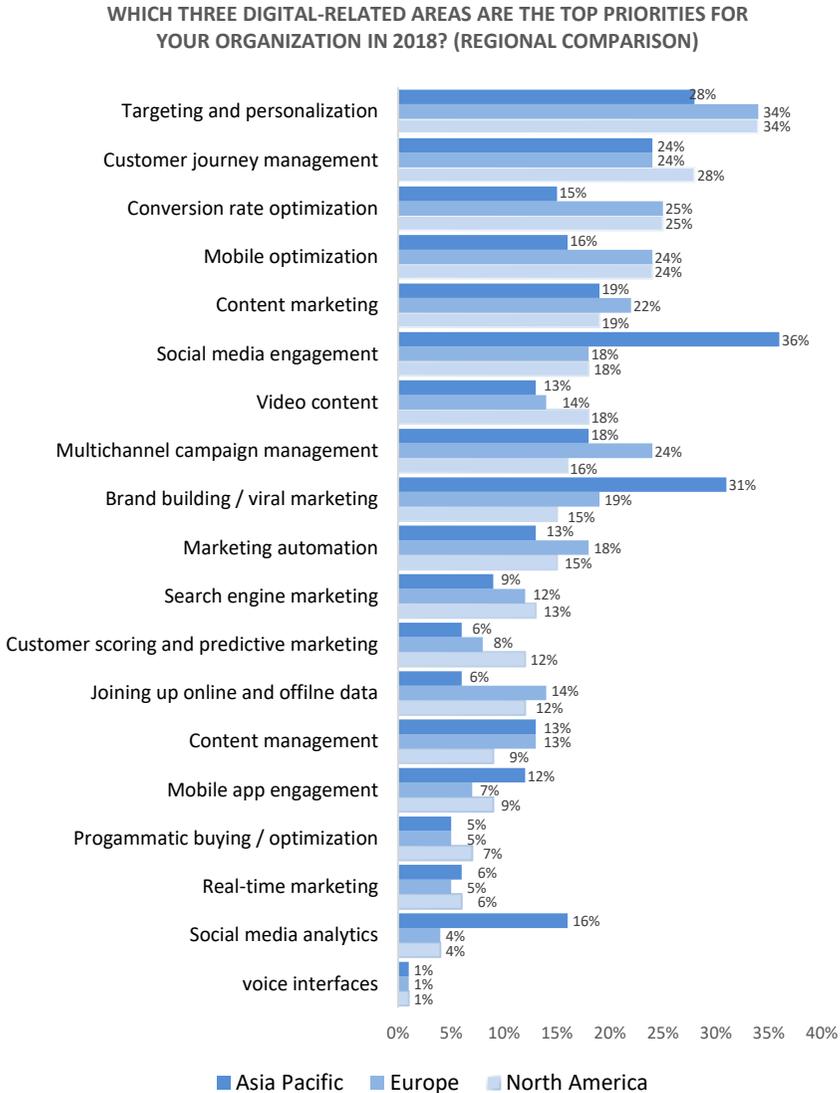


Figure 1: Organizations top priorities in 2018?
 Source: Adobe 2018 Digital Trends in Retail⁷¹

Figure 1 “compares the top digital-related 2018 priorities for hoteliers across regions, with *targeting and personalization* leading the way in both North America and Europe. While not explicitly mentioned, the theme of data again looms large for retailers seeking to personalize and target effectively.”⁷¹

It is obvious that creating a consolidated customer view is a necessary component of personalization, but, unfortunately, “most marketers today are working with customer data that is decentralized, spread across the organization in multiple databases that are updated in batch processes. To find success, marketers must prioritize consolidating data into a single database,” states Jones.⁷⁰

In its *2018 Digital Trends in Retail*, Adobe revealed that “the most exciting prospect through the lens of the retailer is delivering personalized experiences in real time, cited by 37% of retail respondents compared to 36% for client-side respondents in other sectors.”⁷¹ This is an interesting survey to keep in mind as retailers are often on the cutting edge of technology. Once they start receiving personalization marketing from the retailers they buy from, customers will expect similar service from just about every other business they deal with from that moment on.

Adobe’s *2018 Digital Trends in Retail*⁷¹ reveals that “Retailers in Asia are much more focused on social media engagement and brand-building/viral marketing than their counterparts in the West, suggesting that the social and viral marketing opportunity is disproportionately higher in Asia where social uptake has not hit the same kind of plateau as it has in Western markets.”⁷¹

One big cultural difference between the Asian and North American markets is the impact of messaging apps.⁷¹ “Prompted by the launch of brand-friendly Official Accounts on WeChat in 2013, the potential of messaging apps in retail has been embraced more quickly by brands and consumers in China than in the United States, where conversational commerce has been relatively slow to get off the ground.”⁷¹

As Adobe’s *2018 Digital Trends in Retail* discovered, “retailers recognize that the quality of the customer experience will increasingly depend on being able to serve up the most relevant content and messaging at the right moment, with companies embracing predictive analytics to help them anticipate the most effective way of converting prospects into customers, and then meeting their needs on an ongoing basis.”⁷¹

Adobe’s *2018 Digital Trends in Retail* reveals that, “The appeal of real-time personalization suggests a focus on providing the most engaging and relevant experiences, a trend that cuts across numerous digital marketing techniques, including analytics, marketing automation, programmatic ad buying and

dynamic content.”⁷¹

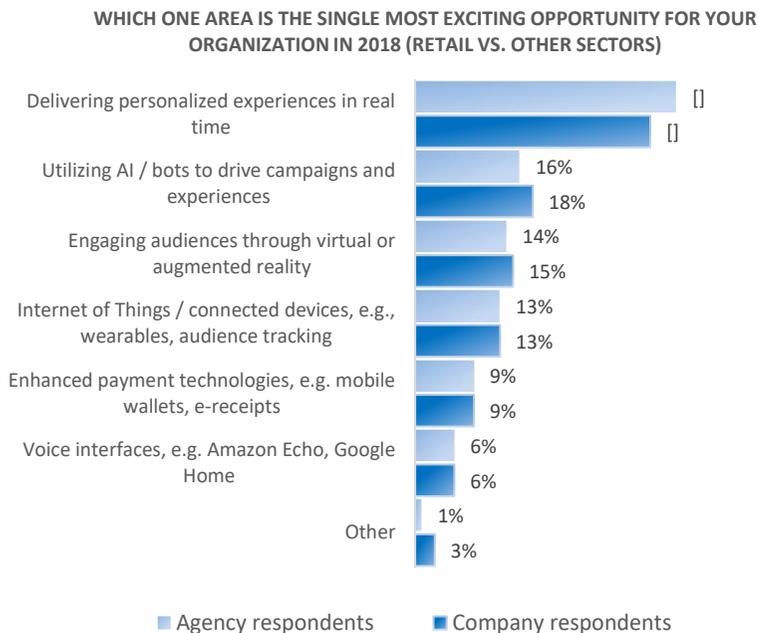


Figure 2: Most Exciting Prospects in Three Years’ Time?

Source: Adobe 2018 Digital Trends in Retail⁷¹

“While a range of potential game-changing technological trends in Figure 2 will undoubtedly have a powerful impact, from the Internet of Things and connected devices, to voice interfaces and augmented reality, hoteliers are predominantly focused on creating a relevant, timely and engaging experience to each of their users, to maximize sales and efficiency.”⁷¹

AI is an example of an emerging technology that can itself help to make the experience more relevant and personalized.⁷¹ “AI-powered machine learning can increasingly help retailers comb through vast quantities of data to provide the best possible content and recommendations to consumers as they progress through the shipping journey from awareness and discovery to conversion.”⁷¹

According to Michael Klein in his article *Machine Learning and AI: If Only My Computer Had a Brain Wired for Business*⁷², “AI helps retailers by serving as an adaptive, automated interface for customer interaction. Similar to a human interaction, this interface can work with customers to resolve issues, route deeper concerns to the right people, and offer personalized recommendations.” “This is because AI can act on real-time insights supplied from databases that

house a user's browsing history, past purchases, and demographics," explains Klein.⁷² "Understanding this data opens opportunities for more personalized targeting, and AI can adapt automated approaches in real time to turn shoppers into buyers," says Klein.⁷² This is going to be a big deal as, according to Tractica⁷³, global revenue resulting from AI technologies just in the retail sector alone is expected to top \$36.8 billion by 2025.

One thing that was surprising to the researchers was the lack of interest in voice technology, with only 6% of respondents pointing to voice interfaces as the most exciting opportunity.⁷¹ "The popularity of voice assistants offered by the likes of Amazon, Google, Microsoft and Apple give retail brands the chance to increase their presence, including in homes and cars, provided that they can find the right kind of utility to consumers at the right time."⁷¹

In her 2019 article *8 Things to Expect from CES, Consumer Tech's Big Shindig*⁷⁴, Lauren Goode points out that, "There are now over 20,000 smart devices compatible with Alexa, and over 10,000 that work with Google Assistant. CES 2019 will undoubtedly be a noisy cacophony of voice-controlled devices, ranging from refrigerators to sound systems to smart lights in the home, to wearables and cars outside of the home."

Goode rightfully claims that "if you add another voice assistant to an existing product, you can call it 'new.'"⁷⁴ Snarkiness aside, this is the wave of the future. People are getting very comfortable talking and giving instructions to smart devices. Goode concludes the article by pointing out a common problem: "The question around voice technology, though, isn't so much whether it will have a presence; the question is whether it will grow more seamless and less awkward this year."⁷⁴

Bright Local, an SEO platform used by thousands of businesses, produced an interesting study⁷⁵ on the potential of voice search, which found:

- 58% of consumers have used voice search to find local business information in the last 12 months.
- 46% of voice search users look for a local business on a daily basis.
- What consumers want most: to be able to use voice search to make reservations, to hear business prices, and to find out which products businesses have.
- 27% visit the website of a local business after making a voice search.
- 25% of consumers say they haven't yet tried local voice search but would consider it.
- 76% of smart speaker users perform local searches at least weekly — with 53% searching using these devices every day.
- Consumers are most likely to perform voice searches to find further information on local businesses they already know about.

- Voice searchers are most likely to look for restaurants, grocery stores, and food delivery.
- Just 18% of consumers have used smart speakers for local voice searches.

It should be obvious that creating a consolidated customer view is a necessary component of personalization, but, unfortunately, “most marketers today are working with customer data that is decentralized, spread across the organization in multiple databases that are updated in batch processes. To find success, marketers must prioritize consolidating data into a single database,” states Jones.⁷⁰

Psychographics is the study and classification of people according to their attitudes, aspirations, and other psychological criteria, especially in market research. As data about people and their behaviors becomes more abundant, this line of research will become more and more important for customer intelligence. The Cambridge Analytica-Facebook scandal is only now starting to reveal how powerful this kind of information is and, in chapter five, I delve further into this fascinating subject.

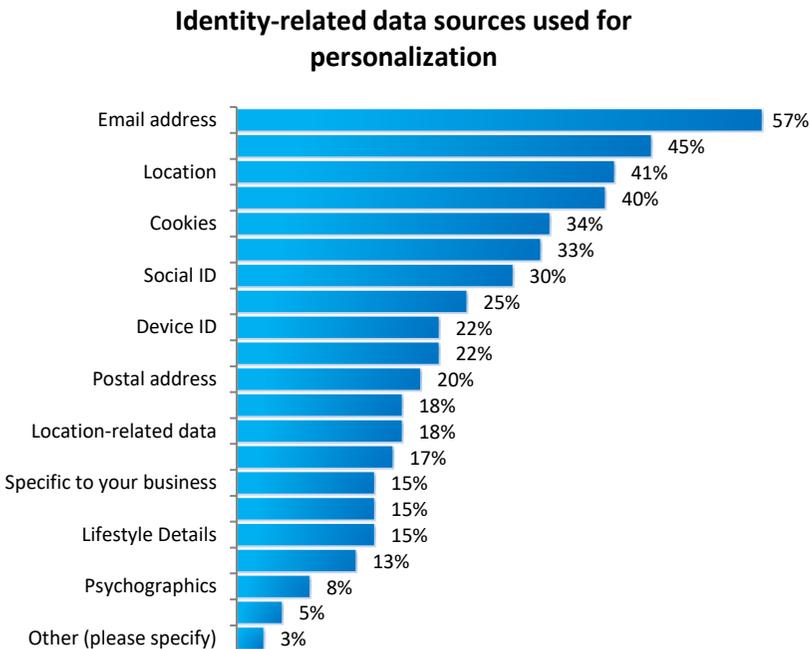


Figure 3: Identity-related data sources used for personalization

Source: VB Insights⁷⁶

Figure 3 lists the identity-related data sources that can be used for personalization and it is a considerable amount of data that must be culled through, siloed, and understood for personalization marketing to work properly and effectively.

Another important step to bringing personalization efforts up to a user’s expectation level will be by using behavioral data. “In order to create these types of customer experiences, marketers must strategically collect and utilize customer data, including real-time signals of intent, which are typically not captured today,” argues Jones.⁷⁰

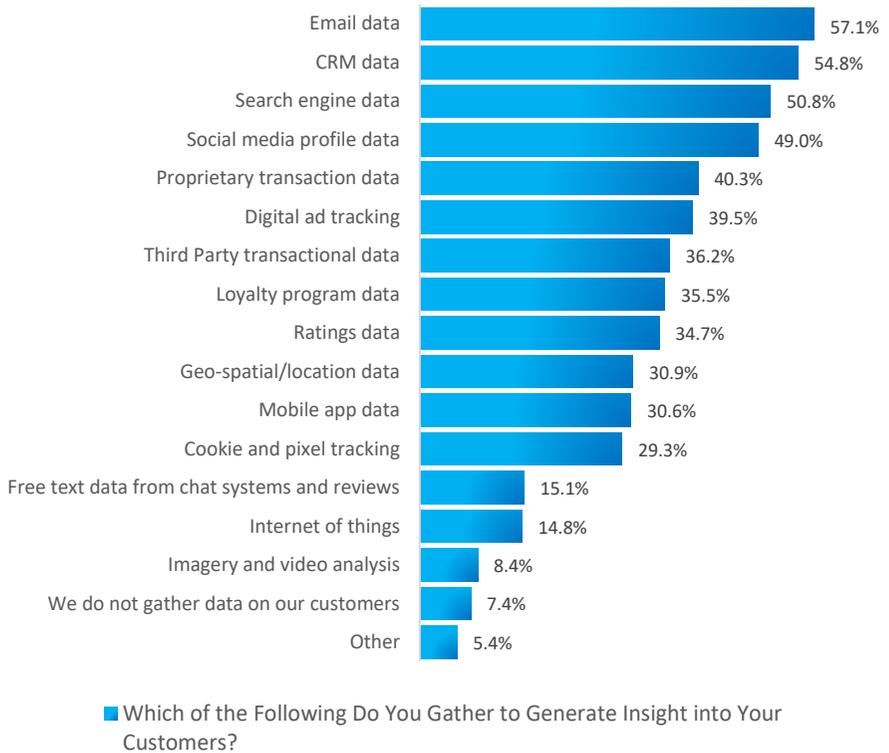


Figure 4: State of Data in Travel Survey, 2017

Source: eyefortravel.com⁷⁷

Figure 4 shows the current data types that a typical travel company might be collecting and utilizing.

With customer attitudes towards personalized content being shaped by today’s online recommendation engines, consumers are becoming more used to receiving what they want, when they want it, and on whatever channel they

want it consumed on.⁷⁰ Hoteliers must keep this in mind when developing personalization programs. The consumer has become highly sophisticated and he or she expects the level of sophistication received on platforms like Amazon, Pandora, Spotify, and Netflix to filter over to all their other business communications; don't waste a customer's time with non-matching offers or he or she will go down the street to a competitor's property.

According to VB Insights, "Email is the dominant channel for personalized content, yet is often limited to field insertion (e.g. "Dear"). Most personalization efforts are also based on transaction history and limited demographic data, meaning personalization is not done to a high degree in most cases."⁷⁶ Figure 5 breaks down the different digital channels that brands can utilize to connect with their customers.

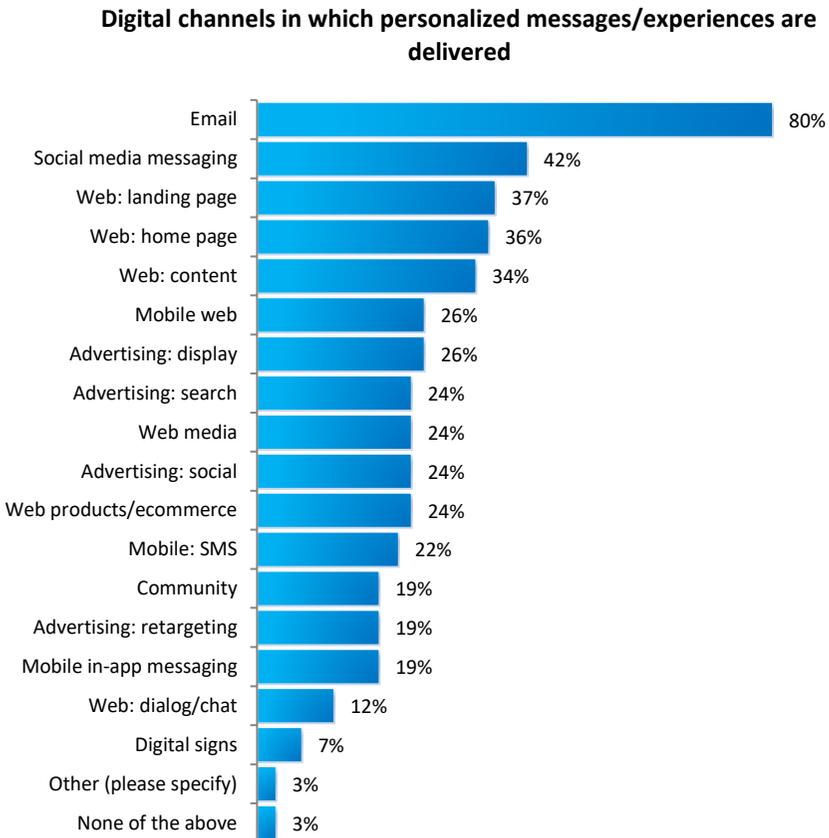


Figure 5: Digital Channels for personalized messages/experiences
 Source: VB Insights⁷⁶

In her article *3 AI-driven strategies for hoteliers in 2019*⁷⁸, Giselle Abramovich claims that, “Personalization is table stakes for today’s retailers, who are increasingly competing to be relevant in the hearts and minds of shoppers.” This is a great analogy as personalization will soon be the base level upon which customers will accept marketing from the companies they choose to buy from.

VB Insights claims that, “Although we may think of the sales process as ‘top-down,’ most companies implement personalization with a bottom-up approach. That is, most companies begin their personalization efforts based on ‘known’ prospects or customers. The channels where personalization is being employed reinforce this finding.”⁷⁶

In its article *Creating the Ultimate Single Customer View*⁷⁹, the Adobe Experience Cloud team argues that, real-time access to data enables an “organization to trigger personalized messages and outreach in the moment of highest impact. What’s more, leveraging a variety of signals emerging from the buying process, marketers can engage with a customer when it’s both most relevant for her, and when she’s most likely to convert — maximizing the value on both sides.”

Of course, not all campaign management systems are alike or have the functionality that helps businesses deliver experiences at the moment of highest impact.⁷⁹ Systems that have lags in data access due to third-party partnerships and integrations are especially susceptible to problems as they are forced to do double duty — first, they have to remind customers how they felt earlier and, second, they have to encourage shoppers to act based on those earlier experiences and emotions; this is far from ideal.⁷⁹

In its *Creating the Single Customer View with Adobe Campaign*⁸⁰, the Adobe Experience Cloud team recommends businesses “Rely on sales-centric campaign management tools and you’ll be hard-pressed to create these single views, let alone construct meaningful mosaics that adapt and evolve in real time. And if you can’t capture the granular details surrounding customer interactions — if you can’t understand the data you do have — it’s virtually impossible to deliver personalized experiences at scale and build a loyal customer base.”

“Personalization is critical to any cross-channel strategy — and at the heart of any personalization strategy is the ability to segment,” argues the Adobe Experience Cloud team.⁸⁰ Unsurprisingly, “Tapping into more complex segmentation strategies helps organizations deliver better, more meaningful cross-channel experiences.”⁸⁰

AI and machine learning bring a whole new level of depth and detail to customer segmentation modeling. “Being able to easily create control vs. test groups based on nuanced criteria helps arrive at the insight necessary to design optimal experiences for different sets of customers,” argues the Adobe Experience Cloud team.⁸⁰ “Applying the same nuanced criteria to the delivery of those experiences is how that insight is transformed into personalization at scale,” they contend.⁸⁰

Adobe argues that the numbers don't lie — segmented and targeted emails generate 58 percent of all revenue.⁸⁰ That's total revenue, not lift, which is a highly impressive number.

"Without advanced filtering it's virtually impossible to extract detailed data and uncover the nuances behind the numbers. Beyond that, though, creating and managing lists also becomes a challenge," warns Adobe.⁸⁰ "Want to target customers based on their preferred device? If filtering isn't native to your campaign management system, that simple task is going to be time-consuming and costly at best. Personalization becomes a trade-off between quality and speed," says Adobe.⁸⁰

"Businesses should also focus on solutions that utilize artificial intelligence (AI) in a tangible and effective way," argues Adobe.⁸⁰ At best, "AI can take the grunt work of data stitching, data cleaning, and anomaly detection off your plate, freeing you up for more meaningful marketing work — gaining a better understanding of customer wants and needs, for example, then spending time designing perfectly personalized experiences," recommends Adobe.⁸⁰

Abby Parasnis, Adobe's chief technology officer argues that Adobe Sensei "gives marketers and analysts new visibility into which segments are most important to their businesses, and allows them to target overlapping or adjacent segments, making it possible to acquire customers much more efficiently."⁸⁰

"By having an integrated customer profile that combines online and offline data, marketers can more easily provide truly meaningful customer experiences that reinforce the brand message across all channels," says Bruce Swan, senior product manager for Adobe Campaign.⁸⁰ "The results include increased engagement as well as a higher likelihood for conversion, long-term loyalty, and brand advocacy," adds Swan.⁸⁰

A unified or single customer view can help marketers "harvest the insights they need to develop targeted marketing campaigns — that, in turn, drives customer loyalty, purchases, and conversions."⁸⁰ It is a virtuous cycle that feeds upon itself, as long as the customer continues to see the value in loyalty. "Data-driven marketing also speeds time-to-market, and reduces overall campaign costs," believes the Adobe team.⁸⁰

Ultimately, Adobe concludes that, "it comes down to one key consideration: your customers deserve to be treated like individuals — and you need to deliver. You need to collect cross-channel insights that can be pulled together into a cohesive single view. You need to have the capabilities to adjust that view in real time, as your consumers pivot — and even change course. And you need both the powerful insights and powerful technology to drive consistent, cohesive, and meaningful cross-channel journeys for every customer."⁸⁰

The A.I. Hotelier can personalize the customer experience in the following ways:

- Customer Service:
 - Geo-locating a customer when he or she signs onto a hotelier's customer Wi-Fi system.
 - Video analytics with facial recognition technology to spot and/or confirm a customer's identity.
 - Social media customer service can cut down on normal customer service expenses, as well as connect with customers on the channels that they prefer, i.e., Facebook, WhatsApp, WeChat, or Instagram.
 - Chatbots can automate customer service requests, as well as disseminate info seamlessly.
- E-Commerce
 - Clickstream analysis can allow personalized offers to be sent to a potentially returning customer when he or she is browsing a company's website or booking a room.
- Customer Management:
 - The ecommerce department can get more accurate attribution analysis — so that the hotelier can understand which advertising is associated with which user, making the advertising more quantifiable and, therefore, much more actionable.
 - CRM systems can add social media as a channel feeding targeted messages to only those customers who are most likely to respond to them.
 - The amount of promotions available and channels through which to market through increases exponentially as campaign lift can be assessed in terms of hours, rather than in terms of days or weeks.
 - Customer acquisition is accelerated because business users throughout the company can quickly derive answers to the following questions:
 - Which combinations of campaigns accelerate conversion?
 - What behavior signals churn?
 - Do web search key words influence deal size?
 - Which product features do users struggle with?
 - Which product features drive product adoption and renewal?
 - What drives customers to use costly sales channels?
 - Customer interaction data can rapidly be turned into business opportunities.

- Powerful recommendation engines can ingest data from a multitude of sources and then be made available to frontline staff, who can react in near real-time to customer requests.
- Point-of-Sale:
 - Brands can better target merchandise, sales, and promotions and help redesign store layouts and product placement to improve the customer's experience.

In its *Pega Marketing Product Overview*⁸¹, Pega Systems explains that Next-Best-Action (NBA) marketing is a “Customer-centric approach to marketing that combines traditional business rules with predictive and adaptive analytics to provide real-time and batch marketing offers and treatments to drive customer lifetime value.” “This includes the capabilities to allow marketers to create a cross-channel engagement strategy that continuously look at customer history and many different customizable attributes to determine the top offer, best time, specific treatment, and best channel to interact with customers and prospects.”⁸¹

Pega's solution includes, “An agent-assisted channel application that provides a best practice implementation of Next-Best-Action for use by call center agents, retail users and brokers.”⁸¹ It “Includes UI panels and decision logic for offer presentment, bundle negotiation, what-if analysis, needs assessment and house-holding.”⁸¹

Pega's Paid Media Manager can extend “Next-Best-Action to paid channels including Facebook Ads, Google Ads, and LinkedIn Ads.”⁸¹ “Which offer or offers to show advertisements to each individual can now be decisioned on based on sophisticated strategies and AI. The full fidelity of enterprise data within the firewall can be safely leveraged to power these paid decisions just as they do on owned channels,” explains Pega.⁸¹

The “Paid Media Manager (PMM) enables marketers to leverage enterprise data and insights to drive intelligent and effective advertising.”⁸¹ “PMM is highly integrated with NBA Designer. When an NBA decision is made on what offer or offers an individual is eligible for PMM can then communicate those decisions to ad platforms by placing customers and prospects in the appropriate audiences.”⁸¹ “Inclusion of audience indicates the offer an individual will be targeted with as well as the bid level,” explains Pega.⁸¹

Historically, ad decisions are based only on broad segmentation models which are based on anonymous data.⁸¹ With PMM, ad decisions can be driven by the full fidelity of a company's proprietary enterprise data and the insights that drive a company's owned channels.⁸¹ “PMM takes a privacy first approach by only communicating the decision over the firewall to ad platforms. The backing enterprise data and AI-based insights stay safely within your firewall.”⁸¹

“These decisions,” can be communicated by leveraging direct CRM server-to-

server APIs to Google Ads, Facebook Ads, and LinkedIn Ads,” explains Pega. “Traditional pixel-based APIs are also supported by Adobe Audience Manager as well.”⁸¹ “PMM also enable segments to be communicated safely and securely to ad platforms using these same paid channel integrations.”⁸¹

In her article *The 5 Biggest Marketing Trends for 2019*⁸², Giselle Abramovich quotes Stacy Martinet, VP of marketing strategy and communications at Adobe, saying, “Companies that want to provide truly transformative customer experiences need customer data that is real-time, intelligent, and predictive.” Martinet adds that, “In 2019 we’ll see enterprises focused on building a seamless flow of connected customer data — behavioral, transactional, financial, operational, and more — to get a true end-to-end view of their customers for immediate actionability.”⁸²

Giselle Abramovich believes marketers have long been talking about personalization marketing, but they are still at a very basic level of personalization.⁸² “To truly unlock the value of personalization, companies must first create a unified view of their customers,” contends Anudit Vikram, SVP of audience solutions at Dun & Bradstreet.⁸²

Jason Heller, partner and global lead, digital marketing operations at McKinsey agrees, claiming, “The single view of the customer is the single most important asset that a modern marketer can have, and it’s the core of their personalization efforts.”⁸² “It also becomes the core of their next-generation marketing ROI capability, as well,” he adds.⁸²

One of the keys to personalization at scale is internal structure.⁸² Heller “expects companies in 2019 will work on building agile marketing execution models in which cross-functional teams can experiment, leveraging the data and technology stack to capture value.”⁸²

“Privacy, of course, will play a big role in an organization’s personalization strategy,” says Abramovich.⁸² “New laws such as GDPR — plus California’s privacy law, which comes into effect in January 2020 — means marketers must be focused on ensuring ethical data collection practices and earning consumers’ trust,” claims Martinet.⁸²

“When choosing partners to work with, brands need to look for products and services that protect the data that is entrusted to them and are designed with privacy in mind,” says Martinet.⁸² “Privacy is about respecting your customers and giving them control over how their data is being used. Be transparent and help them understand the value proposition,” adds Martinet.⁸²

Abramovich believes that, in 2019, many organizations will have what McKinsey refers to as a “consent management” function, which includes “having an ethical view of how the organization manages customers’ data, protects that data, and establishes governance around how that data is utilized.”⁸²

“I think this is an absolute obligation that we have regardless of whether the regulations exist or not because eventually they will exist,” says Heller.⁸² “So starting to operate that way today will only set you up for more success in the future.”⁸²

In terms of privacy, as reported in CB Insights *What’s Next in AI? Artificial Intelligence Trends*⁸³, Google’s federated learning approach aims at adding a layer of privacy by utilizing a person’s mobile messaging while also keeping it private. “In a nutshell, your data stays on your phone. It is not sent to or stored in a central cloud server. A cloud server sends the most updated version of an algorithm — called the ‘global state of the algorithm’ — to a random selection of user devices.”⁸³

“Your phone makes improvements and updates to the model based on your localized data. Only this update (and updates from other users) are sent back to the cloud to improve the “global state” and the process repeats itself,” explains CB Insights.⁸³ Real world examples include Firefox’s use of federated learning to “rank suggestions that appear when a user starts typing into the URL bar.”

Google Ventures-backed AI startup OWKIN is using the approach to protect sensitive patient drug discovery data.⁸³ “The model allows different cancer treatment centers to collaborate without patients’ data ever leaving the premises,” claims CB Insights.⁸³

According to Adobe’s *Indelible content, incredible experiences*⁸⁴, “Marketers want to surface the right content precisely when and where customers need it. But to be efficient, you want to create once and deliver everywhere, with content automatically adjusting to fit connected experiences on any channel. Machine learning lets you do that — finding better ways to optimize layout and copy wherever they’re used.” For example, “Adobe’s smart summarisation can take your product manager’s blog post about gourmet hot dogs and trim the redundant content for a news clip or email.”⁸⁴

Customer Relationship Management

As previously mentioned, CRM is a strategy used to learn more about a customer’s needs and behaviors in order to develop a stronger relationship with him or her, thereby creating a value exchange on both sides.

As Lovelock and Wirtz state in *Services Marketing, People, Technology, Strategy*⁸⁵, “from a customer perspective, well-implemented CRM systems can offer a unified customer interface that delivers customization and personalization.” Lovelock and Wirtz argue that at each transaction point, such relevant patron data as a customer’s personal preferences, as well as his or her overall past history transactions are available to the clerk serving the customer, giving them valuable information about how to interact with that person.⁸⁵ This

is not an easy thing to do, however, especially when unstructured data like social media feeds are added to the mix.

According to Lovelock and Wirtz, most CRM solutions contain the following stages⁸⁵:

- Data collection: the system captures customer contact details, such as demographics, purchasing history, service preferences, etc.
- Data analysis: data captured is analyzed and categorized into a unique set of criteria. This information is then used to tier the customer base and tailor service delivery accordingly.
- Sales force automation: sales leads, cross-sell, and up-sell opportunities can be effectively identified and processed, and the entire cycle from lead generation to close of sales and after-sales service can be tracked and facilitated through the CRM system.
- Marketing automation: the mining of customer data can help a company achieve one-to-one marketing to each one of its customers. Loyalty and retention programs can reduce costs, which can result in an increase of marketing expenditure ROI. By analyzing campaign responses, CRM systems can easily assess a marketing campaign's quantifiable success rate.
- Call center automation: with customer information available right at their fingertips, call center staff can improve customer service levels because they will be able to immediately identify a customer's tier level, as well as compare and contrast him or her against similar customers so that only promotions that are likely to be accepted are offered.

Most hospitality companies will have plenty of data collection, data analysis, sales force automation, marketing automation, and call center automation software to help them in their CRM endeavors, but it is not easy getting all of these complicated systems and processes working together to provide a level of personalized service that wows the customer.

Beyond simple CRM (which, I guess, is never really *that* simple), Social CRM (SCRM) adds a whole new level of sophistication and complexity to the mix. SCRM is the use of "social media services, techniques and technology to enable organizations to engage with customers."⁸⁶ In his article *Time to Put a Stake in the Ground on Social CRM*⁸⁷, Paul Greenberg states that:

"Social CRM is a philosophy and a business strategy, supported by a technology platform, business rules, workflow, processes and social characteristics, designed to engage and react accordingly in a collaborative conversation in order to promote mutually beneficial value in a trusted and transparent business environment. It's the company's response to the customer's

ownership of the conversation.”

One aspect of “Social CRM” is “Social Media Monitoring,” the process by which companies monitor sites like Facebook, Twitter, LinkedIn, Weibo, YouTube, Instagram, and others for relevant brand and anti-brand comments and mentions. Social media monitoring tools allow for continuous and strong customer engagement.

When it comes to social media and implementing it into a hotel, the one constant question should be is, “How does this affect my ROI?” For many hotels, there is the sense that social media is an ethereal, unquantifiable thing, but this shouldn’t be the case. As Figure 6 shows, social media listening can be used in a multitude of ways, like anticipating customer problems, understanding and identifying sentiment, measuring a company’s share of voice, as well as keeping track of a company’s brand. All of these are important in their own right and, together, they can give a hotelier deep detail into a marketing campaign’s performance and assist quantifying attribution analysis, which can help with planning and implementing future marketing campaigns.

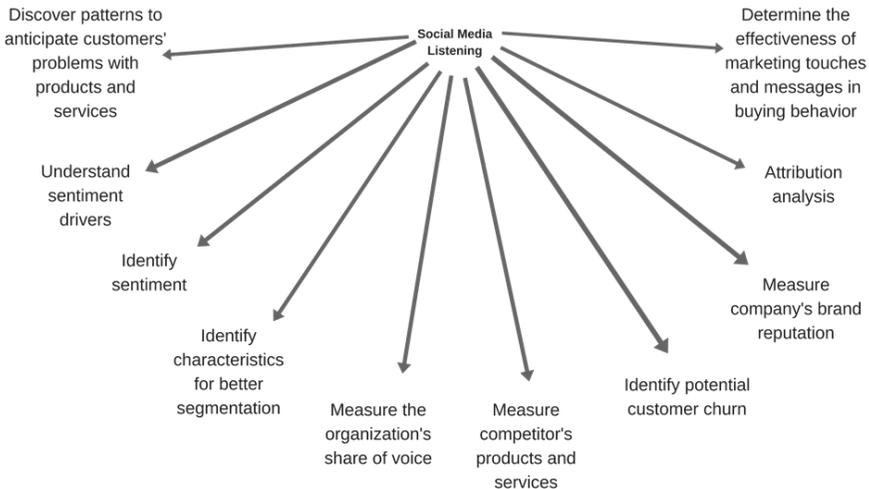


Figure 6: Social Media Listening objectives

Source: www.intelligencia.co

A good example of how a company can test whether a social media solution would work for it is to consider the experience of a telecommunication company that proactively adopted social media recently, as mentioned in R.E. Divol’s article *Demystifying social media*⁸⁸. “The company had launched Twitter-based customer service capabilities, several promotional campaigns built around social contests, a fan page with discounts and tech tips, and an active response

program to engage with people speaking with the brand.”⁸⁸

In social-media terms, the investment was not insignificant, and the company’s senior executives wanted quantifiable ROI not anecdotal evidence that the strategy was paying off.⁸⁸ “As a starting point, to ensure that the company was doing a quality job designing and executing its social presence, it benchmarked its efforts against approaches used by other companies known to be successful in social media.”⁸⁸ According to Divol, “the telecommunication company advanced the following hypotheses⁸⁸:

- “If all of these social-media activities improve general service perceptions about the brand, that improvement should be reflected in a higher volume of positive online posts.
- “If social sharing is effective, added clicks and traffic should result in higher search placements.
- “If both of these assumption hold true, social-media activity should help drive sales — ideally, at a rate even higher than the company achieves with its average gross rating point (GRP) of advertising expenditures.”⁸⁸

The company tested its options. “At various times, it spent less money on conventional advertising, especially as social-media activity ramped up, and it modeled the rising positive sentiment and higher search positions just as it would using traditional metrics.”⁸⁸

The results quite conclusive: “social-media activity not only boosted sales but also had higher ROIs than traditional marketing did. Thus, while the company took a risk by shifting emphasis toward social-media efforts before it had data confirming that this was the correct course, the bet paid off.”⁸⁸ Just as importantly, the company had now created an analytic baseline that gave it the confidence to continue exploring a growing role for social media.⁸⁸ It is very easy to quantify search rankings and it is pretty obvious that if a hotel ranks higher in Google search, it should garner more business.

CRM is an integral part of what businesses hope will be a value exchange on both sides of the customer-company equation, one that will, hopefully, create loyal customers who become apostles for the business.

Lovelock and Wirtz created the “Wheel of Loyalty” as an organizing structure to help businesses build customer loyalty and it is highly relevant to the hospitality industry.⁸⁵ The first of its three sequential steps include building a foundation for loyalty, including “targeting the right portfolio of customer segments, attracting the right customers, tiering the service, and delivering high levels of satisfaction.”⁸⁵

The second step — creating loyalty bonds that either deepen the relationship through cross-selling and bundling or adding value to the customer through loyalty rewards and higher level bonds — can be achieved by the hotel gaining a

fuller understanding of the patron.⁸⁵ It is important to understand as much about the patron as possible, his wants, desires and needs, all the way down to his preferred choice of room type, his reason for staying, and any other preference he or she might want to share with the hotel.

The third factor — identify and reduce the factors that result in “churn” — is also extremely important to a hotelier’s bottom line.⁸⁵⁸⁸ Engagement is paramount here and mobile apps and social media are great channels to keep customers interested and engaged.

Hospitality companies should also feel compelled to reward their customers through Facebook, Twitter, WeChat, Line, WhatsApp, Instagram, and Weibo, or any number of social network, blogging, and/or micro-blogging services. The beauty of using these channels is the ability of the customer to share these awards or stories of these awards with friends and family.

It shouldn’t be that hard to get patrons to share their social media accounts, either, as a hotel can ask patrons for their social media accounts at sign up through methods like social bridging. Social media is now often a preferred contact channel and it does make connecting with users in a real-time way exceptionally easy.

According to Jones and Sasser, “the satisfaction-loyalty relationship can be divided into three main zones: Defection, indifference, and affection. The *zone of defection* occurs at low satisfaction levels. Customers will switch unless switching costs are high or there are no viable or convenient alternatives.”⁸⁹ This, obviously, isn’t the case with a hotelier, where switching often constitutes little more than browsing to a competing hotel’s website and making a booking. With the vast echo chamber of social media against them, losing only one disgruntled patron could be the least of the hotelier’s problems.

Jones and Sasser warn that, “Extremely dissatisfied customers can turn into ‘terrorists,’ providing an abundance of negative feedback about the service provider.”⁸⁹ Through social media channels, negative feedback can reverberate around the world within seconds. Today, more than ever, hospitality companies must spot dissatisfied customers and approach them before they do irreparable harm to the company’s image and reputation and social media is one of the best channels in which to engage them. Like the proverbial canary in the coal mine, the *A.I. hotelier* will have systems set in place that can warn the business about these customers before they become brand terrorists.

Hospitality companies need to empower their patrons to post on Facebook or WeChat or Weibo or Twitter or comment about their hotel experiences and, hopefully, turn them into apostles.

In Jones and Sasser’s *zone of affection*, satisfaction levels are high and “customers may have such high attitudinal loyalty that they don’t look for

alternative service.”⁸⁹ It is within this group that “Apostles” — members who praise the firm in public — reside and this is the group responsible for improved future business performance.⁹⁰ *The A.I. Hotelier* will not only be able to spot these apostles, but also understand them on such a unique and personal level that their loyalty and patronage will almost be guaranteed.

As Darrell Rigby explains in Bain & Company’s *Management Tools 2015 An Executive’s Guide*⁹¹, CRM “is a process companies use to understand their customer groups and respond quickly — and at times, instantly — to shifting customer desires. CRM technology allows firms to collect and manage large amounts of customer data and then carry out strategies based on that information.”⁹¹

Hotel operators can utilize CRM to:

- Create databases of customers segmented into buckets that allow more effective marketing.
- Generate more accurate sales leads.
- Gather market research on customers.
- Rapidly coordinate information between the sales and marketing staff and front-facing hosts and reps, thereby increasing the customer experience.
- Enable reps to see and understand the financial impact of different product configurations before they set prices.
- Accurately gauge the return on individual promotional programs and the effect of integrated marketing activities, and redirect spending accordingly.
- Accumulate data on customer preferences and problems for product and service designers.
- Increase sales by systematically identifying, managing, and automating sales leads.
- Improve customer retention by uncovering the reason(s) for customer churn.
- Design proactive customer service programs.

Today, CRM is evolving into what has been dubbed “Customer Centric Relationship Management” (CCRM), a style of CRM that focuses on customer preferences above all else. CCRM attempts to understand the client in a deep, behavioral way, and it engages customers in individual, interactive relationships through tailored marketing and one-to-one customer service. This personalization can help a hotelier retain customers, build brand loyalty, as well as provide customers not only with the information that they really want but also with the rewards that they might actually use. Today’s technology allows hoteliers to not only surface the information that they need to know about their customers, but it can also provide front-facing employees with offers that these

customers will actually like and, therefore, probably use.

In Bain & Company's *Management Tools 2015 An Executive's Guide*⁹¹, Darrell K. Rigby claims CRM requires managers to:

1. "Start by defining strategic 'pain points' in the customer relationship cycle. These are problems that have a large impact on customer satisfaction and loyalty, where solutions would lead to superior financial rewards and competitive advantage."⁹¹
2. "Evaluate whether — and what kind of — CRM data can fix those pain points."⁹¹
3. "Calculate the value that such information would bring the company."⁹¹
4. "Select the appropriate technology platform, and calculate the cost of implementing it and training employees to use it."⁹¹
5. "Assess whether the benefits of the CRM information outweigh the expenses involved."⁹¹
6. "Design incentive programs to ensure that personnel are encouraged to participate in the CRM program. Many companies have discovered that realigning the organization away from product groups and toward a customer-centered structure improves the success of CRM."⁹¹
7. "Measure CRM progress and impact. Aggressively monitor participation of key personnel in the CRM program. In addition, put measurement systems in place to track the improvement in customer profitability with the use of CRM. Once the data is collected, share the information widely with employees to encourage further participation in the program."⁹¹

Segmentation

Once a hotel implements a CRM program, data segmentation can begin. According to Wikipedia, market segmentation "is the process of dividing a broad consumer or business market, normally consisting of existing and potential customers, into sub-groups of consumers (known as *segments*) based on some type of shared characteristics."⁹²

In dividing or segmenting markets, hotels can look for shared characteristics. Market segmentation tries to identify *high yield segments* — i.e., those segments that are likely to be the most profitable or that have outsized growth potential — so that these can be selected for special attention (i.e., become target markets).

Rigby states that customer segmentation "is the subdivision of a market into discrete customer groups that share similar characteristics."⁹¹ He adds: "Customer Segmentation can be a powerful means to identify unmet customer needs. Companies that identify underserved segments can then outperform the competition by developing uniquely appealing products and services."⁹¹ Rigby

believes that customer segmentation is most effective when a company can discover its most profitable segments and then tailor offerings to them, thereby providing the customer with a distinct competitive advantage.⁹¹

As Rigby points out, customer segmentation requires managers to⁹¹:

- “Divide the market into meaningful and measurable segments according to customers’ needs, their past behaviors or their demographic profiles.”⁹¹
- “Determine the profit potential of each segment by analyzing the revenue and cost impacts of serving each segment.”⁹¹
- “Target segments according to their profit potential and the company’s ability to serve them in a proprietary way.”⁹¹
- “Invest resources to tailor product, service, marketing and distribution programs to match the needs of each target segment.”⁹¹
- “Measure performance of each segment and adjust the segmentation approach over time as market conditions change decision making throughout the organization.”⁹¹

For a hotel, the pain points might be things like customer loyalty and the marketing department should be asking things like, “Why does it cost so much money to retain customers?” “Can we not find cheaper but more meaningful offers that show understanding of the customer?” Also, “How can we drive customer loyalty to such a degree that our customers rave about us on social media?”

Beside the above methodologies, customer segmentation can be used to:

- Prioritize new product development efforts.
- Develop customized marketing programs.
- Choose specific product features.
- Establish appropriate service options.
- Design an optimal distribution strategy.
- Determine appropriate product pricing.

Market segmentation assumes that different market segments require different marketing programs — that is, different offers, prices, promotion, distribution or some combination of marketing variables. Market segmentation is not only designed to identify the most profitable segments, but also to develop profiles of key segments to better understand their needs and purchase motivations. Insights from segmentation analysis are subsequently used to support marketing strategy development and planning.

Many marketers use the S-T-P approach; Segmentation → Targeting → Positioning to provide the framework for marketing planning objectives. That is, a market is segmented, one or more segments are selected for targeting, and products or services are positioned in a way that resonates with the selected

target market or markets. With real-time technology, segmentation can reach a whole new customer experience complexity level.

The process of segmenting the market is deceptively simple. Seven basic steps describe the entire process, including segmentation, targeting, and positioning. In practice, however, the task can be very laborious since it involves poring over loads of data, and it requires a great deal of skill in analysis, interpretation and some judgment. Although a great deal of analysis needs to be undertaken, and many decisions need to be made, marketers tend to use the so-called S-T-P process as a broad framework for simplifying the process outlined here:

- Segmentation:
 - Identify market (also known as the universe) to be segmented.
 - Identify, select, and apply base or bases to be used in the segmentation.
 - Develop segment profiles.
- Targeting:
 - Evaluate each segment's attractiveness.
 - Select segment or segments to be targeted.
- Positioning:
 - Identify optimal positioning for each segment.
 - Develop the marketing program for each segment.

Markets can be broken down into the following segments:

- Geographic segment.
- Demographic segment.
- Psychographic segment.
- Behavioral segment.
- Purchase/usage occasion.
- Generational segment.
- Cultural segmentation.

For the hotelier, customers can also be further segmented into the following areas:

- Game preference.
- Day of week.
- Time of day.
- Length of session.
- Size of stake.
- Most and least profitable customers.

Although customer segmentation is a common business practice, it has received the following criticisms:

- That it fails to identify sufficiently meaningful clusters.

- That it is no better than mass marketing at building brands.
- That in competitive markets, segments rarely exhibit major differences in the way they use brands.
- Geographic/demographic segmentation is overly descriptive and lacks enough insights into the motivations necessary to drive communications strategy.
- Difficulties with market dynamics, notably the instability of segments over time and structural change that leads to segment creep and membership migration as individuals move from one segment to another.

Market segmentation has many critics, but, in spite of its limitations, it remains one of the most enduring concepts in marketing and it continues to be widely used in practice.

As Wikipedia explains⁹², there are no formulas for evaluating the attractiveness of market segments and a good deal of judgment must be exercised. Nevertheless, a number of considerations can be used to evaluate market segments for attractiveness, including:

- Segment Size and Growth:
 - How large is the market?
 - Is the market segment substantial enough to be profitable?
 - Segment size can be measured in number of customers, but superior measures are likely to include sales value or volume.
 - Is the market segment growing or contracting?
 - What are the indications that growth will be sustained in the long term? Is any observed growth sustainable?
 - Is the segment stable over time?
- Segment Structural Attractiveness:
 - To what extent are competitors targeting this market segment?
 - Can we carve out a viable position to differentiate from any competitors?
 - How responsive are members of the market segment to the marketing program?
 - Is this market segment reachable and accessible?
- Company Objectives and Resources:
 - Is this market segment aligned with the company's operating philosophy?
 - Do we have the resources necessary to enter this market segment?
 - Do we have prior experience with this market segment or similar market segments?
 - Do we have the skills and/or know-how to enter this market segment successfully?

The latest developments in CRM technology are adding AI to the process. As explained in the *MIT Technology Review* article *Transform Customer Experience by Harnessing the Power of AI in CRM*⁹³,

“Unlike traditional customer-facing platforms that deliver a fragmented view of the buyer, an intelligent platform presents a single aggregated view of customer data. The built-in intelligence layer helps businesses spot trends, anticipate needs, and respond more proactively. With that complete picture, for example, a business knows exactly when the customer last purchased a product, what that product was, whether he or she had a problem, and, if so, exactly how it was resolved.”

MIT Technology Review adds that, “the wide range of machine-learning (ML) models learns from what is collected to unearth and match patterns, as well as act on correlations that would otherwise remain hidden.”⁹³ Using a consumer shopping experience as an example, the *MIT Technology Review* article explains that, “AI models embedded within the CRM system’s personalization engine take into account the catalog that any given shopper sees and the context on how the merchant is engaging with that shopper, and then ranks every product for that buyer in terms of relevance from search results, making the most targeted and personalized results ever.”⁹³ This can be done at scale, with a constant refining of shopper recommendations based on the ML, explains the *MIT Technology Review*.⁹³

“The data for such recommendations include both historic and real-time click-stream data from multiple sources.”⁹³ *MIT Technology Review* warns that, “What is challenging is that the algorithms used to create predictions are as heterogeneous as the sources of data used. To deliver predictive recommendations with the highest accuracy, a range of different algorithms is applied.”⁹³

“In selecting the right algorithm, the champion-challenger model is used, meaning that every time an algorithm yields accuracy, it is automatically set to default over other models within the platform,” states *MIT Technology Review* article.⁹³ “That way, the path to personalization is very short,” notes the *MIT Technology Review* article. “The end result of such accurate recommendations is that both customer conversions and the overall potential value of the merchant’s inventory goes up,” the article concludes.⁹³

Beyond product recommendations, the *MIT Technology Review* article states that, “other powerful capabilities that enhance CRM for both employee and customer experiences include the algorithms for speech recognition, sentiment analysis, intent, content summarization through natural language processing, and question answering based on tables of data.”⁹³

“Predicting customers’ future behaviors and needs often turns on the ability to parse their emotions, more than just their past purchases, and creating a shared bond,” claims the *MIT Technology Review* article.⁹³ The article describes a CRM system that online hotelier Fanatics utilizes to ensure that it understands its customers in the best possible way, through his or her emotional team bond, because, as Fanatics puts it, “sports merchandise is an emotional business.”⁹³

“We want to deliver the most relevant merchandise to you, at the right time, for your team,” explains Jonathan Wilbur, the company’s director of CRM.⁹³ “If you’re a Yankees fan, we want to make sure we’re never showing you anything Boston Red Sox,” adds Wilbur.⁹³

“The company’s ability to engage with customers around the biggest sporting events in near real time is unmatched,” claims the *MIT Technology Review*.⁹³ Fanatics carries merchandise for more than 1,000 professional and college teams, including from the NFL, MLB, NBA, NHL, NASCAR, and football leagues from around the world.⁹³ “The company is event-driven, engaging fans around everything from the World Series to football star Peyton Manning’s retirement announcement,” explains the *MIT Technology Review*.⁹³ “Multiply a thousand teams by an endless stream of sports news events, and you’ve got billions of e-mails going to fans each year.”⁹³

“In 2015, we sent about 3.5 billion messages,” says Wilbur.⁹³ “When a team wins the Super Bowl, we can have 350 products live with a press of a button three seconds after the game,” adds Wilbur.⁹³ His team “built scripts that searched customer data to display fans’ favorite teams, pulled in real-time scores and stats from vendor feeds, and personalized branding using partner IDs.”⁹³

“The resulting campaigns were customized according to multi-tier segments. Fanatics was able to deliver merchandise relevant to fans and their teams at just the right time,” explains the *MIT Technology Review*.⁹³ “Carolina Panther fans didn’t get e-mails about “Super Bowl Champs” T-shirts after their team lost the big game, but Denver Broncos fans had offers in their inboxes within minutes after the final whistle.”⁹³

“Fanatics is even building automatically triggered rules-driven campaigns based on dynamic information,” notes the *MIT Technology Review*.⁹³ “Any time a baseball player hits three homes runs in a game, we’ll send an e-mail featuring his jersey. Set it and forget it,” Wilbur adds.⁹³ Although hitting three home runs in a game is a rare event, Fanatics needs to be careful not to overdo it. Fans will, of course, want to celebrate if such an occurrence happens, but businesses should be careful not to hit their customers too often. In terms of marketing, even if it is contextually aware and hyper-personalized, there can be too much of a good thing.

Companies like Adobe, IBM, Oracle, Microsoft, SAP, Pega Systems, Salesforce.com, and SugarCRM all have products that not only include contact

management systems that integrate emails, documents, jobs and faxes, but also integrate with mobile and social media accounts as well, so the market doesn't lack product but this will be a case where one side doesn't fit all.

Social media can help amplify the "relationship" in "Customer Relationship Management", thereby enabling organizations to connect and engage consumers in a unique way, as well as personalize and monetize customer relationships on a sustained basis, which should increase profitability.¹¹⁹ "Social media also provides a path to richer customer analysis, using technologies capable of funneling and consolidating customer insights."¹¹⁹ Insights derived from this analysis can help companies to "dynamically calibrate, anticipate, and offer products and services that meet perpetually shifting consumer demands in a hyper-competitive marketplace."¹¹⁹

Specifically, for a hotelier, it would be advantageous to link a patron's customer account with his or her social media accounts so that the hotelier could get a heads-up on what a patron might be saying about them on social media. These channels are also becoming two-way customer service channels and direct messaging patrons to their social accounts is probably one of the quickest ways to reach a patron. Of course, hoteliers should tread carefully in this area, especially in China, but there's no reason why platforms like Facebook, Twitter, WhatsApp, Line, WeChat, Instagram, and others couldn't be prominent customer connection and/or customer service channels.

In his article *Customer Analytics in the Age of Social Media*⁹⁴ for TDWI, David Stodder reports that the importance of customer analytics is in the boardroom; "overwhelmingly, respondents cited giving executive management customer and market insight (71%) as the most important business benefit that their organization seeks to achieve from implementing customer analytics."⁹⁴ "This percentage rises to 81% when survey results are filtered to see only the responses from those who indicated 'strong acceptance' of data-driven customer analytics over gut feel."⁹⁴ The second highest benefit cited, at 62%, was "the ability to react more quickly to changing market conditions, which speaks to the need for customer data insights to help decision makers address competitive pressures from rapid product or service commoditization."⁹⁴

With the commoditization of products and services, customer loyalty can be elusive; innovation must be constant and it should help to reveal why an organization might be losing its customer base.⁹⁴ "Information insights from analytics can help organizations align product and service development with strategic business objectives for customer loyalty."⁹⁴ These insights can also help an organization be selective about how they deploy their marketing campaigns and customer-touch processes so that they emphasize features in new products and services that are important to each specific customer.⁹⁴

Customer analytics can also provide answers to questions like⁹⁴:

- When in the life cycle are customers most likely to churn?
- What types of products or services would prevent them from churning?
- When should customers be offered complimentary items?
- When is it too costly to try to keep certain customers?

Hotels can realize significant ROI from investing in customer analytics as it can improve the marketing department's efficiency, effectiveness⁹⁴, and reach.

However, customer analytics ROI is a difficult thing to quantify. Better customer knowledge equates to more optimized marketing spend because a business can focus its resources on those campaigns that have the highest predicted chances of success for particular segments, as well as cutting off or avoiding those that have the least.⁹⁴

"By using analytics to eliminate mismatches of campaigns targeting the wrong customers or using the wrong messages and offers, marketing functions can reduce wasteful spending and increase gains relative to costs."⁹⁴ Customer segmentation allows organizations to move "away from one-size-fits-all, brand-level-only marketing and toward the 'market of one': that is, personalized, one-to-one marketing."⁹⁴

Reaching a customization and customer service level that makes a customer feel as though he or she is a preferred customer is not easy, scaling that up so that an entire database of customers feel that they are unique and receiving outstanding customer service is even more challenging. However, in this day and age of hyper-personalization, it is almost a necessity if a company wants to provide good and engaging customer service.

TDWI Research⁹⁴ examined the importance of accomplishing various objectives for gaining positive ROI from customer analytics (see Figure 7). "Using customer analytics to target cross-sell and up-sell opportunities was the objective cited by the biggest percentage of respondents (54%)."⁹⁴ This objective is about gaining more value from existing customers, understanding their purchasing habits, and trying to get them to buy more products more often.⁹⁴

"Some organizations (18%) are implementing an advanced technique called 'uplift modeling' (also called incremental or true-lift modeling), which enables marketers to use data mining to measure the impact and influence of marketing actions on customers."⁹⁴ Insights such as these allow marketers to develop new kinds of predictive models to determine the best prospects for up-sell and cross-sell offerings.⁹⁴ "As firms scale up to execute large numbers of campaigns across multiple channels, the efficiency gained from predictive modeling can be critical to marketing spending optimization," argues Stodder.⁹⁴

In your organization, which of the following marketing objectives are most important to achieve for customer analytics to deliver a return on investment? (Please select all that apply.)

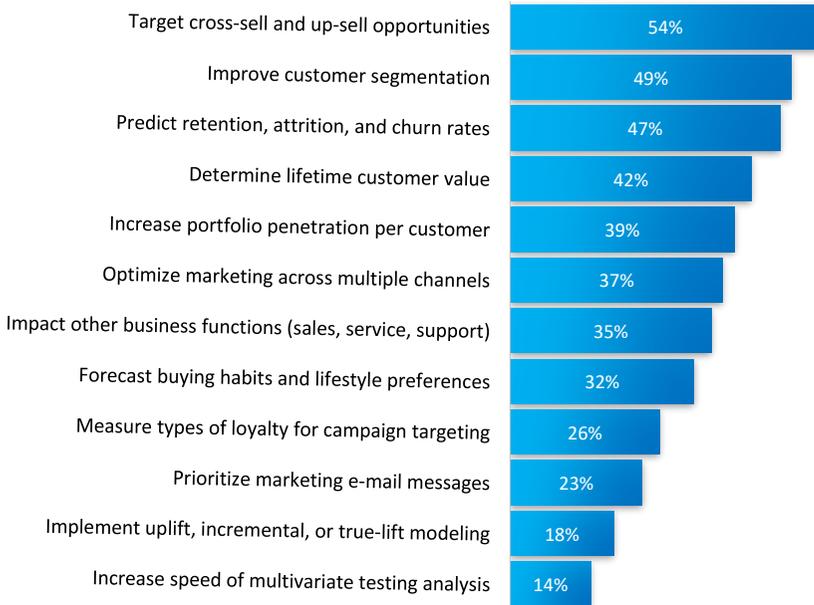


Figure 7: Which Are the Most Important Business Objectives When It Comes to Customer Analytics?

Source: TDWI Research⁹⁴, Based on 1,625 responses from 432 respondents; almost four responses per respondent, on average.

Analytics can improve marketing performance by quantifying a customer’s lifetime value as well as customer worth at the many different stages in the customer’s life cycle.⁹⁴ Armed with this kind of information, managers can align their deployment of resources to achieve the highest value, as well as avoid the costs and inefficiencies of marketing to the wrong people at the wrong time.⁹⁴

Organizations have long used demographics such as gender, household size, education, occupation, and income to segment customers, but data mining techniques let organizations segment much larger customer populations and, perhaps, more importantly, determine whether to apply new characteristics that refine segmentation to fit the specific attributes of the organization’s products and services.⁹⁴ AI can increase these demographic, education, occupation, and incomes variants exponentially, as well as add behavioral ones as well.

“Customer analytics using data mining tools improves the speed of segmentation analysis over manual and spreadsheet efforts that are often used in less mature organizations.”⁹⁴ Speed is a vital ingredient for marketing initiatives that are time sensitive, particularly for those companies that need to provide real-time cross-sell and up-sell offers to customers clicking through web pages.

With social media added to the mix, as well as clickstreams, and other behavioral data, the volume and variety of data is exploding, and that can be a godsend for hoteliers that want to increase personalization.⁹⁴

Social networking sites such as Facebook, Twitter, and LinkedIn “have files containing petabytes of data, often in vast Hadoop clusters.”⁹⁴ Weibo and WeChat add hundreds of millions of users into the mix and, with it, petabytes of data as well.

Text analytics can be used to increase the speed, depth, and consistency of unstructured content analysis far greater than what can be done manually.⁹⁴ “More advanced analytics can look for correlations between satisfaction ratings, commented sentiments, and other records, such as first-call-resolution metrics.”⁹⁴

“To analyze data generated by social media networking services such as Twitter, Facebook, Weibo, and LinkedIn, many organizations are implementing Hadoop and NoSQL technologies, which do not force a schema on the source data prior to storage, as traditional BI and data warehousing systems do.”⁹⁴ Because of this, the discovery analytics processes can run against the raw data.⁹⁴

“Customer analytics tools need to be able to consume data from sources such as Hadoop clusters and then integrate the insights into overall customer profiles,” says Stodder.⁹⁴ The data sources can be varied for these technologies and methods, says Stodder; “they include transaction data, clickstreams, satisfaction surveys, loyalty card membership data, credit card purchases, voter registration, location data, and a host of [other] demographic data types.”⁹⁴

In his article *Control Group Marketing — With or Without CRM Software Systems*⁹⁵, Rick Cook states that, “The basic idea of a control group is simple. Select a random (or nearly random) sample from your campaign's marketing list and exclude them from the promotion. Then measure the control group's activity and compare it to the activity of the group targeted via a campaign. The difference between the control and campaign group gives you a pretty good notion of how effective — and profitable — the campaign is.

“The theory is that a certain fraction of the customers in the campaign are going to purchase from you anyway during the campaign period. The control group lets you filter out that effect, as well as the effects of other channels which may be influencing behavior, such as display advertising, and shows you how much the campaign has affected customer behavior,” explains Cook.⁹⁵

Although control groups should be used to test out the effects of marketing campaigns, few companies include them in their marketing processes.⁹⁵ “Marketing control groups become even more effective when combined with the customer analytics found in most marketing automation or customer relationship management systems,” notes Cook.⁹⁵

Cook argues that, “With a CRM system and a control group you can also detect the halo effect of your campaign. These are purchases and other actions which are influenced by the campaign but don't come in through the normal campaign channels.”⁹⁵ For example, a customer could be so inspired by one particular campaign that he or she picks up the phone and orders products directly from the company instead of going through the call-to-action channel.⁹⁵ “Another example is the customer who doesn't use the promotional coupon you included in your marketing campaign but who purchases the product anyway.”⁹⁵ Cook notes that brands “can assume that customers in the test group who respond in unconventional methods are still influenced by the campaign and so should be counted as part of the campaign effect.”⁹⁵ “Because CRM software lets you track all points of customer contact, and not just the direct response to the campaign, it can capture these halo customers,” concludes Cook.⁹⁵

The size of the control group is usually 10 percent of the size of the campaign or test group.⁹⁵ Ideally you want the control group to be a truly random sample from the company's campaign list, but this is difficult to attain in practice as complete randomness is hard to achieve.⁹⁵ “Many companies select their control group by a simpler process, such as selecting every 10th name on the list to make up the control group,” but there are other more scientific ways to choose the participants, which could and should be utilized.⁹⁵

Customer Lifecycle

Today, we can safely say that the mass marketing experience is over. According to *Gartner*, there are five stages of customer experience maturity — initial, developing, defined, managed and optimizing. The goal here is to improve the customer experience through a systematic process to improve customer satisfaction, loyalty and advocacy.

In its *15 Applications of Artificial Intelligence in Marketing*⁹⁶, Huguesrey maps out the most effective AI technologies for marketing across the customer lifecycle. “All the techniques are 'AI' in the sense that they involve computer intelligence, but we've broken them down into 3 different types of technology — Machine Learning Techniques, Applied Propensity Models, and AI Applications,” says Huguesrey.⁹⁶ The steps are broken down into the customer lifecycle RACE framework (See Figure 8), which contains four separate groups — Reach, Act, Convert, and Engage.⁹⁶

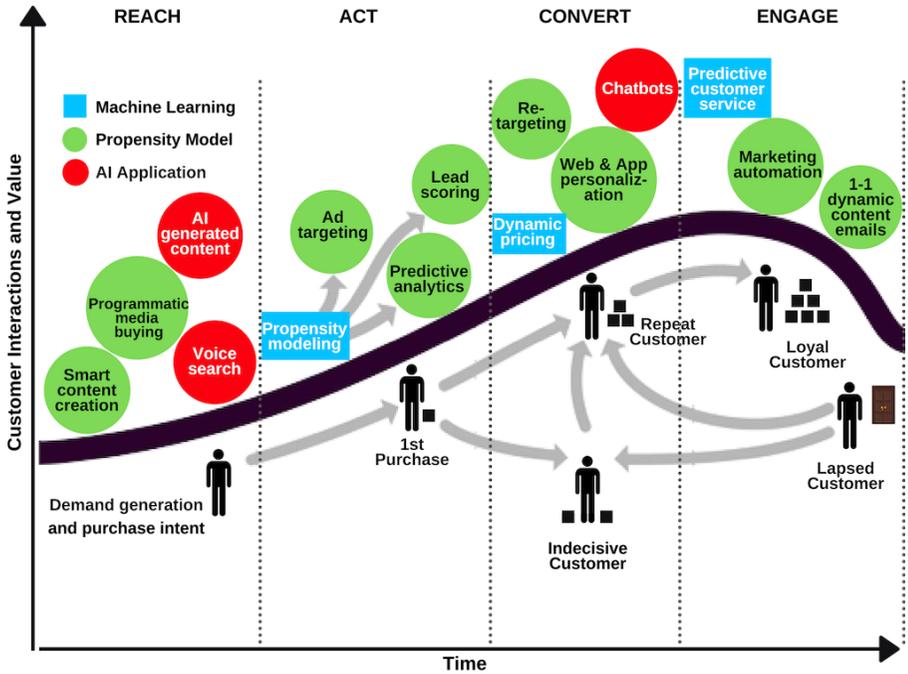


Figure 8: A.I. for marketers across the customer lifecycle

Source: Huguesrey⁹⁶

“Each different application has major implications for marketers, but the applications have different roles to play across the customer journey. Some are better for attracting customers, whilst others are useful for conversion or re-engaging past customers,” says Huguesrey.⁹⁶

According to Huguesrey, reach “involves using techniques such as content marketing, SEO and other ‘earned media’ to bring visitors to your site and start them on the buyer’s journey.”⁹⁶ “AI & applied propensity models can be used at this stage to attract more visitors and provide those that do reach your site with a more engaging experience.”⁹⁶

AI-generated content can be a good place to start. “AI can’t write a political opinion column or a blog post on industry-specific best practice advice, but there are certain areas where AI generated content can be useful and help draw visitors to your site,” says Huguesrey.⁹⁶ AI content writing programs like Wordsmith can pick elements from a dataset and structure a “human sounding” article from it.⁹⁶

“AI writers are useful for reporting on regular, data-focused events. Examples include quarterly earnings reports, sports matches, and market data,” says Huguesrey.⁹⁶ If you operate in a niche such as financial services or sports, then

“AI generated content could form a useful component of your content marketing strategy.”⁹⁶ AI-powered content curation allows brands to better engage visitors and customers on their site by showing them relevant content.⁹⁶ Huguesrey sees it as “a great technique for subscription businesses, where the more someone uses the service, more data the machine learning algorithm has to use and the better the recommendations of content become.”⁹⁶ The systems becomes somewhat of a self-fulfilling prophecy, like it has become for companies like Netflix, Pandora, and Amazon.

In the coming years, voice search is expected to change the future of SEO and brands need to keep up with the changing times.⁹⁶ Huguesrey believes “A brand that nails voice search can leverage big gains in organic traffic with high purchase intent thanks to increased voice search traffic due to AI driven virtual personal assistants.”⁹⁶

Programmatic media buying — the algorithmic purchase and sale of advertisements in real time — “can use propensity models generated by machine learning algorithms to more effectively target ads at the most relevant customers.”⁹⁶ AI can ensure programmatic ads don’t appear on questionable websites and/or remove them from a list of sites that the advertiser doesn’t want them to appear on.⁹⁶

In her article *Programmatic Advertising 101: How it Works*⁹⁷, Sara Vicioso states that, “programmatic advertising is the automated process of buying and selling ad inventory through an exchange, connecting advertisers to publishers.” This process uses artificial intelligence technologies “and real-time bidding for inventory across mobile, display, video and social channels — even making it way into television.”⁹⁷

Vicioso adds that, “Artificial intelligence technologies have algorithms that analyze a visitor’s behavior allowing for real time campaign optimizations towards an audience more likely to convert. Programmatic companies have the ability to gather this audience data to then target more precisely, whether it’s from 1st party (their own) or from a 3rd party data provider.”⁹⁷

Programmatic media buying includes the use of demand-side platforms (DSPs), supply-side platforms (SSPs) and data management platforms (DMPs).⁹⁷ DSPs facilitate the process of buying ad inventory on the open market, as well as provide the ability to reach a brand’s target audience due to the integration of DMPs.⁹⁷ “DMPs collect and analyze a substantial amount of cookie data to then allow the marketer to make more informed decisions of whom their target audience may be,” says Vicioso.⁹⁷

“On the publisher side of things, publishers manage their unsold ad inventory through an SSP,”⁹⁷ which reports such clickstream activity as how long a visitor was on a specific site or how many pages were viewed per visit.⁹⁷ Vicioso explains that, “SSPs will ultimately be in charge of picking the winning bid and will serve

the winning banner ad on the publisher's site."⁹⁷

As Allie Shaw notes in her article *AI could save television advertising with advanced personalization*⁹⁸, "In short, AI programs draw from data pools to make decisions about where and when to buy or sell ad space according to demographic and cost-versus-benefit information." "Essentially, your TV can learn about your habits in the way your web browser already does, allowing advertisers to present you with ads based on that information — so you'll see fewer repetitive ads that you don't care about. This means you and your neighbors may all be watching the premiere of *The Walking Dead* but seeing different ads based on your unique interests," explains Shaw.⁹⁸

"Thanks to programmatic TV advertising, advertisers can know how many people have viewed their ads, where these viewers are located, and what their viewing history looks like — with information updating by the minute," says Shaw.⁹⁸ "They're also able to get more accurate data about an ad's cost per impression (CPM, or the cost for each 1,000 people who see the ad), allowing for more relevant and cost-efficient targeting," she explains.⁹⁸

The second step of the RACE framework is "Act". Brands must draw visitors in and make them aware of the company's product and/or services. Machine learning algorithms can build propensity models that can predict the likelihood of a given customer to convert, the price at which a customer is likely to convert, and/or what customers are most likely to turn into repeat customers.⁹⁶

"Propensity models generated by machine learning can be trained to score leads based on certain criteria so that your sales team can establish how 'hot' a given lead is, and if they are worth devoting time to," explains Huguesrey.⁹⁶ "This can be particularly important in B2B businesses with consultative sales processes, where each sale takes a considerable amount of time on the part of the sales team," says Huguesrey.⁹⁶

The machine learning algorithms can run through vast amounts of historical data to establish which ads perform best on which people and at what stage in the buying process.⁹⁶ Using this data, ads can be served to them with the most effective content at the most effective time.⁹⁶ By using machine learning to constantly optimize thousands of variables, businesses can achieve more effective ad placement and content than traditional methods.⁹⁶ However, humans will still be needed for the creative parts.⁹⁶

The third step of the RACE framework — "Content" — is one of the most important steps and it includes dynamic pricing, re-targeting, web and app personalization, and chatbots.⁹⁶

All marketers know that discount sales are one of the most effective ways of moving product, but they can also hurt the financial bottom line.⁹⁶ Sales are so effective because they get people to buy a product that they might not have

previously considered because they couldn't justify the cost of the purchase. But sales also mean people who would have paid the higher price pay less than they would have. The trick is to understand the threshold between buying and not buying and this is where dynamic pricing comes in.

By targeting special offers only at those who are likely to need them in order to convert, brands can ensure they don't give offers to people who have the propensity to pay full price.⁹⁶ "Machine learning can build a propensity model of which traits show a customer is likely to need an offer to convert, and which are likely to convert without the need for an offer," says Huguesrey.⁹⁶ This means companies can increase sales, while also maximizing their profit margins.⁹⁶

By using a propensity model to predict a customer's stage in the buying cycle, hoteliers can serve the customer, either through an app or on a web page, with the most relevant and timely content.⁹⁶ "If someone is still new to a site, content that informs them and keeps them interested will be most effective, whilst if they have visited many times and are clearly interested in the product then more in-depth content about a product's benefits will perform better," states Huguesrey.⁹⁶

Another way to convert customers is with chatbots that mimic human intelligence by interpreting a consumer's queries and potentially complete an order for them.⁹⁶ Chatbots are relatively easy to build and Facebook is simplifying the process of developing chatbots for brands.⁹⁶ Facebook "wants to make its Messenger app the go-to place for people to have conversations with a brand's virtual ambassadors."⁹⁶ Facebook has created the wit.ai bot engine, which allows brands to train bots with sample conversations and have these bots continually learn from customer interactions.⁹⁶

"Much like with ad targeting, machine learning can be used to establish what content is most likely to bring customers back to the site based on historical data," says Huguesrey.⁹⁶ By building an accurate prediction model of what content works best to win back different customer types, machine learning can help optimize a brand's retargeting ads to make them as effective as possible.⁹⁶

The final step of the RACE framework is "Engage". As previously mentioned, it is far easier to sell to an existing customer than it is to find and attract new ones, therefore keeping current customers happy is paramount.⁹⁶ "This is particularly true in subscription-based business, where a high churn rate can be extremely costly," contends Huguesrey.⁹⁶

"Predictive analytics can be used to work out which customers are most likely to unsubscribe from a service, by assessing what features are most common in customers who do unsubscribe," says Huguesrey.⁹⁶ "It's then possible to reach out to these customers with offers, prompts or assistance to prevent them from churning," contends Huguesrey.⁹⁶

Marketing automation techniques usually involve a series of business rules, which, once triggered, initiate or continue interactions with a given customer.⁹⁶ However, these rules can be quite arbitrary.⁹⁶ “Machine learning can run through billions of points of customer data and establish when are the most effective times to make contact, what words in subject lines are most effective and much more,” says Huguesrey.⁹⁶ “These insights can then be applied to boost the effectiveness of your marketing automation efforts,” he adds.⁹⁶

“In a similar fashion to marketing automation, applying insights generated from machine learning can create extremely effective 1:1 dynamic emails,” says Huguesrey.⁹⁶ Propensity models can “establish a subscribers propensity to buy certain categories, sizes and colors through their previous behavior and displays the most relevant products in newsletters.”⁹⁶ The product stock, deals, pricing specifically individualized for each customer would all be correct at the time the customer opens the offer email.⁹⁶

For most businesses, customer information housed in an EDW would include things like transactional data, customer and CRM data, mobile, social, and location data, as well as information from web logs that track its user’s web behavior, and online advertising bid management systems. EDWs should also give a business the ability to do analytics on the fly, which could help the customer’s experience in a multitude of ways.

Today, most big companies which have large customer databases have loyalty programs that are part of a CRM and/or an SCRM initiative. These companies should provide their customers with an intimate experience that will make them want to return to again and again and again.

Obviously, creating a consolidated customer view is a necessary component of personalization. Another important step of bringing personalization efforts up to a user’s expectation level will be using behavioral data in the process. In order to create these types of customer experiences, businesses need to strategically collect and utilize customer data, including real-time signals of intent, which aren’t always captured today. They are not easy to capture, either.

In their article *Knowing What to Sell, When, and to Whom*⁹⁹, authors V. Kumar, R. Venkatesan, and W. Reinartz showed how, by simply understanding and tweaking behavioral patterns, they could increase the hit rate for offers and promotions to consumers, which then had an immediate impact on revenue.

By applying statistical models based on the work of Nobel prize-winning economist Daniel McFadden, researchers accurately predicted not only a specific person’s purchasing habits, but also the specific time of the purchase to an accuracy of 80%.¹⁰⁰

Obviously, the potential to market to an individual when he or she is primed to accept the advertising is advantageous for both parties involved. By utilizing data

from past campaigns and measures generated by a predictive modeling process, hotels can track actual campaign responses versus expected campaign responses, which can often prove wildly divergent. Additionally, hotels can generate upper and lower “control” limits that can be used to automatically alert campaign managers when a campaign is over or underperforming, letting them focus on campaigns that specifically require attention.

One of the benefits of automating campaigns is that offers based on either stated or inferred preferences of patrons can be developed. Analysis can identify which customers may or may not be more responsive to an offer centered around a particular team or bet type. The result: more individualized offers are sent out to the hotel’s patrons and, because these offers tap into a customer’s wants, desires, needs *and* expectations, they are more likely to be used; more offers used mean more successful campaigns, which means more money coming into the hotel’s coffers.

With predictive analytics, a hotel can even predict which low-tier and mid-tier customers are likely to become the next high rollers. In so doing, the hotelier can afford to be more generous in its offers as it will know that there is a high likelihood that these customers will appreciate the personalized attention and therefore become long term — and, hopefully, highly profitable — patrons.

Once the patron leaves the hotel, the marketing cycle begins anew. RFM models can project the time at which a patron is likely to return and social media should be checked for any comments, likes or uploads left by a customer, something that should already be occurring.

A campaign management solution can enable the hotel to develop and manage personalised customer communications strategies and the delivery of offers. It will also allow users to rapidly create, modify and manage multi-channel, multi-wave marketing campaigns that integrate easily with any fulfilment channel, automatically producing outbound (contact) and inbound (response) communication history. Users can define target segments, prioritise selection rules, rank offers across multiple campaigns and channels, select communication channels, schedule, and execute campaigns, and perform advanced analyses to predict and evaluate the success of customer communications.

The customer journey starts the moment a potential customer browses to a hotelier’s webpage or notices an advertisement for a bet on television, or on the Internet, or in print. With a few browser click strokes, a hotelier’s ecommerce department can create a click path analysis that reveals customer interactions on the hotelier’s website. Descriptive analytical functionalities can then provide a deeper understanding of the customer journey. Column dependencies can visually display the strength of a relationship between attributes within any dataset. This helps users better understand the characteristics of their data and is often used to help target further analytics.

A recommendation engine can also help predict a person's interest based on historical data from many users. This is useful in increasing client engagement, recommending more relevant choices and increasing customer satisfaction. For example, recommendations can predict interest in the hotelier's games and services.

Rapid advancements in facial-recognition technology have reached the point where a single face can be compared against 36 million others in about one second.¹⁰¹ A system made by Hitachi Kokusai Electric and reported by DigInfo TV shown at a security trade show a few years ago was able to achieve this blazing speed by not wasting time on image processing. Using edge analytics, it takes visual data directly from the camera to compare the face in real time.¹⁰¹ The software also groups faces with similar features, so it is able to narrow down the field of choices very quickly. The usefulness to the hotelier's security enforcement is pretty obvious, but it can also be used by multiple departments; facial recognition technology can be set up to send alerts to hosts, store clerks or managers, or just about anyone needing it.

Predictive modeling is only useful if it is deployed *and* it creates an action. Taking advantage of the more powerful, statistically based segmentation methods, customers can be segmented not only by dollar values, but also on all known information, which can include behavioral information gleaned from resort activities, as well as the patron's simple demographic information. This more detailed segmentation allows for more targeted and customer-focused marketing campaigns.

Models can be evaluated and reports generated on multiple statistical measures, such as neural networks, decision trees, genetic algorithms, the nearest neighbor method, rule induction, and lift and gains charts. Once built, scores can be generated in a variety of ways to facilitate quick and easy implementation. The projects themselves can be re-used and shared to facilitate faster model development and knowledge transfer.

In his paper *Predictive Analytics*¹⁰², Wayne Eckerson advises creating predictive models by using the following six steps:

1. Define the business objectives and desired outcomes for the project and then translate them into predictive analytic objectives and tasks.
2. Explore and analyze the source data to determine the most appropriate data and model building approach and then scope the effort.
3. Prepare the data by selecting, extracting, and transforming the data, which will be the basis for the models.
4. Build the models, as well as test and validate them.
5. Deploy the models by applying them to the business decisions and processes.
6. Manage and update the models accordingly.

By utilizing data from past campaigns and measures generated by the predictive modeling process, a hotel can track actual campaign responses versus expected campaign responses, which can often prove wildly divergent. Additionally, a hotel can generate upper and lower “control” limits that can be used to automatically alert campaign managers when a campaign is over or underperforming, letting them focus on campaigns that specifically require attention.

By understanding what type of patron is on its website, why they are there, and what they like to do while they are there, a hotel can individualize its marketing campaigns so that they can be more effective, thereby increasing the hotelier’s ROI.

All of a patron’s captured information can now become part of the master marketing profile that will be the basis for future marketing efforts. Combining the daily, weekly and monthly master marketing profiles will also allow the hotel to develop insightful macro views of its data, views that could help with labor management and vendor needs.

Customer Loyalty

Loyalty is so important to a hotelier company because, as repeated studies have shown, customers become more profitable over time. In their study *Zero Defections: Quality Comes to Service*¹⁰³, Reichheld and Sasser demonstrated that a customer’s profitability rises as his or her loyalty increases. In this study, the authors found that it usually took more than a year to recoup any customer acquisition costs, but then profits increased as customers remained with the service or firm.

Here are a few other facts and figures regarding customers and their loyalty:

- On average, loyal customers are worth up to 10 times as much as their first purchase.¹⁰⁴
- It is 6-7 times more expensive to acquire a new customer than it is to keep a current one.¹⁰⁴
- News of bad customer service reaches more than twice as many ears as praise for a good service experience.¹⁰⁴
- For every customer who bothers to complain, 26 other customers remain silent.¹⁰⁴

Loyalty is so important to a hotelier because, as repeated studies have shown, customers become more profitable over time. Reichheld and Sasser demonstrated that a customer’s profitability increases as his or her loyalty increases.¹⁰³ In this study, the authors found that it usually took more than a year to recoup any customer acquisition costs, but then profits increased as

customers remained with the service or the firm.¹⁰³

Reichheld and Sasser believe there are four factors for this growth and, in order of their importance, they are¹⁰³:

1. Profit derived from increased purchases: as a customer ages, he or she will probably become more affluent, therefore will have more money to spend for company products/services.
2. Profit from reduced operating costs: As customers become more experienced, they should make fewer demands on the business, perhaps taking advantage of available self-service options.
3. Profit from referrals to other customers.
4. Profit from price premiums: long-term customers are more likely to pay regular prices for services rather than being tempted into using a businesses' lower profit products and/or services.

As previously mentioned, customer satisfaction is the foundation of true customer loyalty, while customer dissatisfaction is the key factor that drives customers away.¹⁰³ This may sound obvious, but its importance cannot be overstated. The number one thing that creates loyalty in *anybody* (that includes your customers) is the social construct of reciprocity — the social norm that's been evaluated and debated since the days of Aristotle.¹⁰³ Many scholars believe it to be one of the single most defining aspects of social interaction that keeps society whole.¹⁰³ Reciprocity doesn't have to be a bar of gold, like some hoteliers in Macau like to offer their high rollers, it could simply be an acknowledgement of poor customer service along with the promise to do better in the future.¹⁰³

As previously mentioned, Jones and Sasser warned that, "Extremely dissatisfied customers can turn into 'terrorists,' providing an abundance of negative feedback about the service provider."⁸⁹ Through social media channels, negative feedback can reverberate around the world within seconds. Today, more than ever, companies must spot dissatisfied customers and approach them before they do irreparable harm to a company's image and reputation.

In the *zone of indifference*, customers willingly switch if they can find a better alternative, while in the *zone of affection*, satisfaction levels are high and "customers may have such high attitudinal loyalty that they don't look for alternative services."⁸⁹ It is within this group that "Apostles" — members who praise the firm in public — reside and this is the group that is responsible for improved future business performance.⁸⁹ In the social media world, these people are more likely to be known as "influencers" and I will go into much more detail about this type of marketing in chapter five.

A consumer's engagement with a brand can be measured along a continuum from no awareness, through early engagement, and, hopefully, if everything goes right, into advocacy.⁵³ As for the customer-company relationship, "the strength of feeling will develop and vary over time and, as in any healthy

relationship, both parties should be aware of feelings so they can react accordingly,” advises Woodcock.⁵³

As was shown in Nielsen’s 2012 *Global Trust in Advertising*¹⁰⁵ survey, consumers trust their friends and colleagues much more than they trust TV advertising or corporate communications. Today, consumers communicate with each other like never before, through a multitude of social and mobile media channels and these channels should be exploited as much as possible.

“SCRM is the connection of social data (wherever it is) with existing customer records (customer database) that enable companies to provide new forms of customer insight and relevant context.”⁵³ With SCRM, marketers can “understand the mood, find new sales leads, respond faster to customer needs and maybe even anticipate needs by listening into their conversations and taking action.”⁵³

SCRM doesn’t replace CRM systems; it adds value by augmenting traditional systems.⁵³ As Woodcock notes, “SCRM is a great hunting ground for businesses to find and acquire consumers to full ‘traditional’ CRM programs as well as identify key influencers who can be considered as high value customers. It offers companies an organized approach, using enterprise software that connects business units to the social web giving them the opportunity to respond in near real time, and in a coordinated fashion.”⁵³

Social media can help amplify the “relationship” in “Customer Relationship Management”, thereby enabling organizations to connect and engage consumers in a unique way, as well as personalize and monetize customer relationships on a sustained basis, which should increase profitability.¹¹⁹ “Social media also provides a path to richer customer analysis, using technologies capable of funneling and consolidating customer insights.”¹¹⁹ Insights derived from this analysis can help companies to “dynamically calibrate, anticipate, and offer products and services that meet perpetually shifting consumer demands in a hyper-competitive marketplace.”¹¹⁹

Marketers can also “listen into what customers are saying, to better understand their needs, their voices and tie it back to actual customer profiles”⁵³, which could contain their Facebook or WeChat pages or Twitter handles. “In addition, marketers will be able to catch leads in ‘mid-air’ by listening for keywords that suggest a customer is getting ready to buy, then sending real-time alerts to sales teams to respond.”⁵³

For a hotelier, it would be advantageous to link a patron’s account with his or her social media accounts so that the hotel company could get a heads-up on what a patron might be saying about them on social media. A tip off about an upcoming and/or a last-minute trip to Vegas, Macau, KL, Manila, or Singapore could be captured from social media, then acted upon accordingly.

In a lot of cases, ROI is an enormously tricky thing to measure, but social media is providing unique ways for businesses to quantify their social media spend; gone are the days of companies wasting endless amounts of time and money building up what amounts to a useless group of Facebook followers, or, at least, they should be.

“Short-term campaign ROI as the main measure for individual campaigns will evolve into correlation analysis between activities, engagement and sales. This will be unsettling for many traditional marketers.”⁵³ “The explicit use of active and control groups, and experimentation of using different treatments will help marketers understand the impact of specific SM activities.”⁵³ More direct marketing type disciplines will be required, in a world where there is real-time feedback on attitude and behavior and a plethora of data.”⁵³ This has become a much more demanding world in terms of capturing and utilizing all of this data, but making the effort to turn this data into actionable intelligence will be noticed by fickle consumers, I have no doubt.

In its *Retail Analytics: Game Changer for Customer Loyalty*¹⁰⁶, Cognizant argues that in the retail industry, “predictive models can be used to analyze past performance to assess the likelihood that a customer will exhibit a specific behavior in order to improve marketing effectiveness.” This can help with “predicting customer reactions to a given product and can be leveraged to improve basket size, increase the value of the basket and switch the customer to a better and more profitable offering.”¹⁰⁶ Predictive models can also help tailor pricing strategies that take into account both the need for competitive pricing and the company’s financial bottom line.¹⁰⁶ Both of these processes can be done in the gaming industry as well, obviously.

Predictive analytics and data mining are used to discover which variables out of possibly hundreds are most influential in determining customer loyalty within certain segments.⁹⁴ “Advanced analytics generally involves statistical, quantitative, or mathematical analysis and centers on developing, testing, training, scoring, and monitoring predictive models.”⁹⁴

Models can be created that will uncover patterns, affinities, anomalies, and other useful insights for marketing campaigns and for determining cross-sell and up-sell opportunities.⁹⁴ “The tools and techniques are also used for developing and deploying behavioral scoring models for marketing, deciding whether to adjust customers’ credit limits for purchases, and a variety of highly time-sensitive analytic processes,” notes Stodder.⁹⁴

“As more online customer behavior is recorded in Web logs and tracked through cookies and other observation devices, sizeable amounts of information are becoming available to organizations that seek a more accurate view of a customer’s path to purchase,” says Stodder.⁹⁴ Attribution analysis is, first and foremost, a big-data problem, given the quantity and variety of data available

from today's multiple platforms.⁹⁴

Businesses that are performing attribution analysis will frequently employ Hadoop and/or MapReduce, with analytic software solutions such as R, SAS's eMiner, SAP's InfiniteInsights, Python, and IBM's SPSS, amongst others.⁹⁴ This allows a business to run sophisticated algorithms against detailed data to find the correct path to purchase. This analysis can then be integrated with analysis from other data types and sources, including those which might have been generated by some offline customer activity.⁹⁴

Attribution analysis can reveal such things as what kinds of campaigns most influence customer behavior.⁹⁴ "The analysis can help organizations determine where to allocate marketing resources to gain the highest level of success, as well as how to more accurately assign the percentage of credit due to specific marketing and advertising processes," concludes Stodder.⁹⁴

On August 13, 2014, Facebook announced a major step forward in the area of attribution analysis.¹⁰⁷ In his article *Facebook Now Tells Whether Mobile Ads Lead to Desktop Purchases*¹⁰⁷, T. Peterson says that Facebook "would start telling advertisers on what device people saw an ad and on what device they took an action, such as buying a product or signing up for a test drive, as a result of seeing that ad. That means Facebook will be able to credit mobile ads that lead to desktop sales and desktop ads that result in mobile purchases."

Peterson notes that, "Advertisers can already track conversions through Facebook on desktop and on mobile, but to date Facebook hasn't broken out conversions by device type for advertisers to see. For example, advertisers have been able to see if their desktop and mobile ads lead to conversions, but they didn't know on which device type those conversions were taking place."¹⁰⁷

However, Facebook's new cross-device conversion measurement only works for advertisers who place specific Facebook trackers on their websites and mobile apps.¹⁰⁷ "Without sharing users' personal information with the advertiser, those trackers can see that a Facebook user is checking out the advertisers' site or app and whether they've converted in the advertiser-specified fashion."¹⁰⁷ If the person does convert, "Facebook's trackers can trace back to see if that person has seen an ad from that advertiser on Facebook, which may have directly or indirectly led to the conversion."¹⁰⁷ Of course, nothing is 100% certain when it comes to attribution analysis, but this is a big step in the right direction.

The Hotel Engagement and Loyalty Platform

The *Hotel Engagement and Loyalty Platform* (see Figure 9) shows how a hotel would engage its customers in a loyalty platform that utilizes social media as an important part of the process. The *Hotel Engagement and Loyalty Platform* can be implemented in a multitude of ways. In the *Listening* part, hotels should define and look out for triggers such as photos, hashtags, keywords, likes, video views, etc., etc.

This runs the gamut, from staying on top of keywords and hashtags on Twitter, Facebook, Instagram, and a whole host of other potential image-related social sites.

Check-ins and geo-posts from sites like Foursquare, WeChat, Instagram, Facebook, WhatsApp, YouTube, as well as a whole host of other social networks can help hoteliers connect with a nearby audience. Sports betting operators should also be listening to comment boards or short-term blogging sites like Tumblr or social news aggregation sites like Reddit for comments about their products and services.

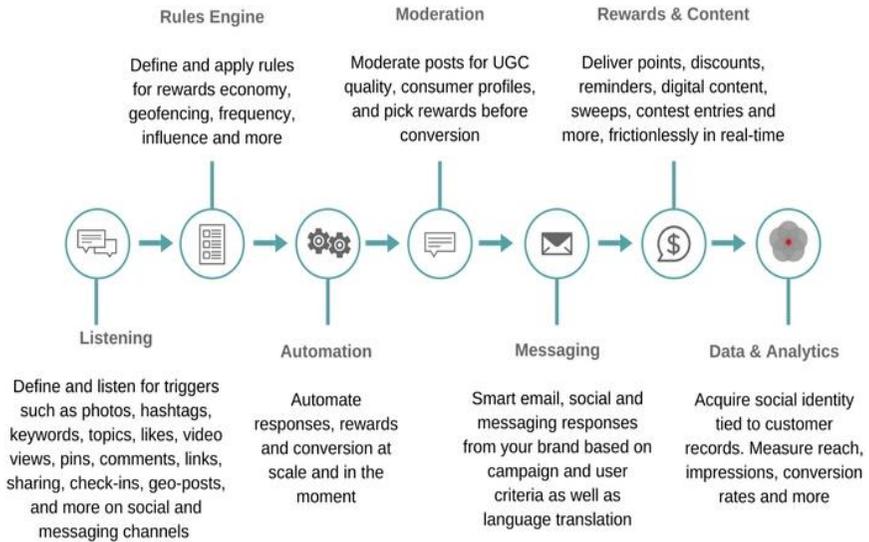


Figure 9: The Hotel Engagement and Loyalty Platform

Source: chirpify.com

The *Rules Engine* step is pretty straightforward; hotel are already creating considerable business rules for their establishments and these should be extended to the company’s defined rewards program, their reward’s economy, and the marketing of the program.

Rewards programs are difficult to implement and costly to maintain because there are so many moving parts; each reward point and free offer has to be correlated against the department that offered it, the right budget it should be assigned to and every reward point has a monetary value that has to be enumerated properly.

Building a rules engine can simplify the marketing process by defining who gets what, when he or she gets it, and through which channel it gets delivered on. With mobile and social being added to the customer channel mix, things are going to get exponentially more complex very quickly, so building a rules engine that lays things out in a highly definable way is imperative.

Once the rules engine is in place, automation must kick in. With hotels now handling

databases filled with millions of customers, it would be impossible to market to customers without considerable automation going on behind the scenes. Segmenting customers and building campaigns that market to thousands of individuals would be impossible as well.

Understanding the ROI of each marketing campaign is imperative, and, with today's real-time personalization capabilities, hoteliers can quickly understand who is accepting their marketing and how much revenue it is driving. Adding a real-time element to the process would be impossible without strict rules set in place and powerful marketing automation tools that not only send out marketing offers but also quantify them once they are utilized.

In terms of marketing and customer service, Facebook bots could be created and automated to answer standard customer service questions and this should lighten the load on a hotelier's customer service department.

Moderating boards and UGC posts are a great channel to connect with customers and/or potential customers. They are also good places to pick up both customer service issues and competitor information.

As Chirpify sees it: "Moderation allows brands to increase social efficiency and effectiveness by uniting automated listening triggers while giving moderators the ability to manually review posts and user content for fit before determining their qualification for a reward. This helps brands better personalize the reward based on the user while making sure that the reward is one that the customer appreciates and/or makes them feel special."¹⁰⁸

Rewards and marketing content can deliver points, discounts, reminders, as well as contest entries in real-time, but reaching today's audiences can be tricky.

Marriott won the *Chief Marketer's* 2017 Gold for Best Loyalty Marketing for the development of a loyalty engagement platform that uses rewards points as social currency to incentivize engagement on Twitter, Facebook and Instagram.¹⁰⁹

In the *Chief Marketer* write up about the award, the magazine noted that, "The platform was designed as a reciprocal ecosystem where members are empowered to engage via social media and advocate on behalf of the program. The platform engages guests one-to-one at scale with personalized content and instant rewards, enabling members to engage with the loyalty program even when they aren't on property."¹⁰⁸

"By connecting their social media accounts with the platform, members can earn points by engaging with a variety of triggers throughout the year. The platform is integrated directly with Marriott Rewards' member database, allowing the program to recognize and reward members the moment they post," *Chief Marketer* notes.¹⁰⁸

According to *Chief Marketer*, engagement was huge. "When it came time to

amplify the launch of Marriott Rewards' Reward-a-Friend enrollment program, connected members helped spread the word with a simple retweet. The campaign generated 7.4M earned media impressions in four days."¹⁰⁸

"Connected members generated more than 65 million positive earned media impressions in 2016 on behalf of Marriott Rewards. More than 84 million Rewards points were awarded in response to 326,000 social media engagements, equivalent to earning roughly 11,000 free nights."¹⁰⁸ This kind of engagement comes at a cost, obviously (the free rooms), but the enormous amount of engagement is worth the cost because it is word-of-mouth marketing and it allows verifiable visibility on the engagement. The ROI shouldn't be hard to quantify either.

Most major hotel companies today have customer loyalty programs that are a part of a CRM and/or a SCRM initiative to provide their customers with an intimate experience that will make them want to return to the hotelier again and again and again.

Obviously, creating a consolidated customer view is a necessary component of personalization. Another important step of bringing personalization efforts up to a user's expectation level will be using behavioral data. In order to create these types of customer experiences, hotel companies will strategically collect and utilize customer data, including real-time signals of intent.

A campaign management solution can enable the hotel to develop and manage personalised customer communications strategies and the delivery of offers. It will also allow users to rapidly create, modify and manage multi-channel, multi-wave marketing campaigns that integrate easily with any fulfilment channel, automatically producing outbound (contact) and inbound (response) communication history. Users can define target segments, prioritise selection rules, prioritise offers across multiple campaigns and channels, select communication channels, schedule and execute campaigns, and perform advanced analyses to predict and evaluate the success of customer communications.

The customer journey starts a long time before the customer even enters the hotel. It begins the moment a potential customer browses to a hotel operator's webpage or notices an advertisement for a hotel on television, or on a website, or in print, or on a billboard. It can even be while connecting with a hotel's social media accounts, or even the moment the customer actually enters the hotel lobby.

With a few browser click strokes, a hotel operator's ecommerce department can create a click path analysis that reveals customer interactions on the hotel's websites. Descriptive analytical functionalities can then provide a deeper understanding of the customer journey.

A recommendation engine can help predict a person's interest based on historical data from many users. This is useful in increasing client engagement, recommending more relevant choices and increasing customer satisfaction.

From checking into the hotel, to eating in the hotel's restaurants, or drinking at one of the hotel's clubs or bars, through to the moment the patron leaves the property, every interaction's datapoint should be collected and collated. Throughout this entire customer journey, the hotel's DW can help collect, analyze, visualize, and then, potentially, live stream recommendation content to those needing it.

Like the proverbial butterfly who flaps its tiny wings in Brazil, and sets off a typhoon in Manila, any customer who shows any inkling towards visiting the property can be quantified and analyzed so that not only is their trip a rewarding one, but also that their customer touch points are reduced as much as possible so the labor needs of the IR are kept to a minimum.

By understanding what type of patron is on its property, why they are there, and what they like to do while they are there, a hotel operator can individualize its marketing campaigns so that they can be more effective, thereby increasing the hotelier property's ROI.

One thing to keep in mind when it comes to rewards is uniqueness and what has become known as "social rewards". In his article *Getting it right: mixing social and economic rewards in hotel loyalty programmes*¹¹⁰, Lee Jin-soo argues that:

"The concept of relationship marketing is prevalent in the local hotel industry, giving rise to numerous loyalty or reward programmes that offer preferential rewards for members in proportion to how often they patronise an establishment. The rewards offered — usually in the form of economic or social benefits — make members feel special, important, and appreciated. Common examples of economic benefits include free room, room upgrade and discounts. Social benefits, on the other hand, are more diverse and include any preferential treatment or personalised recognition and attention given to individual customers."

Lee believes that social rewards are important in today's world that is filled with customer loyalty programs. In comparison to typical rewards, "social rewards usually work better in building stronger relationships since social benefits enhance a customer's intrinsic reasons for sustaining and reinforcing emotional commitment, and thus his attachment to a specific hotel."¹¹⁰

The author of the article, Lee Jin-soo is also an associate professor of the School of Hotel and Tourism Management at the Hong Kong Polytechnic University and the article discusses a study the university did exploring the impact of economic

and social rewards on the relational behavior of loyalty program members.¹¹⁰ The university “conducted an online survey of 334 participants privy to various hotel reward programmes in the United States to study their responses towards economic reward based initiatives versus those based on social benefits.”¹¹⁰

The findings revealed that a social reward dominant programme was “more effective than an economic reward oriented programme in encouraging favourable relational behaviours toward programme providers,” states Jin-soo.¹¹⁰

The relational effects were especially apparent in the following areas: “openness (e.g. “I would feel comfortable telling the hotel when I think something needs improvement.”), advocacy (e.g. “I would defend the hotel to others if I hear someone speaking poorly about it.”), and immunity (e.g. “Even if I hear some negative information about the hotel, I would not switch to a competing hotel”).”¹¹⁰

“When program members were exposed to customised, intrinsic offerings from a loyalty programme, they tend to be intrinsically motivated to stay with a hotel by developing emotional attachment, internal enjoyment, and affective commitment,” Lee noted.

In short, the study concluded that financial incentives alone wouldn’t prevent customers from switching over to a competing program.¹¹⁰ To foster relational behaviors and gain long-term benefits from a loyalty program, hotels needed to consider offering both social and economic rewards.¹¹⁰

In the article, Lee recommends the following:

“Loyalty programme managers should consider economic benefits as a defensive relational strategy and social rewards as an offensive relational strategy in stimulating the relational behaviours of customers. Given the limitations of financial benefits in maintaining long-lasting customer relationships, and the practical need for striving cost-effectiveness in business operation, loyalty programme operators should adopt the strategy of providing economic rewards just to the extent of merely meeting, rather than greatly exceeding, members’ expectations. At the same time, they should develop and offer more customised offers, which can intrinsically motivate customers to foster a sense of belonging and emotional attachment to their hotel.”¹¹⁰

Lee uses Thailand’s Phuket Marine Biology Centre and the Royal Thai Navy’s annual release of “baby turtles at a leading hotel in cooperation with the governor of Phuket and that hotel’s guests”¹¹⁰ as an example of a customized social reward.

At the event, “only members of the hotel’s superclass loyalty programme are allowed to release baby turtles into the sea, which is a rewarding and memorable experience, especially for children.”¹¹⁰ “Such a preferential treatment is so meaningful to customers that they become reluctant to switch to any competing hotel that offers equal or even better financial incentives,” Lee concludes.¹¹⁰

To make this entire system work, we are obviously talking about a huge amount of data flowing through these systems, utilizing everything from a typical EDW, to Hadoop clusters, as well as stream processing applications like Spark, Flink, Storm, IBM’s Infosphere, Hitachi’s HDS, TIBCO’s StreamBase, etc., etc.

In many cases, acquiring a social identity that is tied to a customer record is as simple as asking for it; “Like” my page, “Follow” us, “heart” this, “Pin” that board, “Snap” to our story, “Tweet or retweet” one of our offers and/or a story about your trip to our resorts. These are all wonderful ways to engage an audience, either connecting with a new one or continuing to build a relationship with a current one.

Natural Language Processing

According to skywind.ai⁹, “Natural language refers to language that is spoken and written by people, and natural language processing (NLP) attempts to extract information from the spoken and written word using algorithms.”

In their article *How Artificial Intelligence and Machine Learning Can Impact Market Design*¹⁹, Paul R. Milgrom and Steve Tadelis give some interesting use cases for NLP. Online marketplaces like eBay, Taobao, Airbnb, along with many others have seen exponential growth since their inception because they provide “businesses and individuals with previously unavailable opportunities to purchase or profit from online trading.”¹⁹ Besides the new marketplaces created for these wholesalers and retailer, “the so called ‘gig economy’ is comprised of marketplaces that allow individuals to share their time or assets across different productive activities and earn extra income.”¹⁹

“The amazing success of online marketplaces was not fully anticipated,” Milgrom and Tadelis infer, “primarily because of the hazards of anonymous trade and asymmetric information. Namely, how can strangers who have never transacted with one another, and who may be thousands of miles apart, be willing to trust each other?”¹⁹ “Trust on both sides of the market is essential for parties to be willing to transact and for a marketplace to succeed,” claim Milgrom and Tadelis.¹⁹

eBay’s early success is often attributed to its innovative feedback and reputation mechanism, which has been replicated by practically every other marketplace that came after eBay.¹⁹ Milgrom et al. believe that these online feedback and reputation mechanisms provide a modern-day version of more ancient reputation mechanisms used in the physical marketplaces that were the

medieval trade fairs of Europe.¹¹¹

The problem for Milgrom and Tadelis is that “recent studies have shown that online reputation measures of marketplace sellers, which are based on buyer-generated feedback, don’t accurately reflect their actual performance.¹⁹ A growing body of research reveals that “user-generated feedback mechanisms are often biased, suffer from ‘grade inflation,’ and can be prone to manipulation by sellers.”¹⁹ “For example, the average percent positive for sellers on eBay is about 99.4%, with a median of 100%. This causes a challenge to interpret the true levels of satisfaction on online marketplaces,” state Milgrom and Tadelis.¹⁹

For Milgrom and Tadelis, a natural question emerges: “can online marketplaces use the treasure trove of data it collects to measure the quality of a transaction and predict which sellers will provide a better service to their buyers?”¹⁹ After all, these online marketplaces and gig-economy sites collect vast amounts of data as part of the process of trade.¹⁹ The millions of transactions, searches and browsing that occur in these marketplaces every day could be leveraged to create an environment that promotes trust, similar to the way institutions emerged in the medieval trade fairs of Europe that helped foster trust.¹⁹ Milgrom and Tadelis believe that AI can be applied to these marketplaces to help create a more trustworthy and better buying experience to consumers.¹⁹

“One of the ways that online marketplaces help participants build trust is by letting them communicate through online messaging platforms,” explain Milgrom and Tadelis.¹⁹ On eBay, buyers question sellers about their products, “which may be particularly useful for used or unique products for which buyers may want to get more refined information than is listed.”¹⁹ Airbnb also “allows potential renters to send messages to hosts and ask questions about the property that may not be answered in the original listing.”¹⁹

Using NLP, “marketplaces can mine the data generated by these messages in order to better predict the kind of features that customers value.”¹⁹ However, Milgrom and Tadelis claim, “there may also be subtler ways to apply AI to manage the quality of marketplaces.”¹⁹ The messaging platforms are not only restricted to pre-transaction inquiries, they also provide both parties the ability to send messages to each other post-transaction.¹⁹ The obvious question that emerges for Milgrom and Tadelis is, “how could a marketplace analyze the messages sent between buyers and sellers post the transaction to infer something about the quality of the transaction that feedback doesn’t seem to capture?”¹⁹

This question was posed and answered in the paper *Canary in the e-commerce coal mine: Detecting and predicting poor experiences using buyer-to-seller messages*¹¹² by Masterov et al. Milgrom and Tadelis explain¹⁹:

“By using internal data from eBay’s marketplace. The analysis they performed was divided into two stages. In the first stage,

the goal was to see if NLP can identify transactions that went bad when there was an independent indication that the buyer was unhappy. To do this, they collected internal data from transactions in which messages were sent from the buyer to the seller after the transaction was completed and matched it with another internal data source that recorded actions by buyers indicating that the buyer had a poor experience with the transactions. Actions that indicate an unhappy buyer include a buyer claiming that the item was not received, or that the item was significantly not as described, or leaves negative or neutral feedback, to name a few.”

The simple NLP approach Milgrom and Tadelis use “creates a ‘poor-experience’ indicator as the target (dependent variable) that the machine learning model will try to predict, and uses the messages’ content as the independent variables.”¹⁹ “In its simplest form and as a proof of concept, a regular expression search was used that included a standard list of negative words such as ‘annoyed,’ ‘dissatisfied,’ ‘damaged,’ or ‘negative feedback’ to identify a message as negative,” explain Milgrom and Tadelis.¹⁹ Messages void of these designated terms were considered neutral.¹⁹ Using this classification, the researchers grouped transactions into three distinct types: “(1) No post-transaction messages from buyer to seller; (2) One or more negative messages; or (3) One or more neutral messages with no negative messages.”¹⁹

In the second stage of the analysis, using the fact that negative messages are associated with poor experiences, Masterov et al. constructed a novel measure of seller quality based on the idea that sellers who receive a higher frequency of negative messages are bad sellers.¹¹² According to Masterov et al., the measure, which is “calculated for every seller at any point in time using aggregated negative messages from past sales, and the likelihood that a current transaction will result in a poor experience,”¹¹² is a monotonically increasing relationship.¹¹²

This simple exercise shows that, using a marketplace’s message data and a simple NLP procedure, businesses can predict which sellers will create poor experiences better than one inferred from highly inaccurate and wildly inflated feedback data.¹⁹

Of course, eBay is not unique in allowing “parties to exchange messages and the lessons from this research are easily generalizable to other marketplaces.”¹⁹ “The key is that there is information in communication between market participants, and past communication can help identify and predict the sellers or products that will cause buyers poor experiences and negatively impact the overall trust in the marketplace,” conclude Milgrom and Tadelis.¹⁹

Creating a market for feedback

Besides the over-inflation of customer feedback as described above, another problem with customer feedback forums is the fact that few buyers even bother leaving feedback.¹⁹ In fact, Milgrom and Tadelis argue, “through the lens of mainstream economic theory, it is surprising that a significant fraction of online consumers leave feedback. After all, it is a selfless act that requires time, and it creates a classic free-rider problem.”¹⁹ Additionally, “because potential buyers are attracted to buy from sellers, or products, that already have an established good track record, this creates a ‘cold start’ problem,”¹⁹ i.e., new sellers with no feedback face a high barrier-to-entry because buyers are hesitant to try them out.¹⁹

Li et al. address this problem in their paper *Buying Reputation as a Signal of Quality: Evidence from an Online Marketplace*¹¹³ by “Using a unique and novel implementation of a market for feedback on the huge Chinese marketplace Taobao where they let sellers pay buyers to leave them feedback.”¹⁹ Of course, it might be concerning to allow “sellers to pay for feedback as it seems like a practice in which they will only pay for good feedback and suppress any bad feedback, which would not add any value in promoting trust.”¹⁹ However, Milgrom and Tadelis explain that “Taobao implemented a clever use of NLP to solve this problem: it is the platform, using an NLP AI model, that decides whether feedback is relevant and not the seller who pays for the feedback.”¹⁹ “Hence, the reward to the buyer for leaving feedback was actually managed by the marketplace, and was handed out for informative feedback rather than for positive feedback,” note Milgrom and Tadelis.¹⁹

“Specifically, in March 2012, Taobao launched a ‘Rebate-for-Feedback’ (RFF) feature through which sellers can set a rebate value for any item they sell (cash-back or store coupon) as a reward for a buyer's feedback,” says Milgrom and Tadelis.¹⁹ Sellers who choose this option guarantee that the rebate will be transferred from the seller's account to a buyer who leaves high-quality feedback that is, most importantly, informative about the purchased product, rather than whether the feedback is positive or negative.¹⁹ “Taobao measures the quality of feedback with an NLP algorithm that examines the comment's content and length and finds out whether key features of the item are mentioned,” explains Milgrom and Tadelis.¹⁹ The marketplace actually manages “the market for feedback by forcing the seller to deposit at Taobao a certain amount for a chosen period, so that funds are guaranteed for buyers who meet the rebate criterion, which itself is determined by Taobao.”¹⁹

Taobao wanted to promote more informative feedback, but as Li et al. note, “economic theory offers some insights into how the RFF feature can act as a potent signaling mechanism that will further separate higher from lower quality sellers and products.”¹¹³

Building upon the work of Philip Nelson in his influential article *Information and Consumer Behavior*¹¹⁴ that suggested advertising acts as a signal of quality, say Milgrom and Tadelis suggest that, “According to the theory, advertising — which is a form of burning money — acts as a signal that attracts buyers who correctly believe that only high-quality sellers will choose to advertise.”¹⁹ “Incentive compatibility is achieved through repeat purchases: buyers who purchase and experience the products of advertisers will return in the future only if the goods sold are of high enough quality,” argue Milgrom and Tadelis.¹⁹ “The cost of advertising can be high enough to deter low quality sellers from being willing to spend the money and sell only once, because those sellers will not attract repeat customers, and still low enough to leave profits for higher quality sellers. Hence, ads act as signals that separate high quality sellers, and in turn attract buyers to their products,” state Milgrom and Tadelis.¹⁹

Li et al. argue that Taobao’s “RFF mechanism plays a similar signaling role as ads do, which can be seen as signals that separate high quality sellers, and in turn attract buyers to their products.”¹¹³ Assuming “consumers express their experiences truthfully in written feedback, any consumer who buys a product and is given incentives to leave feedback, will leave positive feedback only if the buying experience was satisfactory.”¹⁹

Li et al. believe that a seller will offer RFF incentives to buyers if he or she expects positive feedback, which usually only happens if the seller provides a high quality item and/or service.¹⁹ “If a seller knows that their goods and services are unsatisfactory, then paying for feedback will generate negative feedback that will harm the low-quality seller,” contend Milgrom and Tadelis.¹⁹ “Equilibrium behavior,” Milgrom and Tadelis argue, “implies that RFF, as a signal of high quality, will attract more buyers and result in more sales.”¹⁹ “The role of AI was precisely to reward buyers for information, not for positive feedback,” state Milgrom and Tadelis¹⁹, and that is as it should be.

Li et al. analyzed data “from the period where the RFF mechanism was featured, and confirmed that first, as expected, more feedback was left in response to the incentives provided by the RFF feature.”¹¹³ Li et al. also discovered that “the additional feedback did not exhibit any biases, suggesting that the NLP algorithms used were able to create the kind of screening needed to select informative feedback.”¹¹³ Li et al. conclude that, “the predictions of the simple signaling story were borne out in the data, suggesting that using NLP to support a novel market for feedback did indeed solve both the free-rider problem and the cold-start problem that can hamper the growth of online marketplaces.”¹¹³

Reducing Search Friction with A.I.

“An important application of AI and machine learning in online marketplaces is the way in which potential buyers engage with the site and proceed to search for products or services,” Milgrom and Tadelis note.¹⁹ At Google, Facebook, and

Amazon AI-powered search engines are trained to maximize what the provider believes to be the right objective.¹⁹ “Often this boils down to conversion, under the belief that the sooner a consumer converts a search to a purchase, the happier the consumer is both in the short and the long run,” say Milgrom and Tadelis.¹⁹ The rationale: “search itself is a friction, and hence, maximizing the successful conversion of search activity to a purchase reduces this friction.”¹⁹

Although this is consistent with economic theory, which posits “search as an inevitable costly process that separates consumers from the products they want”¹⁹ this isn’t really the case. “Unlike the simplistic models of search employed in economic theory, where consumers know what they are looking for and the activity of search is just a costly friction, in reality, people’s search behavior is rich and varied,” claim Milgrom and Tadelis.¹⁹

In their paper *Returns to Consumer Search: Evidence from eBay*¹¹⁵, Blake, Nosko, and Tadelis use “comprehensive data from eBay to shed light on the search process with minimal modeling assumptions.” Blake et al.’s data showed that consumers search significantly more than in previous studies, which were conducted with limited access to search behavior over time.¹¹⁵

“Furthermore, search often proceeds from the vague to the specific. For example, early in a search a user may use the query ‘watch’, then refine it to ‘men’s watch’ and later add further qualifying words such as color, shape, strap type, and more,” explain Blake et al.¹¹⁵ This behavior suggests that consumers aren’t looking specifically at first and are exploring their own tastes, and what product characteristics might exist, as part of their search process.¹¹⁵ Blake et al. showed that the average number of terms in a user’s query “rises over time, and the propensity to use the default ranking algorithm declines over time as users move to more focused searches like price sorting.”¹¹⁵

“These observations suggest that marketplaces and retailers alike could design their online search algorithms to understand search intent so as to better serve their consumers,” recommend Milgrom and Tadelis.¹⁹ Consumers in the exploratory phases of the search process, should be provided some general offerings to better learn their tastes as well as all available options in the market.¹⁹

Once the consumer shows the desire to purchase something in particular, the offering should be narrowed to a set of products that match the consumer’s preferences.¹⁹ “Hence, machine learning and AI can play an instrumental role in recognizing customer intent,” contend Milgrom and Tadelis.¹⁹ This is good news for any company looking to utilize social media in its marketing plans.

AI and machine learning not only helps “predict a customer’s intent, but given the large heterogeneity on consumer tastes, AI can help a marketplace or hotelier better segment the many customers into groups that can be better served with tailored information.”¹⁹

Using AI for more refined customer segmentation, or even personalized experiences, does raise price discrimination concerns.¹⁹ “For example, in 2012 the Wall Street Journal reported¹¹⁶ that ‘Orbitz Worldwide Inc. has found that people who use... Mac computers spend as much as 30% more a night on hotels, so the online travel agency is starting to show them different, and sometimes costlier, travel options than Windows visitors see.’¹⁹ Whether these practices of utilizing consumer data and AI to adjust pricing helps or harms consumers is up for discussion, but economic theory states that price discrimination can either increase or reduce consumer welfare.¹⁹ “If on average Mac users prefer staying at fancier and more expensive hotels because owning a Mac is correlated with higher income and tastes for luxury, then Orbitz practice is beneficial because it shows people what they want to see and reduces search frictions. However, if this is just a way to extract more surplus from consumers who are less price sensitive, but do not necessarily care for the snazzier hotel rooms, then it harms these consumers,” contend Milgrom and Tadelis.¹⁹ Either way, price elasticity systems can be set up if brands choose to set them up.

Conclusion

We live in a real-time, 24-7 world, a world where 280-character Twitter messages foment political revolutions; a world where marketers should fear not the power of the pen, but the destructive force of the critical tweet or the far-reaching viral impact of an inflammatory social media diatribe that can encircle the digital world in seconds, laying waste to a reputation that might have taken decades to develop.

Conversely, it is also a world where an advertiser’s message can go viral and reach more eyeballs in less than an hour than a multi-million-dollar television commercial campaign can in a year. Customer intelligence is imperative in a world that moves so quickly and, thankfully for the hotel industry, great strides have been made in developing tools and setting up architectures that simplify the customer intelligence and customer experience (CX) process.

The loyalty programs that started in the 80s and 90s should be morphing into complex data collecting and data crunching machines that capture not just every dollar (or pound or euro or won or even every mop) that a customer spends on a hotel property, but also every post a customer submits to his or her social channels so that an online psychometric profile can be built for each and every customer almost in real-time.

This social profile can be used to both keep track of each customer’s behavior as well as create competitive intel, i.e., is this particular customer frequenting a competitor’s hotel? These psychological profiles can also be the basis for micro and macro psychometric profiles that a hotel can utilize to understand the type of customer it is attracting. This could be highly valuable information that can be

utilized by the hotel's marketing department in its future advertising campaigns. Better client understanding should also go a long way in closing the gap between customer service expectations and a company's delivery of service quality, which is currently quite divergent and trending possibly trending away.

Hotel operators should recognize that the customer journey is an important concept to understand and implement. Each customer should be viewed through his or her unique customer experience maturity stage, which includes "initial", "developing", "defined", "managed", and "optimized". Questions of loyalty, customer satisfaction, and customer dissatisfaction should be viewed according to which maturity stage the customer is in. A problem that arises for a new customer should be handled in a very different way as compared to an issue arising with a returning patron.

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CHAPTER THREE: ANALYTICS

Overview

As previously mentioned, Annie Eissler points out that, according to Nucleus Research “analytics and business intelligence solutions deliver, on average, \$13.01 for every dollar spent.”²⁷ She adds that, “We’re at a point where the hype surrounding data analytics has converted into real, documented returns for companies of all sizes and across all industries. But the truth is, leading companies have been achieving double-digit return on investment (ROI) from their analytics investments for several years now.”²⁷

According to Nina Sandy, a Nucleus Research analyst, “Companies don’t have the luxury anymore to wait weeks for reports on the profitability of business decisions in increasingly fast paced markets.”²⁷ “New analytics solutions are being developed around this need where businesses can make better decisions, faster.”²⁷

The fact that so many software vendors are adding analytics to their standard data mining, CRM, social media, marketing automation, and other offerings is reducing prices across the board. For price, you obviously can’t beat open source, but there is no free lunch in the software world and these open source products do require skilled consultants to write the code and build the systems, but these open source solutions can reduce the sting of the yearly license/maintenance fees that comes with commercial software.

Eissler warns that, “You need the technology to enable analytics, but if you don’t understand the technology that enables the analytics — or the business application — then it won’t provide any value,”²⁷ which is an accurate assessment; “junk in, junk out,” as any good analyst will tell you. Eissler concludes that, “The real value comes when you take the technological component of analytics and apply it to a business component that — once optimized — produces a solid ROI that continues to pay off over time.”²⁷

Analytics is, of course, a huge field. In this chapter, I will mostly focus on customer analytics, which, when coupled with insights from social media data, can enable organizations to make faster strides in predicting retention, attrition, and return rates, with the goal of reducing customer churn, raising customer lift, and/or increasing a whole host of other metrics.¹¹⁷

Sources such as transactions data, clickstream, as well as service and call center records are also important for customer analytics.¹¹⁷ These can both improve how a hospitality organization decides on characteristics for customer

segmentation, and also provide clues to emerging characteristics for the definition of new segments.¹¹⁷

As David Stodder explains in his article *Customer Analytics in the Age of Social Media*¹¹⁷, “Firms can employ predictive modeling to test and learn from campaigns so that they are able to select the most persuasive offers to put in front of the right customers at the right time.”¹¹⁷

Webopedia.com says customer analytics “exploits behavioral data to identify unique segments in a customer base that the business can act upon. Information obtained through customer analytics is often used to segment markets, in direct marketing to customers, predicate analysis, or even to guide future product and services offered by the business.”¹¹⁸

In IBM’s *Achieving Customer Loyalty with Customer Analytics*¹¹⁹, IBM argues that customer analytics can uncover “patterns and trends in customer behavior and sentiment hidden among different types of customer data such as transactions, demographics, social media, survey and interactions.” “The results of the analysis are then used to predict future outcomes so businesses can make smarter decisions and act more effectively.”¹¹⁹ Results from these models can then be presented back to the business users in easily digestible dashboards and scorecards.¹¹⁹ “Self-learning predictive models ensure that each new iteration of customer analytics insight and the business decisions it drives become more accurate and effective,” argues IBM.¹¹⁹

Customer analytics can also help determine which of a hotel’s advertising campaign or advertising partner’s pages have the highest landing rates, as well as show conversion rates for all of a hotel company’s advertising and marketing budgets.

Mobile analytics can also display how many visitors downloaded material from a site, which can help in factoring a company’s advertising and marketing budgets. And, finally, mobile analytics can display which pages have the highest exit rates. With this type of analysis, marketers can rapidly adjust marketing campaigns to exploit the most effective ones and, conversely, trim the non-performing ones.

The biggest problem with any analytics procedure is filtering out the noise associated with the data. Without clean data, “the trends, patterns, and other insights hidden in the raw data are lost through aggregation and filtering.”¹¹⁷ Organizations need an unstructured place “to put all kinds of big data in its pure form, rather than in a more structured data warehousing environment.”¹¹⁷ This is because what might be considered just “noise” in the raw data from one perspective could be full of important “signals” from a more knowledgeable perspective.¹¹⁷ “Discovery, including what-if analysis, is an important part of customer analytics because users in marketing and other functions do not always know what they are looking for in the data and must try different types of analysis to produce the insight needed.”¹¹⁷ As per Stodder, among the frequent

targets for analysis are the following¹¹⁷:

- Understanding sentiment drivers.
- Identifying characteristics for better segmentation.
- Measuring the organization’s share of voice and brand reputation compared with the competition.
- Determining the effectiveness of marketing touches and messages in buying behavior, i.e., attribution analysis.
- Using predictive analytics on social media to discover patterns and anticipate customers’ problems with products and/or services.

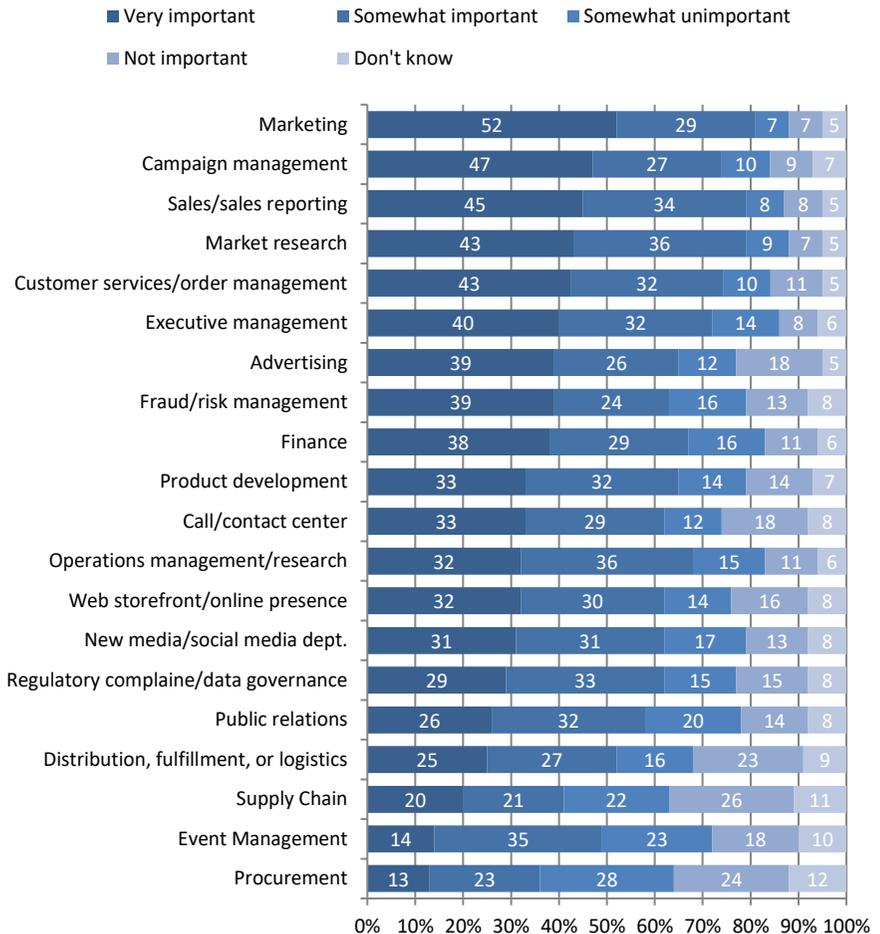


Figure 10: Importance of Customer Analytics Technology
 Based on one answer per business function from 452 responses.
 Source: TWDI Research¹¹⁷

TWEDI's research¹¹⁷ found that "the business functions or operations for which respondents considered customer analytics most important were marketing (81%, with 52% indicating "very important"), sales and sales reporting (79%, with 45% "very important"), and campaign management (74%, with 47% "very important").¹¹⁷ Market research (43% "very important") and customer services and order management (also 43% "very important") were also high among business functions regarded as critical to developers and consumers of customer analytics (see Figure 10).¹¹⁷

The marketing department, "which in most organizations is empowered with the responsibility for identifying, attracting, satisfying, and keeping customers, is clearly the main stage for customer analytics."¹¹⁷ Marketing departments and functions are becoming increasingly qualitative.¹¹⁷ "Gut feelings" are being replaced by data-driven decision-making.¹¹⁷ "Data drives the pursuit of efficiency and achievement of measurable results. Marketing functions are key supporters of 'data science,' which is the use of scientific methods on data to develop hypotheses and models and apply iterative, test-and-learn strategies to marketing campaigns and related initiatives."¹¹⁷

Customer analytics can be a very effective tool for micro-targeting customers with customized marketing offers and promotions.¹¹⁹ Obviously, when an organization "attempts to cross-sell or up-sell a customer, a product or service they desire, it can enhance satisfaction."¹¹⁹ However, unwanted marketing campaigns can do just the opposite, annoying customers, thereby eroding loyalty and, potentially, hurting sales.¹¹⁹ Even worse, unwanted marketing campaigns can give customers the impression that the organization doesn't care about their wants, desires, needs and preferences."¹¹⁹

Customer analytics can help determine which marketing interactions are likely to please individual customers and which will not."¹¹⁹ Sales functions can be important beneficiaries of customer analytics as well.¹¹⁷ Stodder argues that, "Sales reports typically focus on providing visibility into the pipeline. Managers can use data insights to improve sales forecasting of potential revenues based on deeper knowledge of priority opportunities, most valued customer segments, and more."¹¹⁷

"Customer service and order management can use customer analytics to get a more subtle and substantial view of what actions impact customer experiences and satisfaction."¹¹⁷ Contact centers can utilize "customer analytics to help tune performance metrics closer to real time, so that each day's agents are guided, if not incentivized, to interact with customers in beneficial ways."¹¹⁷

Analytics can also "help service and order management functions move away from one-size-fits-all approaches to customers and instead tune and tailor interactions more personally based on knowledge of particular types or segments, such as regions or nationalities."¹¹⁷ "Finally, through integrated views

of customer data and analytics, service and order management functions are able to work in better synchronicity with the organization's marketing, sales, and other business functions."¹¹⁷ Customer analytics can be used to understand where marketing campaigns are working as well.

In the words of business management guru Thomas Davenport, "Organizations are competing on analytics not just because they can — business today is awash in data crunchers — but also because they should."¹²⁰ Although these words were said more than ten years ago, they might be more relevant today than ever before. Davenport adds, "Business processes are among the last remaining points of differentiation. And analytics competitors wring every last drop of value from those processes."¹²⁰ "Customer analytics helps organizations determine what steps will give them competitive advantages, increase profitability, and identify waste in business processes," Davenport argues.¹²⁰

With the steep drop in RAM prices, in-memory solutions are all the rage these days and they allow analytics to reach a whole new level of sophistication. Today, creativity is becoming the differentiator; today's overriding philosophy might be "Those who analyze best win."

With products and services being commoditized at such a rapid rate today, customer loyalty has become more elusive than ever.¹¹⁷ "Innovation must be constant and must immediately address why an organization is losing customers. Information insights from analytics can help an organization align product and service development with strategic business objectives for customer loyalty."¹¹⁷ In addition, these insights can help hotelier organizations be selective in how they deploy marketing campaigns and customer-touch processes so that they emphasize features in new products and services that are important to customers.

When TDWI Research examined the business benefits sought from customer analytics (see Figure 11), respondents cited giving executive management customer and market insight as the most important benefit (71%).¹¹⁷ The second most important benefit was being able to react more quickly to changing market conditions (62%).¹¹⁷

Improving customer satisfaction and gaining a complete picture of a customer's activity across business channels — two areas that would be considered a part of the "Customer Experience Management" (CEM) process — are critical to identifying what steps an organization must take to build and retain customer loyalty.¹¹⁷ The remaining items fall mainly into the categories of business intelligence, marketing, and brand management and they are extremely important to a hotelier company as well.

What are the most important business benefits that your organization seeks to achieve from implementing customer analytics technologies and methods? (Please select all that apply)



Figure 11: What Are the Important Business Benefits of Customer Analytics? Based on 2,573 responses from 454 respondents; almost six responses, on average.

Source: TDWI Research¹¹⁷

Organizations are becoming open to customer analytics because they are interested in discovering how a marketing department can be more effective, not just more efficient.¹¹⁷ “Whereas other types of applications for e-commerce, fulfillment, or marketing automation help organizations determine how to get things done (e.g., getting goods delivered at the right time, executing a marketing campaign), customer analytics helps organizations answer who, what, when, where, and why questions,” argues Scott Groenendal, program director of customer analytics market strategy for IBM Business Analytics.¹¹⁷ “They can find answers to questions such as: What channel should I communicate through? When is the best time to target this person, and why would they be receptive to

this message?” adds Groenendal.¹¹⁷

Individual creativity, personal experiences, customer behavior and marketing context are critical components of consumer marketing decisions.¹¹⁷ “The role of customer analytics is not necessarily to replace these, but to help decision makers come to fact-based conclusions through better knowledge of the organization’s customers and markets.”¹¹⁷

Just as importantly, analytics are needed for scalability.¹¹⁷ “Just as automation is necessary to run hundreds or thousands of marketing campaigns, customer analytics processes are important for supplying intelligence and guidance to those automated routines. Customer analytics can provide the brains to match the marketing systems’ brawn.”¹¹⁷

With the commoditization of products and services, customer loyalty can be elusive; innovation must be constant and it should help to reveal why an organization might be losing its customer base.¹¹⁷ “Information insights from analytics can help organizations align product and service development with strategic business objectives for customer loyalty.”¹¹⁷ These insights can also help an organization be selective about how they deploy their marketing campaigns and customer-touch processes so that they can emphasize features in new products and services that are important to each specific customer.¹¹⁷

In its *Achieving Customer Loyalty with Customer Analytics*¹¹⁹, IBM describes one of its studies that asked some of the world’s leading company CEOs and CMOs what their number one priority was.¹¹⁹ The CEOs answered that it was to engage customers, while the CMOs said it was to enhance customer loyalty.¹¹⁹ The study argued that forward-thinking companies were using customer analytics to¹¹⁹:

- Guide front-line interactions with customers.
- Create and execute customer retention strategies.
- Prompt people or systems to proactively address customer satisfaction issues.
- Guide product planning to fulfill future customer needs.
- Hire and train employees to act upon customer insights and improve loyalty.
- Align operations to focus on satisfying customers.

The *Customer Analytics in the Age of Social Media*¹¹⁷ report concluded that the importance of customer analytics is in the boardroom; “overwhelmingly, respondents cited giving executive management customer and market insight (71%) as the most important business benefit that their organization seeks to achieve from implementing customer analytics.”¹¹⁷ “This percentage rises to 81% when survey results are filtered to see only the responses from those who indicated ‘strong acceptance’ of data-driven customer analytics over gut feel.”¹¹⁷

The second highest benefit cited at 62% was “the ability to react more quickly to

changing market conditions, which speaks to the need for customer data insights to help decision makers address competitive pressures from rapid product or service commoditization.”¹¹⁷

Customer analytics can also provide answers to questions like, “When in the life cycle are customers most likely to churn? What types of products or services would prevent them from churning, and when should they be offered complimentary items? When is it too costly to try to keep certain customers?”¹¹⁷

Businesses can realize significant ROI from investing in customer analytics as it can improve the marketing department’s efficiency and effectiveness.¹¹⁷ However, customer analytics ROI is a difficult thing to fully quantify — especially in the analytics space. Better customer knowledge equates to more optimized marketing spend because a business can focus its resources on those campaigns that have the highest predicted chances of success for particular segments, as well as cutting off or avoiding those that have the least.¹¹⁷

“By using analytics to eliminate mismatches of campaigns targeting the wrong customers or using the wrong messages and offers, marketing functions can reduce wasteful spending and increase gains relative to costs.”¹¹⁷ Customer segmentation allows organizations to move “away from one-size-fits-all, brand-level-only marketing and toward the ‘market of one’: that is, personalized, one-to-one marketing.”¹¹⁷

Reaching a customization and customer service level that makes a customer feel as though he or she is a preferred customer is not easy, scaling that up so that an entire database of customers feel that they are unique and receiving outstanding customer service is even more challenging, but, in this day and age, it is almost a necessity if a company wants to provide good and engaging customer service.

TDWI Research¹¹⁷ examined the importance of accomplishing various objectives for gaining positive ROI from customer analytics (see Figure 12). “Using customer analytics to target cross-sell and up-sell opportunities was the objective cited by the biggest percentage of respondents (54%).”¹¹⁷ This objective is about gaining more value from existing customers by understanding their purchasing habits and trying to get them to buy more products more often.¹¹⁷ “Some organizations (18%) are implementing an advanced technique called ‘uplift modeling’ (also called incremental or true-lift modeling), which enables marketers to use data mining to measure the impact and influence of marketing actions on customers.”¹¹⁷ Insights such as these allow marketers to develop new kinds of predictive models to determine the best prospects for up-sell and cross-sell offerings.¹¹⁷ “As firms scale up to execute large numbers of campaigns across multiple channels, the efficiency gained from predictive modeling can be critical to marketing spending optimization,” argues Stodder.¹¹⁷

In your organization, which of the following marketing objectives are most important to achieve for customer analytics to deliver a return on investment? (Please select all that apply.)



Figure 12: Which Are the Most Important Business Objectives When it Comes to Customer Analytics?

Source: TWDI Research¹¹⁷, Based on 1,625 responses from 432 respondents; almost four responses per respondent, on average.

Analytics can improve marketing performance by quantifying a customer’s lifetime value as well as customer worth at the many different stages in the customer’s life cycle.¹¹⁷ “If organizations can identify their most valuable customers they can determine if they are worthy of retention efforts and resources because of the returns they will provide.”¹¹⁹ For instance, it may not be worth the time, effort, and expense to retain a low value customer, unless customer analytics reveals that this low-spend customer actually has a lot of social influence.¹¹⁹ Armed with this information, managers can align their deployment of resources to achieve the highest value, as well as avoid the costs and inefficiencies of marketing to the wrong people at the wrong time.¹¹⁷

Organizations have long used demographics such as gender, household size, education, occupation, and income to segment customers.¹¹⁷ Data mining techniques let organizations segment much larger customer populations and,

perhaps, more importantly, determine whether to apply new characteristics that refine segmentation to fit the specific attributes of the organization's products and services.¹¹⁷

"Customer analytics using data mining tools improves the speed of segmentation analysis over manual and spreadsheet efforts that are often used in less mature organizations."¹¹⁷ Speed is a vital ingredient for marketing initiatives that are time sensitive, particularly for those companies that need to provide real-time cross-sell and up-sell offers to customers clicking through web pages.¹¹⁷ Today, personalized web pages can be rendered during the web page load and elements of the page can take into account past purchase history, clickstream information, as well as a whole host of other things.

In its *Achieving Customer Loyalty with Analytics*¹¹⁹, IBM argues that customer analytics can provide businesses with the ability to:

- Analyze all data types to gain a 360-degree view of each individual customer.
- Employ advanced algorithms that uncover relevant patterns and causal relationships that impact customer satisfaction and loyalty.
- Build predictive models that anticipate future outcomes.
- Learn from every customer interaction and apply lessons to future interactions and strategies.
- Deploy customer insights to decision-makers and front-line systems.
- Improve sales forecasting and help minimize sales cycles.
- Measure and report on marketing performance.

"The next most common objectives in the research were predicting retention, attrition, and churn rates (47%) and determining lifetime customer value (42%)."¹¹⁷ Churn can cost organizations heavily, both from the loss of profits from existing customers as well as in the high price of attracting new ones. "Attrition or churn analysis methods are aimed at discovering which variables have the most influence on customers' decisions to leave or stay."¹¹⁷

With data mining and predictive analytics, organizations can learn which attrition rates are acceptable or expected for particular customer segments and which rates could be highly detrimental to the bottom line.¹¹⁷ "Predictive customer analytics can play a major role in enabling organizations to discover and model which customers are most likely to leave, and from which segments."¹¹⁷

With social media added to the mix, as well as clickstreams, and other behavioral data, the volume and variety of data is exploding.¹¹⁷ "Social networking sites such as Facebook, Twitter, LinkedIn, and MySpace have files containing petabytes of data, often in vast Hadoop clusters."¹¹⁷ Weibo and WeChat add another hundreds of millions of users to the mix and with it petabytes of data.

"Advertising concerns are recording tens of millions of events daily that

organizations want to mine in near real time to identify prospects,” Stodder notes.¹¹⁷ Businesses of all kinds want to use predictive models and score event and transaction details as fast as they come in so that they can gain insight into individual shopping behavior.¹¹⁷ Insights that they hope will give them an advantage over their competitors, but this is dangerous and expensive territory to chart, especially if done incorrectly.

The “data sources most commonly monitored for customer analytics are customer satisfaction surveys (57%) and customer transactions and online purchases (55%). Just under half (44%) are monitoring Web site logs and clickstream sources. In addition to monitoring customer satisfaction surveys, about half (48%) of organizations surveyed are studying call and contact center interactions.”¹¹⁷

Customer satisfaction surveys are usually conducted in person, on a website, over the phone or through traditional mail and e-mail channels.¹¹⁷ Because this includes both semi-structured data and unstructured comments, data collection can be difficult.¹¹⁷ “Standard questions inquire about a customer’s satisfaction with purchases, the services they received, and the company’s brands overall. Other questions address the customer’s likelihood of buying from the company again and whether they would recommend the firm to others.”¹¹⁷

Text analytics can be used to increase the speed, depth, and consistency of unstructured content analysis far greater than what can be done manually.¹¹⁷ “More advanced analytics can look for correlations between satisfaction ratings, commented sentiments, and other records, such as first-call-resolution metrics.”¹¹⁷

“To analyze data generated by social media networking services such as Twitter, Facebook, Weibo, and LinkedIn, many organizations are implementing Hadoop and NoSQL technologies, which do not force a schema on the source data prior to storage, as traditional BI and data warehousing systems do.”¹¹⁷ Because of this, the discovery analytics processes can run against the raw data.¹¹⁷ “Customer analytics tools need to be able to consume data from sources such as Hadoop clusters and then integrate the insights into overall customer profiles,” advises Stodder.¹¹⁷

The data sources can be varied for these technologies and methods; “they include transaction data, clickstreams, satisfaction surveys, loyalty card membership data, credit card purchases, voter registration, location data, and a host of [other] demographic data types.”¹¹⁷

Data Mining

In his paper *The CRISP-DM model, the new blueprint for data mining*¹²¹, C. Shearer introduces the concept of the “Cross-industry standard process for data

mining”, which is more commonly known by its acronym CRISP-DM. It is a “data mining process model that describes commonly used approaches that data mining experts use to tackle problems.”¹²¹ It is currently the de facto standard for developing data mining and data discovery projects.¹²¹

In their paper *Methods for mining HTS data*¹²², Harper and Pickett break the CRISP-DM process of data mining into the following six major phases:

1. Business understanding — focuses on understanding the project objectives and requirements purely from a business perspective, and then “converting this knowledge into a data mining problem definition, and a preliminary plan designed to achieve the objectives.”¹²² “A decision model, especially one built using the *Decision Model and Notation* standard can be used.”¹²²
2. Data understanding — this starts with an “initial data collection and proceeds with activities in order to get familiar with the data, to identify data quality problems, to discover first insights into the data, or to detect interesting subsets to form hypotheses for hidden information.”¹²²
3. Data preparation — phase that covers “all activities to construct the final dataset (data that will be fed into the modeling tool(s)) from the initial raw data. Data preparation tasks are likely to be performed multiple times, and not in any prescribed order. Tasks include table, record, and attribute selection as well as transformation and cleaning of data for modeling tools.”¹²²
4. Modeling — various modeling techniques are selected and applied in this phase, and their parameters are calibrated to optimal values.¹²² “Typically, there are several techniques for the same data mining problem type. Some techniques have specific requirements on the form of data. Therefore, stepping back to the data preparation phase is often needed.”¹²²
5. Evaluation — At this project stage, model (or models) that appear to have high quality from a data analysis perspective should have been made.¹²² “Before proceeding to final model deployment, it is imperative to more thoroughly evaluate the model, and review the steps executed to construct the model, to be certain it dovetails with the business objectives.”¹²² A key objective here is to determine if any important key business objective has been left out.¹²² At the end of this phase, a decision on whether to use the data mining results should be reached.¹²²
6. Deployment — Creation of the model is generally not the end in and of itself.¹²² “Even if the purpose of the model is to increase knowledge of the data, the knowledge gained will need to be organized and presented in a way that is useful to the customer.”¹²² “Depending on the requirements, the deployment phase can be as simple as generating

a report or as complex as implementing a repeatable data scoring (e.g. segment allocation) or data mining process.”¹²² “In many cases it will be the customer, not the data analyst, who will carry out the deployment steps. Even if the analyst deploys the model it is important for the customer to understand up front the actions which will need to be carried out in order to actually make use of the created models.”¹²²

The sequence of the phases (see Figure 13) is not strict and Harper and Pickett argue that moving back and forth between different phases is often required so flexibility is important.¹²² “The arrows in the process diagram indicate the most important and frequent dependencies between phases,” contend Harper and Pickett.¹²² “The outer circle in the diagram symbolizes the cyclic nature of data mining itself,” add Harper and Pickett.¹²²

The data mining processes continues long after a solution has been deployed, argue Harper and Pickett.¹²² The “lessons learned during the process can trigger new, often more focused business questions and subsequent data mining processes will benefit from the experiences of previous ones,” the writers conclude.¹²²

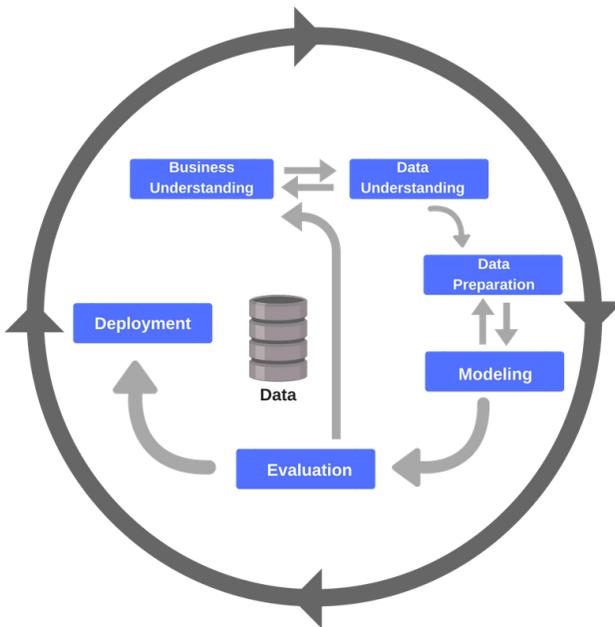


Figure 13: CRISP DM

Source: Wikipedia

In the SAS Institute Best Practices paper *Data Mining and the Case for Sampling*¹²³, SAS defines data mining “as the process used to reveal valuable

information and complex relationships that exist in large amounts of data.”¹²³ For SAS, data mining is an iterative process, divided into five stages that are represented by the acronym SEMMA.¹²³ “Beginning with a statistically representative sample of data, the SEMMA methodology — which stands for Sample, Explore, Modify, Model, and Assess — makes it easy for business analysts to apply exploratory statistical and visualization techniques, select and transform the most significant predictive variables, model the variables to predict outcomes, and confirm a model’s accuracy,” argues SAS.¹²³ According to SAS, the SEMMA methodology is broken down into the following steps¹²³:

- “Sample the data by creating one or more data tables. The samples should be big enough to contain the significant information, yet small enough to process quickly.”¹²³
- “Explore the data by searching for anticipated relationships, unanticipated trends, and anomalies in order to gain understanding and ideas.”¹²³
- “Modify the data by creating, selecting, and transforming the variables to focus the model selection process.”¹²³
- “Model the data by allowing the software to search automatically for a combination of data that reliably predicts a desired outcome.”¹²³
- “Assess the data by evaluating the usefulness and reliability of the findings from the data mining process.”¹²³

SEMMA is itself a cycle, in which the internal steps can be performed iteratively, as needed.¹²³ SAS advises that projects following SEMMA “can sift through millions of records and reveal patterns that enable businesses to meet data mining objectives such as”¹²³:

- Segmenting customers accurately into groups with similar buying patterns.
- Profiling customers for individual relationship management.
- Dramatically increasing response rate from direct mail campaigns.
- Identifying the most profitable customers and the underlying reasons for his or her popularity.
- Understanding why customers leave for competitors (attrition, churn analysis).
- Uncovering factors affecting purchasing patterns, payments and response rates.
- Increasing profits by marketing to those most likely to purchase.
- Decreasing costs by filtering out those least likely to purchase.
- Detecting patterns to uncover non-compliance.¹²³

Artificial Intelligence & Machine Learning

According to Wikipedia, Machine Learning (ML) is the subfield of computer science that “explores the construction and study of algorithms that can learn from data. Such algorithms operate by building a model based on inputs and using that to make predictions or decisions, rather than following only explicitly programmed instructions.”¹²⁴

ML “evolved from the study of pattern recognition and computational learning theory in artificial intelligence” and it “explores the study and construction of algorithms that can learn from and make predictions on data — such algorithms overcome following strictly static program instructions by making data driven predictions or decisions, through building a model from sample inputs.”¹²⁴

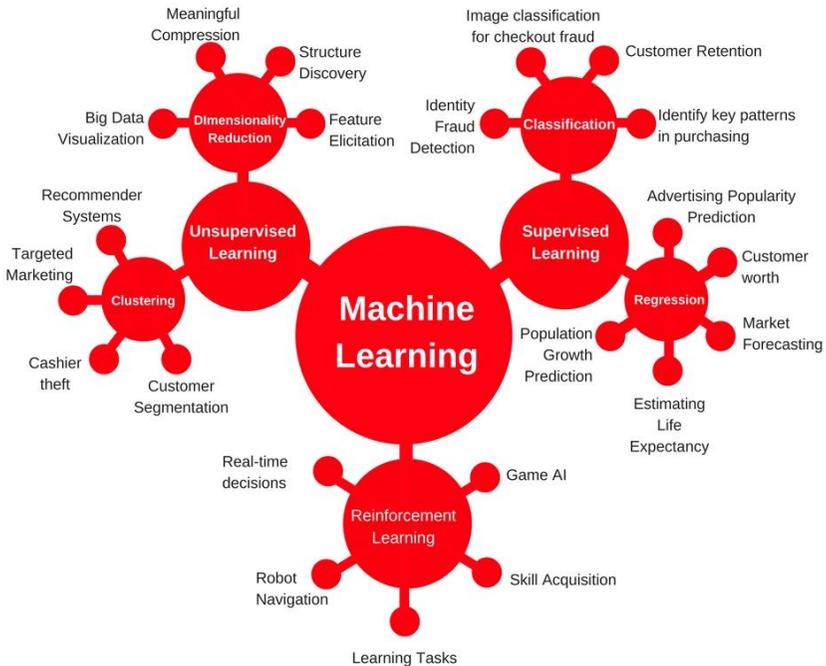


Figure 14: Machine Learning for hoteliers

Source: www.intelligencia.co

As per Wikipedia, ML can be broken down into the following three categories (see Figure 14)¹²⁴:

1. Supervised learning: The computer is presented with example inputs and their desired outputs, given by a “teacher”, and the goal is to learn a general rule that maps inputs to outputs.
2. Unsupervised learning: No labels are given to the learning algorithm, leaving it on its own to find structure in its input. Unsupervised learning can be a goal in itself (discovering hidden patterns in data) or a means towards an end (feature learning).
3. Reinforcement learning: A computer program interacts with a dynamic environment in which it must perform a certain goal (such as driving a vehicle), without a teacher explicitly telling it whether it has come close to its goal or not. Another example is learning to play a game by playing against an opponent.

There are so many use cases for ML and deep learning in the hotel industry that it is impossible to create an exhaustive list here, but it is particularly useful for marketing personalization, customer recommendation, spam filtering, network security, optical character recognition (OCR), voice recognition, computer vision, fraud detection, predictive asset maintenance, optimization, language translations, sentiment analysis, and online search, amongst many others uses.

ML can be used to spot credit card or transaction fraud in process; ML can build predictive models of credit card transactions based on their likelihood of being fraudulent and the system can compare real-time transactions against these models. When the system spots potential fraud it can alert either the bank or the hotel where the transaction occurs.

Although ML and data mining often employ the same methods and overlap significantly, they do differ quite significantly. As Wikipedia explains¹²⁴:

“While machine learning focuses on prediction, based on known properties learned from the training data, data mining focuses on the discovery of (previously) unknown properties in the data (this is the analysis step of Knowledge Discovery in Databases). Data mining uses many machine learning methods, but with different goals; on the other hand, machine learning also employs data mining methods as “unsupervised learning” or as a preprocessing step to improve learner accuracy. Much of the confusion between these two research communities (which do often have separate conferences and separate journals, ECML PKDD being a major exception) comes from the basic assumptions they work with: in machine learning, performance is usually evaluated with respect to the ability to reproduce known knowledge, while in Knowledge Discovery and Data Mining (KDD) the key task is the discovery of previously unknown knowledge. Evaluated with respect to known knowledge, an uninformed (unsupervised) method will

easily be outperformed by other supervised methods, while in a typical KDD task, supervised methods cannot be used due to the unavailability of training data.”

WEKA, a comprehensive collection of machine-learning algorithms for data mining tasks written in Java and released under the GPL, contains tools for data pre-processing, classification, regression, clustering, association rules, and visualization. It has a very minimal learning curve compared to products like SAS’s Enterprise Miner. However, unlike SAS, it can become quite inefficient with larger datasets, at least as of the date of this publication.

Python and R are the most popular open source solutions used for ML and they both have a large user base community. Scikit-learn combined with Pandas, Numpy, Seaborn and Matplotlib make implementing ML algorithms in Python very versatile and these provide more customization and utilization than R.

The R community has a large and active user base. R’s libraries contain a wide variety of statistical and graphical techniques as well. These include linear and nonlinear modeling, classical statistical tests, time-series analysis, classification, clustering, amongst others. Due to its S heritage, R also has strong object-oriented programming capabilities.

Other ML software includes Matlab, Scikit, Accord, Apache’s Mahout, Spark’s MLlib, H2O on Hadoop, ConvNteJS, SPSS, SAP’s Predictive Analytics library, even SQL Server is powerful enough to build some ML models on it.

ML can help a hotel discover customer segments that they may not realize they had. Armed with this kind of information, hospitality companies can understand what matters most to its customers at the individual and personalization level, which will enable them to anticipate their customer’s needs before even the customers are aware of them. Even more, hotel operators can understand key characteristics of their most profitable customers and recognize the next important ones when he or she happens to login onto the hotel’s website or step into the hotel lobby.

The use of deep neural networks and image classifiers can analyze and parse images, which can enable hotel marketers to monitor the images that provide the highest selling and conversion rates through each ecommerce channel.

ML can also be used to compute dynamic clusters of customers to create fluid segmentation in real-time. As consumer buying habits or booking patterns evolve, fluid segmentation ensures the hotel operator continues to reach the right guests, at the right time, at the right price, through the right channels, with the right offer.

Today, the importance of personalization in customer experience initiatives can’t be underestimated. In his article *5 Ways AI Will Boost Personalization in Digital Marketing*¹²⁵, Dirk Vogel argues that AI will radically change the marketing

landscape by allowing the following:

- Personal shopping for everyone.
- Utilizing chatbots to increase customer service.
- Seamless programmatic media buying.
- Predictive customer service.
- Optimizing marketing automation.

According to Vogel, “Shopping online creates rich data footprints regarding the individual preferences, spending habits and preferred channels of individual consumers. Feeding these digital breadcrumbs into an AI-engine helps bring curated shopping journeys to mass audiences.”¹²⁵

As Amazon, Pandora, and Netflix have proven, personalized shopping for everyone is a winning formula; “Using an advanced recommendation-AI, e-commerce leader Amazon creates more than 35% of its total revenues with personalized shopping recommendations,” states Vogel.¹²⁵ “Taking personalization to the next level, artificial intelligence also allows for predicting the kinds of purchases consumers are going to make before they even know it,” notes Vogel.¹²⁵

“Customer service is still where today’s brands are dropping the ball,” Vogel believes, adding that, “Only 35% of companies are able to identify their customers at the moment of contact (Selligent survey) — with customers potentially unfriending brands and taking their business elsewhere.”¹²⁵

It may sound counter-intuitive, Vogel argues, “but automated bots can create lifelike, seamless customer service experiences, addressing the consumer on their purchase history and known preferences.”¹²⁵ One of the standouts, Vogel notes is Facebook’s “M” technology, which is embedded in the Messenger app.¹²⁵ “The AI delivers personalized product, travel and restaurant recommendations, while troubleshooting technical problems,” explains Vogel.¹²⁵

Although chatbots are cheaper than handling customer service inquiries over the phone, there’s a catch as chatbots can only deliver highly personalized and contextual assistance if they have access to universal consumer profiles that are populated by real-time data.¹²⁵ This means, done correctly, developing chatbots is an expensive upfront investment, it is an investment that should be done company-wide, not siloed by just the marketing or customer service department, as information that chatbots tap into are useful throughout an organization.

On the marketing side, AI may deliver that extra dash of relevancy programmatic advertising has been waiting for all these years.¹²⁵ “On the consumer side, AI helps create individualized display ads that website visitors want to see,”¹²⁵ while on the accounting side, “the bots handle invoicing and payment for these ad transactions, giving marketers more time to focus on the big picture.”¹²⁵

With AI, predictive customer service and marketing could be just around the corner.¹²⁵ “What may sound like a scenario from *Minority Report* is already being beta tested: Intel subsidiary Saffron has created an artificial intelligence that is able to predict with 88% certainty why, on which channel, and for which product individual customers will seek help next. ‘We’ve been expecting your call,’ never rang more true,” Vogel states.¹²⁵

One of the biggest problems in corporate marketing is hitting the customer with automated marketing offers too often.¹²⁵ In the future, “AI will analyze a consumer’s purchase history and email habits to choose the optimal time for hitting the inbox with content that’s bound to boost open rates and conversions,” Vogel contends.¹²⁵

Another interesting use of AI is what Pinterest is doing with its visual search technology. According to Lauren Johnson’s *Adweek* article *Pinterest Is Offering Brands Its Visual Search Technology To Score Large Ad Deals*¹²⁶, “The visual search technology is Pinterest’s version of AI and human curation that lets consumers snap a picture of IRL things and find similar items online. Taking a picture of a red dress for example, pulls up posts of red dresses that consumers can browse through and shop,” states Johnson.¹²⁶

“The idea is to give people enough ideas that are visually related so that they have a new way to identify and search for things,” said Amy Vener, retail vertical strategy lead at Pinterest.¹²⁶ “From a visual-discovery perspective, our technology is doing something similar where we’re analyzing within the image the colors, the shapes and the textures to bring that to another level of dimension,” Vener adds.¹²⁶

Utilizing the technology, someone who points his or her phone’s camera at a baby crib will receive recommendations for similar baby products.¹²⁶ “Eventually, all of Target’s inventory will be equipped with Pinterest’s technology to allow anyone to scan items in the real world and shop similar items through Target.com,” states Johnson. “Target is the first hotelier to build Pinterest’s technology into its apps and website, though the site also has a deal to power Bixby, Samsung’s AI app that works similarly.”¹²⁶

“We’re now in a place where we’re using Pinterest as a service to power some visual search for other products,” Vener said. “I think there’s an opportunity for hoteliers to be a little more of a prominent player when it comes to visual discovery.”¹²⁶

7 Patterns of AI

In her *Forbes* article *The Seven Patterns of AI*¹²⁷, Kathleen Walch lays out a theory that, regardless of the application of AI, there are seven commonalities to all AI applications. These are “hyperpersonalization, autonomous systems, predictive analytics and decision support, conversational/human interactions, patterns and

anomalies, recognition systems, and goal-driven systems.”¹²⁷ Walch adds that, “Any customized approach to AI is going to require its own programming and pattern, but no matter what combination these trends are used in, they all follow their own pretty standard set of rules. These seven patterns are then applied individually or in various combinations depending on the specific solution to which AI is being applied.”¹²⁷

The ‘Hyperpersonalization Pattern’, which can be boiled down to the slogan, ‘Treat each customer as an individual’ is defined as “using machine learning to develop a profile of each individual, and then having that profile learn and adapt over time for a wide variety of purposes including displaying relevant content, recommend relevant products, provide personalized recommendations and so on.”¹²⁷ The objective here is to “treat each individual as an individual,”¹²⁷ which is far from a simple thing to do.

“Implementations of the hyperpersonalization particular pattern include creating personalized recommendations based off of browsing patterns and searches,” says Walch.¹²⁷ Not only limited to the marketing industry, hyperpersonalization is being implemented in industries such as finance, healthcare, as well as in personalized fitness and wellness applications.¹²⁷ For example, in the US the FICO credit score is being augmented using AI.¹²⁷

According to Walch, the FICO credit score “is used to lump individuals together who might otherwise have vastly different amounts of credit worthiness and penalizes groups of individuals who lack credit history.”¹²⁷ Walch argues that, “By moving away from using the traditional FICO score into something that treats each individual as an individual we might get more accurate pictures of individuals to see just how likely they are to pay back loans.”¹²⁷

Walch’s second AI pattern is ‘Autonomous systems’, which should reduce the need for manual labor, which is paramount in an industry like the hotel industry, which often has to utilize under skilled employees because of a lack of local talent.

“Autonomous systems are physical and virtual software and hardware systems that are able to accomplish a task, reach a goal, interact with their surroundings, and achieve an objective with minimal human involvement,” says Walch.¹²⁷ “Where the primary objective of hyper-personalization is to treat people as individuals, the goal of autonomous systems is to streamline things with as little human interaction as possible,” notes Walch.¹²⁷ “The autonomous pattern requires machine learning capability that can independently perceive the outside world, predict the future behavior of external elements, and plan for how to deal with those changes,” adds Walch.¹²⁷

“Obvious applications of this pattern include autonomous machines and vehicles of all sorts includes cars, boats, trains, airplanes, and more”¹²⁷, which aren’t that important to the hotelier industry. “However this pattern also includes

autonomous systems including autonomous documentation and knowledge generation, autonomous business processes, and cognitive automation. These include systems that can operate in close proximity to humans, including preferential decision making,” notes Walch.¹²⁷

AI powered predictive analytics, which are very much a topic of this chapter, “is defined as using machine learning and other cognitive approaches to understand how past or existing behaviors can help predict future outcomes or help humans make decisions about future outcomes based on these patterns. The objective of this pattern is helping humans make better decisions.”¹²⁷

Walch explains that, “Some uses of this pattern include assisted search and retrieval, predicting some future value for data, predicting behavior, predicting failure, assisted problem resolution, identifying and selecting best fit, identifying matches in data, optimization activities, giving advice, and intelligent navigation.”¹²⁷ The idea is for AI powered predictive analytics to help users make better decisions, providing augmented intelligence capabilities. Machine learning can be a constantly process, adapting over time to provide better results.¹²⁷

The ‘Conversational Pattern’ allows machines to communicate as humans do.¹²⁷ The conversational/human interaction pattern “is defined as machines and humans interacting with each other through conversational forms of interaction and content across a variety of methods including voice, text, and image forms.”¹²⁷ As Walch explains, “This includes machine to human, human to machine, and back and forth human and machine interaction. The objective of this pattern is enabling machines to interact with humans how humans interact with each other.”¹²⁷

Chatbots, voice assistants, and sentiment, mood and intent analysis all fit within this category.¹²⁷ As Walch points out, these systems are “trying to understand the intent behind human interactions.”¹²⁷ They “can also be used to facilitate human to human interaction through translation.”¹²⁷ “The big thing to remember is that this pattern is used to create an easier way for humans to interact with each other and machines through methods that are natural or comfortable for humans,” concludes Walch.¹²⁷

“Machine learning is particularly good at identifying patterns and finding anomalies or outliers,” says Walch.¹²⁷ She adds that, “The ‘pattern-matching pattern’ is one of the repeating approaches to AI projects that has seen wide and increasing adoption.”¹²⁷ The goal of the ‘Patterns and Anomalies’ pattern of AI is “to use machine learning and other cognitive approaches to learn patterns in the data and learn higher order connections between data points to see if it fits an existing pattern or if it is an outlier or anomaly.”¹²⁷ “The object of this pattern is to find what fits with existing data and what doesn’t,” add Walch.¹²⁷

“Applications of this pattern include fraud and risk detection to see if things are

out of the ordinary or expectations are happening. Another application is finding patterns among data, and helping to minimize or fix human mistakes,” notes Walch.¹²⁷ “This pattern also includes predictive text, where it can analyze patterns in speech and grammar to help suggest words to choose to speed up the writing process,” adds Walch.¹²⁷

“One of the big advancements in machine learning is the use of deep learning to greatly improve the accuracy of recognition-related tasks such as image, video, audio, and object recognition, classification, and identification,” explains Walch.¹²⁷ “The recognition pattern is defined as using machine learning and other cognitive approaches to identify and determine objects or other desired things to be identified within image, video, audio, text, or other primarily unstructured data,” says Walch.¹²⁷ “The objective of this pattern is to have machines identify and understand things,” notes Walch.¹²⁷

“Image and object recognition, facial recognition, audio and sound recognition, handwriting and text recognition, and gesture detection” are all examples of this well-developed pattern, which computers excel at.¹²⁷ Google, Facebook, Apple, Samsung, Huawei and a whole host of other companies are investing heavily in recognition systems. In China, “one of the most well-funded AI companies, SenseTime, is focused on facial recognition applications for the Chinese government.”¹²⁷

The ‘Goal-Driven Systems Pattern’ is the seventh of Walch’s AI patterns.¹²⁷ For decades, machines have been beating humans at easily conquered games like checkers and chess. Now, through the power of reinforcement learning and much more powerful computers, machines can now beat human at some of the most complex games imaginable, including Go and multi-player games like Dota 2.¹²⁷ “AlphaGo and AlphaZero were created by Google’s DeepMind division under the theory that through goals, computers could learn anything through game play,” explains Walch.¹²⁷ DeepMind, the company behind AlphaGo and AlphaZero, believes that, “Games are just the beginning to solutions that could potentially even lead to breakthroughs in solving long-hoped for goals in Artificial General Intelligence (AGI).”¹²⁷

“Games are not the only possibility for goal-driven systems,” says Walch, adding that, “With the power of reinforcement learning and other machine learning techniques, organizations can apply machine learning and other cognitive approaches to give their systems the ability to learn through trial and error.”¹²⁷ “This is useful for any situation where you want to have the system find the optimal solution to a problem. The main learning approach for this pattern is through reinforcement learning,” says Walch.¹²⁷ “Examples in the pattern can include game playing, resource optimization, iterative problem solving, and bidding and real-time auctions,” explains Walch.¹²⁷ Although the goal-driven systems pattern is that widely utilized as some of the other patterns, it is gaining rapid adoption.¹²⁷

Although each one of these patterns can all be utilized individually, organizations often combine one or more of these seven patterns to realize their goals.¹²⁷ Walch believes that, “By companies thinking of AI projects in terms of these patterns it will help them better approach, plan, and execute AI projects.”¹²⁷ “In fact,” she claims, “emerging methodologies are focusing on the use of these seven patterns as a way to expedite AI project planning.”¹²⁷ “Once you know that you’re doing a recognition pattern, for example, you can gain insight into a wide range of solutions that have been applied to that problem, insights into the data that’s needed to power the pattern, use cases and examples of applications of the pattern, algorithm and model development tips, and other insights that can help speed up the delivery of high quality AI projects,” Walch concludes.¹²⁷

Hotel Analytics

In his article *Patron Analytics in the Casino and Gaming Industry: How the House Always Wins*¹²⁸, Scott Sutton lays out the backstory of how analytics is currently used in the hotelier and gaming industry:

“In the 1980’s and 1990’s, casino patron loyalty programs, originally called ‘slot clubs’, started popping up in many of the larger casinos. These slot clubs encouraged customers to sign up for player cards and, in return for loyalty to the casino, patrons would receive rewards such as complimentary rooms, access to special events, and other offers. This was revolutionary, as it allowed casinos to track gaming behavior down to the individual level, leading to more accurate information about patrons’ gaming behavior and interests. The information could then be used to better segment customers, predict future behavior, and improve marketing outcomes. As casino analytics advanced, casino resorts started incorporating the relevant data from hotel, dining, retail, entertainment, and other outlets to get a more complete view of a patron’s behaviors. A recent development is that many of the major gaming loyalty programs, especially those in competitive markets such as Las Vegas, are now also rewarding non-gaming spending in order to encourage customers to keep non-gaming spending at their respective properties, in addition to providing additional data about non-gaming behavior.”

This book is an attempt to chart the next course of analytics for hotels by utilizing IoT, geo-location capabilities, ML, facial and emotional recognition, AR, as well as many of the other technologies discussed here.

It could be argued that the most valuable use of predictive analytics in a hotel would be by the marketing and sales department, but that’s not the whole story.

Being able to accurately predict not only who are a hotel’s best leads and prospects, but when and how it is best to engage them is nice but understanding how their acceptance of these marketing offers will affect the overall hotel property’s bottom line is what *The A.I. Hotelier* is all about.

As previously mentioned, there are four different types of analytics and they are:

- Descriptive analytics – What happened?
- Diagnostic analytics – Why did it happen?
- Predictive analytics – What will happen?
- Prescriptive analytics – How can we make it happen again?

Figure 15 contains examples of how each of these types of analytics can be utilized by a hotelier company.

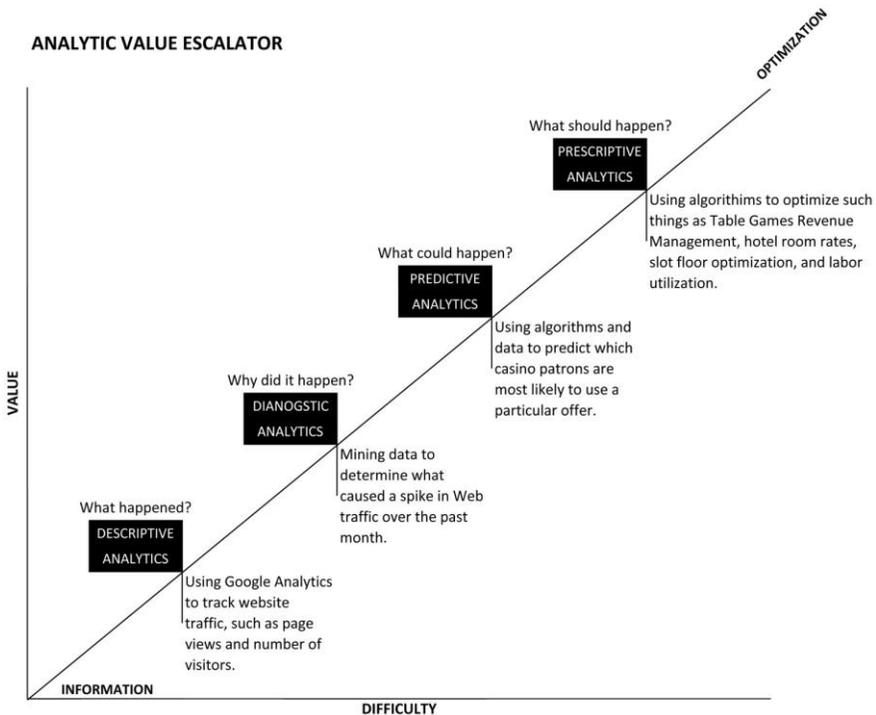


Figure 15: Analytics Value Escalator

Source: www.intelligencia.co

For a hotel operator, descriptive analytics could include pattern discovery methods such as customer segmentation, i.e., culling through a customer database to understand a customer’s preferred room type. Simple cluster segmentation models could also divide customers into their preferred choice of purchases.

Market basket analysis, which utilizes association rules, would also be considered a descriptive analytics procedure. Hotels could use market basket analysis to bundle and offer promotions as well as gain insight into its customers' buying habits. Detailed customer shopping and purchasing behavior could also be used to develop future products.

Diagnostic analytics is a form of advanced analytics that examines data or content to answer the question, "Why did it happen?" It attempts to understand causation and behaviors by utilizing such techniques as drill-down, data discovery, data mining and correlations. Building a decision tree atop a web user's clickstream behavior pattern could be considered a form of diagnostic analytics as these patterns might reveal why a person clicked his or her way through a hotel operator's website.

In his seminal article *Predictive Analytics White Paper*¹²⁹, Charles Nyce states that, "Predictive analytics is a broad term describing a variety of statistical and analytical techniques used to develop models that predict future events or behaviors. The form of these predictive models varies, depending on the behavior or event that they are predicting. Most predictive models generate a score (a patron rating, for example), with a higher score indicating a higher likelihood of the given behavior or event occurring."

Data mining, which is used to identify trends, patterns, and/or relationships within a data set, can then be used to develop a predictive model.¹²⁹ Prediction of future events is the key here and these analyses can be used in a multitude of ways, including forecasting behavior that could lead to a competitive advantage over rivals. Gut instinct can sometimes punch you in the gut and predictive analytics can help factor in variables that are inaccessible to the human mind and often the amount of variables in an analytical problem are beyond human comprehension.

Predictive analytics is the use of statistics, machine learning, data mining, and modeling to analyze current and historical facts to make predictions about future events. Said another way, it gives mere mortals the ability to predict the future like Nostradamus. In recent years, data mining has become one of the most valuable tools for extracting and manipulating data and for establishing patterns in order to produce useful information for decision-making.

Whether you love it or hate it, predictive analytics has already helped elect presidents, discover new energy sources, score consumer credit, assess health risks, detect fraud, and target prospective buyers. It is here to stay, and technological advances, ranging from faster hardware to software that analyzes increasingly vast quantities of data, are making the use of predictive analytics more creative and efficient than ever before.

Predictive analytics is an area of data mining that deals with extracting information from data sets and using it to predict trends and behavioral patterns.

Often the unknown event of interest is in the future, but predictive analytics can be applied to any type of unknown, whether that is in the past, the present, or the future.

Predictive analytics uses many techniques from data mining to analyze current data to make predictions about the future, including statistics, modeling, machine learning, and AI. For example, logistic regression can be used to turn a market basket analysis into a predictor so that a hotelier can understand what items are usually purchased together.

For a hotelier, predictive analytics can also be used for CRM, collection analysis, cross-sell, customer retention, direct marketing, fraud detection, product prediction, project risk management, amongst many other things.

Predictive analytics utilizes the following techniques:

- Regression
- Linear regression
- Discrete choice models
- Logistic regression
- Multinomial logistic regression
- Probit regression
- Time series models
- Survival or duration analysis
- Classification and regression trees
- Multivariate adaptive regression splines
- Machine learning
- Neural networks
- Naïve Bayes
- K -nearest neighbors

Predictive modeling is only useful if it is deployed *and* it creates an action. Taking advantage of the more powerful, statistically based segmentation methods, customers can be segmented not only by dollar values, but also on all known information, which can include behavioral information gleaned from hotel activities, as well as the patron's simple demographic information. This more detailed segmentation allows for more targeted and customer-focused marketing campaigns.

Models can be evaluated and reports generated on multiple statistical measures, such as neural networks, decision trees, genetic algorithms, the nearest neighbor method, rule induction, and lift and gains charts. Once built, scores can be generated in a variety of ways to facilitate quick and easy implementation. The projects themselves can be reused and shared to facilitate faster model development and knowledge transfer.

In his paper *Predictive Analytics*¹³⁰, Wayne Eckerson advises creating predictive

models by using the following six steps:

1. Define the business objectives and desired outcomes for the project and then translate them into predictive analytic objectives and tasks.
2. Explore and analyze the source data to determine the most appropriate data and model building approach and then scope the effort.
3. Prepare the data by selecting, extracting, and transforming the data, which will be the basis for the models.
4. Build the models, as well as test and validate them.
5. Deploy the models by applying them to the business decisions and processes.
6. Manage and update the models accordingly.

By utilizing data from past campaigns and measures generated by the predictive modeling process, hotel operators can track actual campaign responses versus expected campaign responses, which can often prove wildly divergent. Additionally, hotel operators can generate upper and lower “control” limits that can be used to automatically alert campaign managers when a campaign is over or underperforming, letting them focus on campaigns that specifically require attention.

Prescriptive analytics tries to optimize a key metric, such as profit, by not only anticipating what will happen, but also when it will happen and why it happens. In its *Prescriptive Analytics Makes Waves with Retail & CPG*¹³¹, Profitect has one of the best descriptions of prescriptive analytics, i.e., it is the “application of logic and mathematics to data to specify a preferred course of action. The most common examples are optimization methods, such as linear programming; decision analysis methods, such as influence diagrams; and predictive analytics working in combination with rules.” Profitect argues that prescriptive analytics differs from descriptive, diagnostic and predictive analytics in that its output is a decision.¹³¹

Prescriptive analytics can ingest a mixture of structured, unstructured, and semi-structured data, and utilize business rules that can predict what lies ahead, as well as advise how to exploit this predicted future without compromising other priorities. Stream processing can add an entirely new component to prescriptive analytics.

The analytics powerhouse SAS is finding its vaunted place atop the analytics pyramid challenged not just by their typical acronymed competitors — SAP, IBM, EMC, HDS, and the like — but also by the simpler visualization toolmakers like Tableau, Qlik, and Alteryx, who are muscling their way into the mix, with products that include data blending and in-memory technology that allows business users to access complete datasets at the touch of a button. These solutions offer less complex analytical capabilities, but such things as market basket analysis or simple decision tree networks can be created with them and

the costs associated with them can be one quarter or one fifth of what the top echelon providers charge.

Throughout the rest of this chapter, I will break down many of the different types of analytical models that can be used to strengthen the customer experience for hospitality companies.

In its conference paper *How Predictive Analytics is Changing the Retail Industry*¹³² from the International Conference on Management and Information Systems, the writers argue that predictive models incorporate the following steps:

- **Project Definition:** Define the business objectives and desired outcomes for the project and translate them into predictive analytic objectives and tasks.
- **Exploration:** Analyze source data to determine the most appropriate data and model building approach, and scope the effort.
- **Data Preparation:** Select, extract, and transform data upon which to create models.
- **Model Building:** Create, test, and validate models, and evaluate whether they will meet project metrics and goals.
- **Deployment:** Apply model results to business decisions or processes. This ranges from sharing insights with business users to embedding models into applications to automating decisions and business processes
- **Model Management:** Manage models to improve performance (i.e., accuracy), control access, promote reuse, standardize toolsets, and minimize redundant activities.

Even though this was a paper around the subject of retail, it can be utilized for model building in the hotel industry as well.

Analytical Methods

Decision Trees

According to Wikipedia, a decision tree is “a decision support tool that uses a tree-like graph or model of decisions and their possible consequences, including chance event outcomes, resource costs, and utility. It is one way to display an algorithm.”¹³³

Lucidchart¹³⁴ states that, “A decision tree is a map of possible outcomes of a series of related choices. It allows an individual or organization to weigh possible actions against one another based on their costs, probabilities, and benefits. They can be used either to drive informal discussion or to map out an algorithm that predicts the best choice mathematically.” Lucidchart also adds: “A decision tree typically starts with a single node, which branches into possible outcomes.

Each of these outcomes leads to additional nodes, which branch off into other possibilities. This gives it a treelike shape.”¹³⁴

Decision trees are used to identify the strategy that is most likely to reach a goal. It is a decision support tool that uses a graph or model of decisions and their possible consequences, including chance event outcomes, resource costs, and utility. Decision trees are sequential partitions of a set of data that maximize the differences of a dependent variable (response or output variable). They offer a concise way of defining groups that are consistent in their attributes, but which vary in terms of the dependent variable.

A decision tree consists of three types of nodes:

1. Decision nodes — represented by squares, which shows a decision to be made.¹³⁴
2. Chance nodes — represented by circles, which shows the probabilities of the certain results.¹³⁴
3. End nodes — represented by triangles, which reveals the final outcome of a decision path.¹³⁴

The construction of a decision tree is based on the principle of “divide and conquer”: through a supervised learning algorithm, successive divisions of the multivariable space are carried out in order to maximize the distance between groups in each division (that is, carry out partitions that discriminate). The division process finalizes when all of the entries of a branch have the same value in the output variable, giving rise to the complete model. The further down the input variables are in the tree, the less important they are in the output classification (and the less generalization they allow, due to the decrease in the number of inputs in the descending branches).

For the hospitality industry, decision trees can be utilized in operations management and marketing, where they can predict whether a person will respond to an offer or not, or whether they are likely to abuse an offer.¹²⁸

According to Deng et al. in their paper *Building a Big Data Analytics Service Framework for Mobile Advertising and Marketing*¹³⁵, the decision tree algorithm is:

“Used to classify the attributes and decide the outcome of the class attribute. In order to construct a decision tree both class attribute and item attributes are required. Decision tree is a tree like structure where the intermediate nodes represent attributes of the data, leaf nodes represents the outcome of the data and the branches hold the attribute value. Decision trees are widely used in the classification process because no domain knowledge is needed to construct the decision tree.”

The main step in the decision tree algorithm is to identify the root node for any

given set of data.¹³⁵ “Multiple methods exist to decide the root node of the decision tree. Information gain and Gini impurity are the primary methods used to identify the root node. Root node plays an important role in deciding which side of the decision tree the data falls into. Like every classification methods, decision trees are also constructed using the training data and tested with the test data.”¹³⁵

Advantages	Disadvantages
<ul style="list-style-type: none"> • Simple and robust • Useful to predict the outcomes of future data • Little cleansing is enough to remove the missing values data • Useful for large data sets • Decision trees can handle both categorical and numerical data 	<ul style="list-style-type: none"> • Possibility of creating complex decision trees for simple data • Replication problem makes the decision trees complex. So remove the replicated data before constructing a decision tree • Pruning is required to avoid complex decision trees • It is hard to find out the correct root node

Table 2: Advantages and disadvantages of decision trees

Source: Researchgate¹³⁵

***k*-Means Cluster**

As its name suggests, the *k*-Means cluster is a clustering algorithm and it is one of the most commonly used analytical models because of its simplicity and ease of use. The fact that it is still going strong after fifty years speaks as much to its ease-of-use as it does to the difficulty of designing a general-purpose clustering algorithm.

According to Telgarsky and Vattani, “The goal of cluster analysis is to partition a given set of items into clusters such that similar items are assigned to the same cluster whereas dissimilar ones are not. Perhaps the most popular clustering formulation is *K*-means in which the goal is to maximize the expected similarity between data items and their associated cluster centroids.”¹³⁶

Hartigan and Wong explain that the: “aim of the *k*-means algorithm is to divide *M* points in *N* dimensions into *k* clusters so that the within-cluster sum of squares is minimized. It is not practical to require that the solution has minimal sum of squares against all partitions, except when *M*, *N* are small and *k* = 2. We seek instead ‘local’ optima, solutions that no movement of a point from one cluster to another will reduce the within-cluster sum of squares.”¹³⁷

k-means clustering identifies and classifies items into groups based on their similarity. *K* is the number of clusters that needs to be decided upon before the

clustering process begins.¹³⁵ “The whole solution depends on the K value. So, it is important to choose a correct K value. The data point is grouped into a cluster based on the Euclidean distance between the point and the centroid of the cluster,” explains Deng et al.¹³⁵

For Deng et al, initial clustering can be done in one of three ways.

1. Dynamically Chosen: In this method, the first K items are chosen and then assigned to K clusters.
2. Randomly Chosen: In this method, the values are randomly selected and then assigned to K clusters.
3. Choosing from Upper and Lower Boundaries: In this method, the values that are very distant from each other are chosen and they are used as initial values for each cluster.”¹³⁵

According to Deng et al., the k -Means methodology is as follows¹³⁵:

- Step 1: Choose the initial values using one of the above three methods
- Step 2: For each additional value
- Step 3: Calculate the Euclidean distance between this point and centroid of the clusters.
- Step 4: Move the value to the nearest cluster.
- Step 5: Calculate the new centroid for the cluster.
- Step 6: Repeat steps 3 to 5.
- Step 7: Calculate centroid of the cluster.
- Step 8: For each value
- Step 9: Calculate the Euclidean distance between this value and the centroid of all the clusters.
- Step 10: Move the value to the nearest cluster.

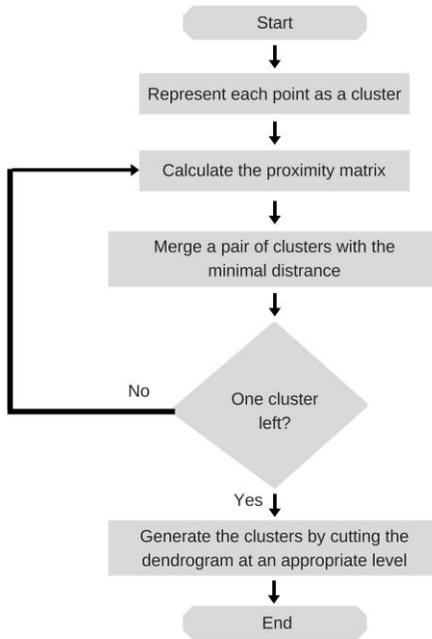


Figure 16: Clustering Algorithm

Source: Researchgate¹³⁵

Advantages	Disadvantages
<ul style="list-style-type: none"> • Faster computations than hierarchical clustering • It produces tighter clusters than other clustering techniques • Gives best result when data sets are distinct • Easy to understand 	<ul style="list-style-type: none"> • Sensitive to noise • Numbers of clusters must be decided before starting clustering • Choosing correct initial clustering process • Choosing correct number of clusters • The centroid of the group changes because we calculate centroid every time a new item joins the cluster • Large data sets needed to cluster the data correctly

Table 3: Advantages and disadvantages of decision trees

Source: Researchgate¹³⁵

***k*-Nearest Neighbors**

First described in the early 1950s, the *k*-nearest neighbors method is a

classification (or regression) algorithm that, in order to determine the classification of a point, combines the classification of the K nearest points. It is supervised because you are trying to classify a point based on the known classification of other points. It is labor intensive when given large training sets, and it did not gain popularity until the computer revolution in the 1960s brought processing power that was able to handle large data sets.¹³⁵ Today, it is widely used in the area of pattern recognition.¹³⁵

As Deng et al. explain¹³⁵:

“Nearest-neighbor classifiers are based on learning by analogy, that is, by comparing a given test tuple with training tuples that are similar to it. The training tuples are described by n attributes. Each tuple represents a point in an n -dimensional space. In this way, all of the training tuples are stored in an n -dimensional pattern space. When given an unknown tuple, a k -nearest-neighbor classifier searches the pattern space for the k training tuples that are closest to the unknown tuple. These k training tuples are the k ‘nearest neighbors’ of the unknown tuple. When the ‘ k ’ closest points are obtained, the unknown sample is then assigned to the most common class among those k -points. In case of $k=1$, the unknown sample is assigned to the closest point in the pattern space. The closeness is measured using the distance between the two points.”

the k -means clustering and k -nearest neighbor methodologies seek to accomplish different goals; k -nearest neighbors is a classification algorithm, which is a subset of supervised learning, while k -means is a clustering algorithm, which is a subset of unsupervised learning.

K -nearest neighbor techniques can be used to prevent theft in the retail and gaming business. Modern surveillance systems are intelligent enough to analyze and interpret video data on their own, utilizing k -nearest neighbor for visual pattern recognition to scan and detect hidden packages in the bottom bin of a shopping cart at check-out, for example.

As she explains in her article *Solving Real-World Problems with Nearest Neighbor Algorithms*¹³⁸, Lillian Pierson states that, “If an object is detected that’s an exact match for an object listed in the database, then the price of the spotted product could even automatically be added to the customer’s bill. While this automated billing practice is not used extensively at this time, the technology has been developed and is available for use.”

The K -nearest neighbor algorithm can also be used to detect patterns in credit card usage to root out credit card fraud. “Many new transaction-scrutinizing software applications use k NN algorithms to analyze register data and spot unusual patterns that indicate suspicious activity,” Pierson adds.¹³⁸

“If register data indicates that a lot of customer information is being entered manually rather than through automated scanning and swiping, this could indicate that the employee who’s using that register is in fact stealing customer’s personal information,” warns Pierson.¹³⁸ Another example would be “if register data indicates that a particular good is being returned or exchanged multiple times, this could indicate that employees are misusing the return policy or trying to make money from doing fake returns.”¹³⁸

kNN is not just about fraud. It can also be used to increase retail sales. “Average nearest neighbor algorithm classification and point pattern detection can be used in grocery retail to identify key patterns in customer purchasing behavior, and subsequently increase sales and customer satisfaction by anticipating customer behavior,” explains Pierson.¹³⁸

Advantages	Disadvantages
<ul style="list-style-type: none"> • It produces tighter clusters than other clustering techniques • Gives best result when data sets are distinct • Easy to understand 	<ul style="list-style-type: none"> • KNN neither doesn’t follow any nor have any standard for selecting the value ‘k’, which is one of the key factors in the success of an algorithm • As KNN is a Lazy Learner algorithm, it has high storage requirements and requires efficient indexing techniques • The efficiency of the KNN algorithm also depends on the choice of the distance metric used. The results of the algorithm differ for each similarity metric

Table 4: Advantages and disadvantages of decision trees

Source: Researchgate.¹³⁵

Logistic Regression

According to Wikipedia, logistic regression is a regression model where the dependent variable (DV) is categorical, i.e., a variable that can take on one of a limited, and usually fixed, number of possible values.¹³⁹ This compares to a variable that would be continuous. Developed in 1958 by statistician David Cox, “The binary logistic model is used to estimate the probability of a binary response based on one or more predictor (or independent) variables (features). It allows one to say that the presence of a risk factor increases the probability of a given outcome by a specific percentage.”¹³⁹

In his article *Using Logistic Regression to Predict Customer Retention*¹⁴⁰, Andrew Karp explains that:

“Logistic regression is an increasingly popular statistical technique used to model the probability of discrete (i.e., binary

or multinomial) outcomes. When properly applied, logistic regression analyses yield very powerful insights in to what attributes (i.e., variables) are more or less likely to predict event outcomes in a population of interest. These models also show the extent to which changes in the values of the attributes may increase or decrease the predicted probability of event outcomes."

Logistic regression techniques may be used to classify a new observation whose group is unknown, in one of the groups, based on the values of the predictor variables. According to Karp, "Logistic regression models are frequently employed to assess the chance that a customer will: a) re-purchase a product, b) remain a customer, or c) respond to a direct mail or other marketing stimulus."¹⁴⁰

Karp adds that "Economists frequently call logistic regression a 'qualitative choice' model, and for obvious reasons: a logistic regression model helps us assess probability which 'qualities' or 'outcomes' will be chosen (selected) by the population under analysis."¹⁴⁰ As can be expected, Karp argues that, "When proper care is taken to create an appropriate dependent variable, logistic regression is often a superior (both substantively and statistically) alternative to other tools available to model event outcomes."¹⁴⁰

Karp uses a health care example to make his point that the analyst has several independent variables to use in the modeling process, but this example can be illustrative of how they could be used in the hotelier industry.¹⁴⁰ Karp explains that "An analyst developing a model predicting re-enrollment in a health insurance plan may have data for each member's interaction with both the health plans administrative apparatus and health care utilization in the prior 'plan year.'"¹⁴⁰

The analyst can then construct variables such as the "number of times member called the health plan for information, number of physician office visits, whether or not the member changed primary care physicians during the previous 'plan year,' and answers to a customer satisfaction survey."¹⁴⁰ These can be employed in the modeling process and, once the model has been constructed, the analyst must decide which variable can be employed as the "outcome" or the "dependent" variable.¹⁴⁰

In logistic regression analyses "it is often the analyst's responsibility to *construct* the dependent variable based on an agreed-upon definition of what constitutes the 'event of interest' which is being modeled."¹⁴⁰

In the health care re-enrollment example, "a health plan's management team may define 'attrition' or 'failure to re-enroll' as situations where a member fails to return the re-enrollment card within 30 days of its due date. Or, in a response modeling scenario, a direct mail firm may define 'non-response' to an advertisement as failure to respond within 45 days of mailout."¹⁴⁰

Logistic regression models can be powerful tools to build models that understand customer retention.¹⁴⁰ “When applied properly, logistic regression models can yield powerful insights into why some customers leave and others stay. These insights can then be employed to modify organizational strategies and/or assess the impact of the implementation of these strategies,” Karp adds.¹⁴⁰

A/B Testing

Also known as split testing or bucket testing, A/B testing is a method of marketing testing by which a baseline control sample is compared to a variety of single-variable test samples in order to improve response rates.

A classic direct mail tactic, this method has recently been adopted within the interactive space to test tactics such as banner ads, emails, and landing pages. As Scott Sutton explains in his article *Patron Analytics in the casino and Hospitality Industry: How the House Always Wins*¹²⁸, for casino marketers, A/B testing is the most effective way to identify the best available marketing offer.¹²⁸ It can test “two different offers against one another in order to identify the offer that drives the highest response and the most revenue/profit.”¹²⁸

As Dan Siroker and Peter Komen explain in their book *A/B Testing: The Most Powerful Way to Turn Clicks Into Customers*¹⁴¹, “The hardest part of A/B testing is determining what to test in the first place. Having worked with thousands of customers who do A/B testing every day, one of the most common questions we hear is, ‘Where do I begin?’”

The mistake many companies make is they jump in headfirst without any detailed planning. Siroker and Komen propose the following deliberate five-step process¹⁴¹:

1. Define success
2. Identify bottlenecks
3. Construct a hypothesis
4. Prioritize
5. Test

A/B testing is particularly good for website marketing, especially for uncovering a company’s best landing page. As Siroker and Komen explain, “Defining success in the context of A/B testing involves taking the answer to the question of your site’s ultimate purpose and turning it into something more precise: *quantifiable success metrics*. Your success metrics are the specific numbers you hope will be improved by your tests.”¹⁴¹

Whereas a hotel’s website could easily define its success metrics in terms of revenue per visitor/bettor, it is also important to understand such things as traffic sources, bounce rate, top pages, conversion rates, conversion by traffic

source, amongst other things.

Site Type	Common Conversion & Aggregate Goals
e-Commerce A site that sells things for users to purchase online.	<ul style="list-style-type: none"> • Completed purchase • Each step within the checkout funnel • Products added to cart • Product page views
Media/Content A site focused on article or other content consumption.	<ul style="list-style-type: none"> • Page views • Articles read • Bounce rate (when measuring within an A/B testing tool, this is often measured by seeing if the user clicked anywhere on the page)
Lead Generation A site that acquires business through name capture.	<ul style="list-style-type: none"> • Form completion • Clicks to a form page (links may read “Contact us” for example)
Donation	<ul style="list-style-type: none"> • Form completion • Clicks to a form page (links may read “Send a donation” for example)

Table 5: Typical A/B conversion & aggregate goals

Source: *A/B Testing: The Most Powerful Way to Turn Clicks Into Customers*¹⁴¹

As Siroker and Komen state:

*“Part of building out your testing strategy is identifying what constitutes — and does not constitute — a “conversion” for your particular site. In online terms, a conversion is the point at which a visitor takes the desired action on your website. Pinpointing the specific actions you want people to take most on your site and that are most critical to your business will lead you to the tests that have an impact.”*¹⁴¹

Once the site’s quantifiable success metrics are agreed upon, attention can be paid trying to discover where the bottlenecks are.¹⁴¹ These are the places where users are dropping off, or the places where momentum in moving users through the desired series of actions weakens.¹⁴¹

In his article *100+ Hotel Trends to Watch in 2020*, Jordan Hollander notes that hoteliers will be able to optimize their websites constantly with the help of AI.⁶⁸ He mentions Hotelchamp’s Autopilot and Triptease Convert, two commercial services that will performs A/B tests to increase the rate of direct online bookings.

Time Series Model

A time series is an ordered sequence of values of a variable at uniformly spaced time intervals. A Time Series model can be used to predict or forecast the future behavior of a variable.

In his article *Time Series Analysis*, Muhammad Imdadullah explains that “Time series analysis is the analysis of a series of data-points over time, allowing one to answer question such as what is the causal effect on a variable *Y* of a change in variable *X* over time? An important difference between time series and cross section data is that the ordering of cases does matter in time series.”¹⁴²

These models account for the fact that data points taken over time may have an internal structure (such as autocorrelation, trend, or seasonal variation) that should be taken into account. For the hotel industry, a Time Series Analysis can be used to forecast sales, project yields and workloads, as well as analyze budgets.

Time series can be broken down into two variations:

- Continuous Time Series — “A time series is said to be continuous when observation are made continuously in time. The term continuous is used for series of this type even when the measured variable can only take a discrete set of values.”¹⁴²
- Discrete Time Series — “A time series is said to be discrete when observations are taken at specific times, usually equally spaced. The term discrete is used for series of this type even when the measured variable is a continuous variable.”¹⁴²

As Sang and Dong explain in their *Determining Revenue-Generating Casino Visitors Using a Vector Autoregressive Model: The Case of the G Casino in Korea*¹⁴³, time-series data was analyzed to:

“investigate the characteristics of hotelier visitors that affect hoteliers’ revenue generation. Exchange rates — a traditional measure relevant to tourism — and customer types and nationalities were empirically analyzed with a vector autoregressive model using data acquired from all branches of Korea’s G hotelier. The results suggest that the hoteliers’ revenues were affected by the customers’ type and nationality; VIP customers were very important factors in the hoteliers’ revenue generation; moreover, the revenue impact of Russian visitors was quite strong despite their small numbers.”

Time series can be used to compare seasonal estimation and trend estimation in forecasting models on both a state or a national level.

Neural Networks

Artificial Neural Networks (ANN) or just “Neural Networks” are non-linear statistical data modeling tools that are used when the exact nature of a relationship between input and output is unknown. In their article *Neural Networks in Data Mining*¹⁴⁴, Singh and Chauhan claim that a neural network is:

“A mathematical model or computational model based on biological neural networks, in other words, is an emulation of biological neural system. It consists of an interconnected group of artificial neurons and processes information using a connectionist approach to computation. In most cases an ANN is an adaptive system that changes its structure based on external or internal information that flows through the network during the learning phase.”

As Jim Gao explains in his article *Machine Learning Applications for Data Center Optimization*¹⁴⁵:

“Neural networks are a class of machine learning algorithms that mimic cognitive behavior via interactions between artificial neurons. They are advantageous for modeling intricate systems because neural networks do not require the user to predefine the feature interactions in the model, which assumes relationships within the data. Instead, the neural network searches for patterns and interactions between features to automatically generate a best fit model. Common applications for this branch of machine learning include speech recognition, image processing, and autonomous software agents. As with most learning systems, the model accuracy improves over time as new training data is acquired.”

Neural networks can be used to find patterns in data. A key feature of neural networks is that they learn the relationship between inputs and output through training.

There are three types of training in neural networks; reinforcement learning, supervised and unsupervised training, with supervised being the most common one. Neural Networks are data processing systems whose structure and functioning are inspired by biological neural networks. Their fundamental characteristics include parallel processing, distributed memory, and adaptability to their surroundings.

For a hotel’s marketing purposes, neural networks can be used to classify a consumer’s spending pattern, analyze a new product, identify a patron’s characteristics as well as forecast sales.¹⁴⁴ The advantages of neural networks include high accuracy, high noise tolerance and ease of use as they can be

updated with fresh data, which makes them useful for dynamic environments.¹⁴⁴

In her article *How DeepMind's AlphaGo Zero Learned all by itself to trash world champ AI AlphaGo*¹⁴⁶, Katyanna Quach explains how neural networks can work when training computers to play board games. According to Quach, the board game Go is considered a “difficult game for computers to master because, besides being complex, the number of possible moves — more than chess at 10^{170} — is greater than the number of atoms in the universe.”¹⁴⁶

“AlphaGo, the predecessor to AlphaGo Zero, crushed 18-time world champion Lee Sedol and the reigning world number one player, Ke Jie,” explains Quach.¹⁴⁶ The next generation of DeepMind’s technology, AlphaGo Zero, beat “AlphaGo 100-0 after training for just a fraction of the time AlphaGo needed, and it didn’t learn from observing humans playing against each other — unlike AlphaGo. Instead, Zero’s neural network relies on an old technique in reinforcement learning: self-play.”¹⁴⁶

As Quach notes about the process¹⁴⁶:

“Essentially, AlphaGo Zero plays against itself. During training, it sits on each side of the table: two instances of the same software face off against each other. A match starts with the game’s black and white stones scattered on the board, placed following a random set of moves from their starting positions. The two computer players are given the list of moves that led to the positions of the stones on the grid, and then are each told to come up with multiple chains of next moves along with estimates of the probability they will win by following through each chain.

“So, the black player could come up with four chains of next moves, and predict the third chain will be the most successful. The white player could come up with its own chains, and think its first choice is the strongest.

“The next move from the best possible chain is then played, and the computer players repeat the above steps, coming up with chains of moves ranked by strength. This repeats over and over, with the software feeling its way through the game and internalizing which strategies turn out to be the strongest.”

This methodology differs from the old AlphaGo, which “relied on a computationally intensive Monte Carlo tree search to play through Go scenarios.”¹⁴⁶ “The nodes and branches created a much larger tree than AlphaGo practically needed to play.”¹⁴⁶

“A combination of reinforcement learning and human-supervised learning was used to build ‘value’ and ‘policy’ neural networks that used the search tree to

execute gameplay strategies,” explains Quach.¹⁴⁶ “The software learned from 30 million moves played in human-on-human games, and benefited from various bodes and tricks to learn to win. For instance, it was trained from master-level human players, rather than picking it up from scratch,” adds Quach.¹⁴⁶

“Self-play is an established technique in reinforcement learning, and has been used to teach machines to play backgammon, chess, poker, and Scrabble,” says Quach.¹⁴⁶ David Silver, a lead researcher on AlphaGo, explains that it is an effective technique because the opponent is always the right level of difficulty.¹⁴⁶

“So it starts off extremely naive,” Silver said, adding that “at every step of the learning process it has an opponent — a sparring partner if you like — that is exactly calibrated to its current level of performance. To begin with these players are very weak but over time they get progressively stronger.”¹⁴⁶

Tim Salimans, a research scientist at OpenAI, explains that self-play means “agents can learn behaviours that are not hand coded on any reinforcement learning task, but the sophistication of the learned behavior is limited by the sophistication of the environment. In order for an agent to learn intelligent behavior in a particular environment, the environment has to be challenging, but not too challenging.”¹⁴⁶

“The competitive element makes the agent explicitly search for its own weaknesses. Once those weaknesses are found the agent can improve them. In self-play the difficulty of the task the agent is solving is always reasonable, but over time it is open ended: since the opponent can always improve, the task can always get harder,” adds Salimans.

Self-play does have its limitations.¹⁴⁶ Right now, there are “problems that AlphaGo Zero cannot solve, such as games with hidden states or imperfect information, such as StarCraft, and it’s unlikely that self-play will be successful tackling more advanced challenges.”¹⁴⁶

Self-play will be worthwhile in some areas of AI, argues Salimans.¹⁴⁶ “As our algorithms for reinforcement learning become more powerful the bottleneck in developing artificial intelligence will gradually shift to developing sufficiently sophisticated tasks and environments. Even very talented people will not develop a great intellect if they are not exposed to the right environment,” he warns.¹⁴⁶

DeepMind, the company behind AlphaGo Zero and its predecessor, believes that “the approach may be generalizable to a wider set of scenarios that share similar properties to a game like Go.”¹⁴⁶

Discriminant Analysis

According to Wikipedia, “Discriminant function analysis is a statistical analysis used to predict a categorical dependent variable (called a grouping variable) by

one or more continuous or binary independent variables (called predictor variables). The original dichotomous discriminant analysis was developed by Sir Ronald Fisher in 1936. It differs from an ANOVA or MANOVA, which is used to predict one (ANOVA) or multiple (MANOVA) continuous dependent variables by one or more independent categorical variables.”¹⁴⁷

Discriminant or discriminant function analysis is a method used to determine which weightings of quantitative variables or predictors best discriminate between two or more than two groups of cases and do so better than chance. It is a method used in statistics, pattern recognition and machine learning to find a linear combination of features that characterizes or separates two or more classes of objects or events.

Because of its ability to classify individuals or experimental units into two or more uniquely defined populations, discriminant analysis can be used for market segmentation and the prediction of group membership. The discriminant score can be the basis on which a prediction about group membership is made. For example, the discriminant weights of each predictive variable (age, sex, income, etc.) indicate the relative importance of each variable. In other words, if age has a low discriminant weight then it is less important than the other variables.

For a hotel’s marketing department, use of discriminant analysis can help predict why a patron frequents one hotel over another. Discriminant analysis is specifically useful in product research, perception/image research, advertising research and direct marketing.

Survival or Duration Analysis

As per Wikipedia, “Survival analysis is a branch of statistics for analyzing the expected duration of time until one or more events happen, such as death in biological organisms and failure in mechanical systems. This topic is called reliability theory or reliability analysis in engineering, duration analysis or duration modeling in economics, and event history analysis in sociology.”¹⁴⁸ Survival analysis attempts to answer questions such as¹⁴⁸:

- What is the proportion of a population which will survive past a certain time?
- Of those that survive, at what rate will they die or fail?
- Can multiple causes of death or failure be taken into account?
- How do particular circumstances or characteristics increase or decrease the probability of survival?

A branch of statistics that deals with death in biological organisms and failure in mechanical systems, survival analysis involves the modeling of time to event data; in this context, death or failure is considered an “event” in the survival analysis literature – traditionally only a single event occurs, after which the organism or mechanism is dead or broken. Survival analysis is the study of

lifetimes and their distributions. It usually involves one or more of the following objectives:

1. To explore the behavior of the distribution of a lifetime.
2. To model the distribution of a lifetime.
3. To test for differences between the distributions of two or more lifetimes.
4. To model the impact of one or more explanatory variables on a lifetime distribution.

There are several other data mining techniques that can be used but the ones listed above are the industry's most common ones and much of what you will need to glean from your data can be discovered by using them. Once the data has been mined, a business intelligence solution can help visualize what's going on with your data, while a predictive analytics program can actually analyze current and historical trends to make predictions about future events.

Hotelier Analytical Models

The following models have been implemented in the hospitality industry, but this should not be considered an authoritative list, as creative hospitality executives should be able to easily come up with a lot more.

Customer Segmentation

A customer segmentation model provides a view of the hotel from a customer perspective, such models have many and varied applications. Customers are segmented according to what they present to the hotelier. Views include:

Generally, the data is used to determine the appropriate segments for these views. However, the hotelier has the ability to select the intervals that are preferential and relevant to their venue. For example, it may be desired to split time of day into three, eight-hour periods or six, four-hour periods.

The results of this analysis present a detailed view of how the hotel is populated at different times and can allow for appropriate strategic decisions to be made. These decisions could be a function of marketing, operations or strategy. The output is also used for the building of acquisition models as discussed below.

Other potential for analysis would be a master segmentation model that uses the preference results described. Customers are clustered based on their preferences to gain a global view of the hotelier that is concise and understandable. Furthermore, such models can help measure the impact of strategic decisions, e.g. the addition or removal of a sports or lottery game can be measured against how particular metrics are affected.

Customer Acquisition Model

Just like every other business, hotel operators are always looking for new customers. With the hospitality business getting more and more competitive and saturated by the day, there is always a constant need to know where to attract customers from and what type of customer to target.

The results of the segmentation modeling previously described can be used to build a predictive model that identifies likely characteristics of attractive customers. Obviously, the hotel will have no internal data available on customers they don't already have on their books, so the analysis becomes a data mining exercise using publicly available input variables. Hotels can then target these customers with a view to attracting those who have the traits that they see in their already valuable customers.

The best external data to use would be population census data, linked to the internal customers by a location identifier (such as postcode or mesh block). It is acknowledged that in some jurisdictions robust and accurate census data may not be available so the model would be relying on whatever information the hotelier records on its customers from a demographic and lifestyle point of view.

This approach becomes a classical data-mining problem, where a pool of independent variables would be tested for the strength of association with the response variable. Once the relevant predictors are identified and the characteristics and traits are defined, marketing and acquisition campaigns could be targeted at the population towards these kinds of people.

This would be something that looks to predict a metric derived from current/past customers. Such a metric could come from a segmentation model that identified the high value customers that are most attractive to the hospitality company. There are several approaches that can be used and once the target has been defined, this allows for a parametric equation to be derived. This equation attempts to predict the characteristics that distinguish the desirable customers from the rest.

This model can only use publicly available information (although other hotelier information might be acceptable) as that is how a potential customer would be identified. Current information that the company would have on hand would be age, nationality, gender, and address.

Where available, third party data should be looked at to further enhance the findings. This could be census data that gives an indication of further customer demographics and this enhances the ability to hone in on customer sweet spots.

Recency-Frequency-Monetary (RFM) Models

RFM is a method used for analyzing customer value. It is commonly used in database marketing and direct marketing and has received particular attention

in the hotelier and retail industries. RFM stands for:

- **Recency** — How recently did the customer purchase?
- **Frequency** — How often do they purchase?
- **Monetary Value** — How much do they spend?

Most businesses will keep scores of data about a customer's purchases. All that is needed is a table with the customer name, date of purchase and purchase value. One methodology is to assign a scale of 1 to 10, whereby 10 is the maximum value and to stipulate a formula by which the data suits the scale. For example, in a service-based business like the hotelier business, you could have the following:

- **Recency = 10** — the number of months that have passed since the customer last purchased.
- **Frequency = number of purchases in the last 12 months (maximum of 10).**
- **Monetary = value of the highest order from a given customer (benchmarked against \$10k).**

Alternatively, one can create categories for each attribute. For instance, the 'Recency' attribute might be broken into three categories – customers with purchases within the last 90 days; purchases between 91 and 365 days; and purchases longer than 365 days. Such categories may be arrived at by applying business rules or using a data mining technique to find meaningful breaks.

Once each of the attributes has appropriate categories defined, segments are created from the intersection of the values. If there were three categories for each attribute, then the resulting matrix would have twenty-seven possible combinations (one well-known commercial approach uses five bins per attribute, which yields 125 segments).

Segments could also be collapsed into sub-segments if the gradations appear too small to be useful. The resulting segments can be ordered from most valuable (highest recency, frequency, and value) to least valuable (lowest recency, frequency, and value). Identifying the most valuable RFM segments can capitalize on chance relationships in the data used for this analysis. For this reason, it is highly recommended that another set of data be used to validate the results of the RFM segmentation process.

Advocates of this technique point out that it has the virtue of simplicity: no specialized statistical software is required, and the results are readily understood by businesspeople. In the absence of other targeting techniques, it can provide a lift in response rates for promotions.

Whichever approach is adopted, profiling will be done on the results to determine what makes up group membership. Categorical factors such as

gender, nationality/locality can be used as well as age (or, indeed, any other demographic feature that is available) to understand the “type” of customer that resides in each group. These factors can be used for each segment and applied against the population metrics to determine how much more or less likely a segment is to exhibit a feature or type of behavior when compared to the customer base as a whole.

Propensity to Respond Model

A Propensity to Respond model is the theoretical probability that a sampled person (or unit) will become a respondent in an offer or survey. They are especially useful in the marketing field.

A response likelihood model can have substantial cost savings as it can lead to lower mailing costs by identifying patrons who are very unlikely to respond to a particular offer. After segmenting these people out, the hotel can then focus on only those most likely to take up the offer. A hotel can identify the likelihood of response from all eligible patrons.¹²⁸ After that, it can identify the most valuable patrons that are most likely to respond.¹²⁸ This allows the hotel to estimate the expected response from the most valuable patrons and eliminate mailing(s) to the patrons that are of lower worth and/or are unlikely to respond.¹²⁸

Sutton warns that, “Occasionally, response likelihood models will lead to easy decisions, such as cutting out low worth patrons with a low likelihood of responding. However, more complex situations might arise since response models are never perfect.”¹²⁸ It doesn’t matter how good a model is or how accurate the historical data is, there is always a chance that a patron identified as unlikely to respond will respond.¹²⁸ “Thus, when making a decision about patrons identified as unlikely to respond to an offer, it is also important to balance that likelihood of response with the potential return on response,” advises Sutton.¹²⁸

A propensity to respond model would be built using historical information around marketing campaigns and it looks at predicting the likelihood a customer will respond to a marketing communication. The advantage of this model is that it strengthens the marketing strategy even more, beyond purely segmenting the customer base. It can further allow for improved ROI on the marketing budget, by identifying the likely number of respondents to be returned by a campaign.

Often a business’ marketing department will have an expected number of respondents or an expected response rate.¹²⁸ By identifying those who are most likely to respond, the chances of meeting that expected number or rate of response is greatly improved.¹²⁸ Gone are the days of marketing to an entire customer base. This is an unnecessary waste of the marketing budget and also runs the risk of annoying customers by touching them too often or with the wrong offer.¹²⁸

Again, a predictive model would be built which identifies those most likely to respond through to those least likely to respond. This would be done using customer metrics and historical campaign/marketing information that identifies those who responded and those who didn't. Variables that have a significant association with the customer action are extracted and these form part of the prediction algorithm. Every customer is then given a score according to how likely they are to respond to a marketing campaign.

This information can be used for strategies such as extracting the top 40% of customers most likely to respond, or a fixed number, such as 100,000 customers. The result is the marketing function becomes more efficient and effective, with better returns for the company's marketing dollar.

Customer Conversion Model

This model would be used to score customers based on information contained in a hotelier's source systems as it would only be applicable for customers who had pre-booked their room (as opposed to walk-in customers). Historical information would be extracted from the hotel's IT systems around desirable customers. This would include spending patterns and profitability.

To identify the relationships that may exist between how the customer comes to the hotel and his or her desirability metric, information would be extracted from the hotel's source systems. Basically, anything that can be attributed to the initial transaction the customer has with the hotel would be used as a potential input.

These models might also have to be stratified by itinerary to identify the most relevant relationships. The major advantage of a predictive model with this intention would be that it allows the hotel to identify customers that they need to interact with once they enter the hotel. This would give the hotel clerks the potential to get the required information they need to successfully foster a strong customer relationship.

Furthermore, if every potential customer has a score associated with him or her as to his or her long-term likelihood of being attractive, the hotel can further hone in on its customers by monitoring their behavior once they are in the hotel. It is imperative that the hotel interact with desirable customers before they have left the property. If customers are made to feel like they are valuable and worthwhile, the likelihood of them returning under their own volition significantly increases.

Identify When a Patron is Likely to Return

Besides knowing which offers a patron is most likely to respond to, it would also be good to know exactly when a patron was planning to make his or her next stay.¹²⁸ Although it might not be possible to know exactly when a patron plans to return, the hotel's marketing department might be able to make an accurate

prediction around it.¹²⁸

“There are a variety of methods that range in complexity that can be used to assess when a patron will return to bet, including frequency analysis, regression, and survival analysis. Knowing when a patron is likely to bet is beneficial as it helps to identify patrons that haven’t made a trip in the expected amount of time and are at risk of leaving,” advises Sutton.¹²⁸ “First, the business needs to have an idea of the average or median time between trips. This might need to be segmented based on geography, worth, or even historical frequency,” recommends Sutton.¹²⁸ Patrons who haven’t made a bet within the set amount of time for his or her segment will be flagged and dealt with appropriately, perhaps marketed to more aggressively, perhaps given marketing content referencing “We haven’t seen you in a while”, or “Last chance type of offers.”¹²⁸

“Marketing can integrate information from predicted worth, optimal offers, and time to next trip to maximize campaign success in a number of ways,” says Sutton. “The business can save money by adjusting the frequency of offers for patrons that are not identified as likely to bet on rarer events. Instead of sending the patron monthly offers, they can send quarterly offers with longer validation windows that allow more time to bet. Conversely, campaigns might be created with the goal of increasing the frequency of bets from higher worth patrons,” recommends Sutton. This can also be done for stays, not just bets.

Patron Worth Model

As Sutton explains, “Most industry experts would agree that determining a patron’s worth is the first and foremost responsibility of patron analytics in the hotelier industry.”¹²⁸ Of course, predicting a patron’s future behavior is not easy and it is affected by a number of variables, “many of which are outside factors that the business might not have insight into, including total income, expendable income, ethnicity, reasons for a trip to the hotelier, etc., etc.”¹²⁸

Even where a patron lives, or information gleaned from his or her social media accounts could be very revealing. There is also “plenty of information to be found with in-house data that can be used to build models and metrics to predict a patron’s future worth.”¹²⁸ Once patron worth has been determined, “patrons can then be segmented into groups based on other behaviors and effective marketing campaigns can be developed around those behaviors.”¹²⁸

The first thing to do is to “determine what worth is, as the definition of worth is critical for deciding how valuable a patron is and how much to reinvest in the patron in the future.”¹²⁸ As Sutton explains, “There are two main components of worth — the financial sources of worth (i.e., gambling) and the unit of time to which it refers (daily, weekly, monthly, etc.). Additionally, worth can refer to historical worth, which is already known, or future worth, which is unknown.”¹²⁸

“The definition of worth will likely depend on both the various financial sources

of revenue that affect the business directly and the exact business problems that are being addressed. Gambling worth can also be broken down into various sources (i.e., what types of betting does the patron like to do) depending on the business issues being addressed,” Sutton explains.¹²⁸

“Once patron worth has been defined, the business can then use data mining and modeling to estimate predicted worth into the future,” states Sutton.¹²⁸

“There are a variety of techniques that are used to develop models to predict future worth, the most common being regression models. Multiple regression models are the most common because they utilize a variety of predictors and the relationships between those predictors to predict future worth,” adds Sutton.¹²⁸

“Regression models can also be built using such categorical variables predictors as gender, ethnicity, age range, or other demographic variables. Developing separate models based on categorical variables, such as separate models predicting worth for slot and table players, might produce models with less error and better predictions.”¹²⁸ “Regression models are particularly effective because the model can be used to score historical data to predict an unknown outcome, which is worth in this case, within a certain degree of confidence,” adds Sutton.¹²⁸

Customer Churn Model

In his article *Smart Strategies Require Smarter KPIs*¹⁴⁹, Michael Schrage argues that “reducing churn—the KPI that tracks customers ending their relationship with a company over a particular time period—is a strategic priority. Even determining that period—a week, month, quarter, or year—is itself a strategic choice. Almost without exception, significant changes in churn rates command immediate top management attention.”¹⁴⁹

According to the *Harvard Business Review*¹⁵⁰, the cost of acquiring new customers can prove to be five to 25 times more expensive than keeping existing ones. Schrage believes that, “Customer retention is key to sustaining cash flow and profitability.”¹⁴⁹ In today’s big data and AI environments, Schrage believes that, “understanding ex post facto churn no longer strategically suffices; organizations seek to predict churn to proactively prevent it.”¹⁴⁹ “Making churn a more anticipatory and prescriptive KPI requires a virtuous cycle approach. In short, ‘learning from churning’ makes the KPI smart,” argues Schrage.¹⁴⁹

For Schrage, data governance is key.¹⁴⁹ He adds that, “Distinctions must be drawn between churn presumed (a customer who simply stops engaging, that is, no more visits, purchases, etc.) versus churn absolute (the customer who explicitly closes an account or discontinues a service).”¹⁴⁹ “Similarly, differences between reactive and prospective churn must be understood. Customers can leave after specific bad experiences, such as poor service or unexpected charges.

Alternately, rival options might appear, or the service becomes less compelling for other reasons. This prospective or silent churn is typically more difficult to identify or predict,” says Schrage.¹⁴⁹ Because it is so difficult to identify or predict, it will probably be recognized by any patron who the hotelier reaches out to proactively stop him or her from churning.

Schrage argues that¹⁴⁹:

“organizations seeking to devise a smarter churn KPI need to correlate negative customer experiences with propensity to churn. They want to be able to capture and chart the gradual disengagement behaviors that reliably lead to disconnection. They’d likely analytically invest in identifying those clusters and segments at highest risk for departure. That requires that these companies know what data sets would make the best resources for scoring or ranking ‘likeliest to churn’ customers to prioritize preemptive and preventive action.”

For Schrage, even these analytics don’t go far enough and he uses the example of one global telecom: the company “developed and explored several churn prediction models. It quickly discovered that its analytics lacked any meaningful assessment of customer lifetime value (CLV)—that is, the long-term revenue and profit potential of the customer.”¹⁴⁹ “Potentially high-value customers were not measurably differentiated from customers who reliably switched providers in pursuit of the lowest possible price (or, almost as challenging, customers whose constant complaining and refund requests made them money losers),” explains Schrage.¹⁴⁹ “Aligning the CLV KPI with the predictive churn KPI completely transformed how the company assigned resources and designed interventions for customer retention,” says Schrage.¹⁴⁹

Arguably, customer retention is both one of the cornerstones of any CRM system, as well as being the most important component of the customer lifetime value (CLV) framework.¹⁵¹

In their article *In pursuit of enhanced customer retention management*¹⁵², Ascarza, Neslin, Netzer, Lemmens, & Aurélie highlight “the importance of distinguishing between which customers are *at risk* and which *should be targeted* — as they aren’t necessarily the same customers.”

There are indications that companies have problems managing customer retention. According to Handley¹⁵³, from the point of view of the customer, 85% report that companies could do more to retain them. A *Forbes Insight*¹⁵⁴ study found that from the company’s point of view, a vast majority of top executives report that customer retention is a priority for their organization, only 49% believe their company has the ability to support their retention goals.

Ascarza et al. suggest that “an inordinate amount of effort has been devoted to

predicting customer churn”¹⁵², but less attention has been afforded to “elements of campaign design such as whom to target, when to target, and with what incentives, as well as the broader issues of managing multiple campaigns and integrating retention programs with the firm’s marketing activities and strategies.”¹⁵²

Ascarza et al. propose the following definition: “First, the central idea that customer retention is *continuity* — the customer continues to interact with the firm. Second, that customer retention is a form of customer behavior — a behavior that firms intend to manage. Accordingly, we propose that ‘*Customer retention is the customer continuing to transact with the firm.*’”¹⁵²

Hotels are unique from many other industries in that their customers are not tied into contracts, but “many of the retention metrics relevant for contractual firms are also relevant for non-contractual firms” state Ascarza et al.¹⁵² A simple 0/1 indicator of transaction, and a measure of recency are appropriate for both types of companies.¹⁵² However, on its own recency is not a good indicator of customer retention, argue Ascarza et al.¹⁵² They provide the following example¹⁵²:

Customers A and B last purchased 6 months ago. On the one hand, Customer A typically purchases once a year (i.e., her inter-purchase time is 12 months), thus a recency of 6 months should not be taken as an indication of churn because it is well within the customer’s purchase cycle. On the other hand, Customer B usually purchases every month, in which case a recency of 6 months should be worrisome for the firm. We thus recommend calculating a recency/inter-purchase ratio, where a ratio larger than one is an indication of a retention problem. Regarding the examples above, Customer A’s recency/inter-purchase times is $6/12 = 0.5$, whereas Customer B’s ratio is $6/1 = 6$.

Ascarza et al. warn there are two caveats that should be kept in mind when creating the recency/inter-purchase-time ratio¹⁵²; “First, it requires observing a reasonable number of transaction to reliability calculate the average inter-purchase time. Second, even for those customers for whom one observes a sufficient number of transactions, the inter-purchase time measure might be biased due to the right censoring nature of the data — the time between the last purchase and the last observation is ignored.”¹⁵²

Ascarza et al. propose the following process to develop and evaluate a single retention campaign¹⁵²:

- Identify customers who are at risk of not being retained.
- Diagnose why each customer is at risk.

- Decide when to target these customers and with what incentive and/or action.
- Implement the campaign and evaluate it.

For Ascarza et al., “these steps are applicable to both proactive and reactive campaigns.”¹⁵² “Reactive campaigns are simpler because the firm doesn’t need to identify who is at risk — the customer who calls to cancel self-identifies. ‘Rescue rates’ can readily be calculated to evaluate the program, and subsequent behavior can be monitored.”¹⁵² The incentive should be substantial because the company is pretty certain the customer will churn.¹⁵⁵ Reactive campaigns, however, can be challenging because not all customers can be rescued, and, because we’re dealing with human nature here, customers learn that informing the firm about their intentions to churn can be richly rewarded with valuable incentives, which can endanger the long-run sustainability of reactive churn management.¹⁵⁶

“Proactive campaigns are more challenging starting from the basic task of identifying who is at risk,” argue Ascarza et al.¹⁵² Balancing the cost of false positives (targeting a customer who has no intention to leave) against false negatives (failing to identify a customer who is truly at risk) requires sophisticated analytics.¹⁵⁷

To discover who is at risk, a predictive model must be built that identifies customers at risk of not being retained, or in general of generating lower retention metrics.¹⁵² “The dependent variable could be 0/1 churn or any measure of retention.”¹⁵² Table 9 summarizes variables predictor variables for several different industries, all in contractual settings, but many will be useful for the sports betting industry. “These include well-researched predictors like customer satisfaction, usage behavior, switching costs, customer characteristics, and marketing efforts, as well as more recently explored factors such as social connectivity,” explain Ascarza et al.¹⁵²

Factors	Example	Method
Customer Satisfaction	<ol style="list-style-type: none"> 1. Emotion in emails 2. Customer service calls 3. Usage trends 4. Complaints 5. Previous non-renewal 	<ol style="list-style-type: none"> 1. Logistic, SVM, Random Forests 2. SVM + ALBA 3. Logistic, NN, SVM, Genetic 4. Logistic, NN, SVM, Genetic 5. Logistic, SVM, Random Forests
Usage Behavior	<ol style="list-style-type: none"> 1. Usage levels 2. Usage levels 	<ol style="list-style-type: none"> 1. SVM with ALBA 2. Logistic, NN, SVM, Genetic
Switching Costs	<ol style="list-style-type: none"> 1. Add-on services 2. Pricing plan 	<ol style="list-style-type: none"> 1. Logistic, NN, SVM, Genetic 2. Dec Tree, Naïve Bayes, Logistic, NN, SVM

	3. Ease of switching	3. Graphical comparison
Customer Characteristics	1. Psychographic Segment 2. Demographics 3. Customer tenure	1. Logistic, NN, SVM, Genetic 2. Logistic, NN, SVM, Genetic 3. Logistic, Decision Tree
Marketing	1. Mail responders 2. Response to direct mail 3. Previous marketing campaigns 4. Acquisition method 5. Acquisition channel	1. Bagging and Boosting 2. Logistic, SVM, Random Forests 3. Decision rules 4. Probit 5. Logistic
Social Connectivity	1. Neighbor churn 2. Social network connections 3. Social embeddedness 4. Neighbor/connections usage	1. Hazard 2. Random Forests, Bayesian Networks 3. Decision rules 4. Logistic

Table 6: Predictors of Churn in Contractual Settings

Ascarza, Neslin, Netzer, Lemmens, Aurelie¹⁵²

According to Ascarza et al., “Social connectivity factors can predict churn.”¹⁵² Studies in the telco industry have shown that high ‘social embeddedness’, i.e., the extent to which the customer is connected to other customers within the network, is negatively correlated with churn.¹⁵⁸ Additionally, “the behavior of customer’s connections also affects her own retention.”¹⁵²

Two studies^{159 160} found that a customer is more likely to churn from a service or company if his or her contacts within the company has churned. Conversely, an Ascarza, Ebbes, Netzler and Danielson study¹⁶¹ found that a customer is less likely to churn if his or her contacts increase use of the service. Due to network externalities, Ascarza et al. argue, “the service becomes less valuable to the customer if her friends are not using it.”¹⁵² “These social-related factors are more likely to predict churn for network oriented services such as multi-player gaming, communications, shared services, since customers exert an externality by using the service,” state Ascarza et al.¹⁵² Ascarza et al. conclude that, “If ones goes beyond the predictive power of social connections and towards understanding the social effect, it is imperative to consider the similarity among connected customers (homophily), correlated random shocks among connected customers (e.g., a marketing campaign that is geographically targeted and hence affects connected customers), and true social contagious effects.”¹⁵²

Ascarza et al. also consider whether using ultra-fine grained “big data” can be

used to improve churn prediction.¹⁵² According to Ascarza et al., these include “actions consumers take such as visiting a web page, visiting a specific location, ‘Liking’ something on Facebook, etc.”¹⁵² but the researchers have found no evidence of this sort of data improving retention.¹⁵² However, this type of data has been found to improve the prediction of customer acquisition^{162 163} and cross-selling¹⁶⁴ so Ascarza et al. believe it could be considered for churn prediction as well.

The main goal of a retention program is obviously to prevent churn, therefore understanding the causes of such churn behavior is imperative if you are to design an effective retention program.¹⁵² Ascarza et al. believe that, “There is a difference between determining the best predictors of churn and understanding *why* the customer is at risk of churning.”¹⁵² “For example, demographic variables might predict churn, but these variables rarely cause customers to leave the company.”¹⁵² “The distinction becomes less clear when we consider factors like past consumption or related behaviors. Are heavy users more likely to be retained *because* they consume more or is it that satisfaction with the service is driving both behaviors?” ask Ascarza et al.¹⁵²

Additionally, “identifying specific causes for an individual customer is quite different from identifying general causes in a population.”¹⁵² To identify the potential causes of churn for an individual customer, the variables or combinations of variables that are both viable causes and for which the customer exhibits a risky behavior must be discovered.¹⁵²

A competing risk hazard model could be used “to predict which of the possible reasons of churn are most likely to cause churn at any point in time.”¹⁵² Once the causes of churn are identified, the hotel needs to isolate those that are controllable and those that are not.¹⁵² Both correlates of low retention and also the causes of it need to be identified.¹⁵²

Ascarza et al. argue that it’s not always the customers who are at the highest risk that should be targeted.¹⁵² In her article *Retention Futility: Targeting High Risk Customers Might Be Ineffective*¹⁶⁵, Eva Ascarza explains that the highest risk customers may not be receptive to retention efforts. As Ascarza et al. put it, “They might be so turned off by the company that nothing can retain them.”¹⁵² Ascarza et al. advise focusing on customers who are at risk of leaving *and* are likely to change their minds and stay if targeted.¹⁶⁶

Although research on customer *response* to retention programs is scarce, Ascarza’s *Retention Futility: Targeting High Risk Customers Might Be Ineffective*¹⁶⁵, which advocates for the use of “uplift” models. “In the jargon of customer-level decision models, uplift modeling recognizes customer *heterogeneity* with respect to the incremental impact of the test,” states Ascarza.¹⁶⁵ Incremental impact can be modeled in many different way, including by utilizing interactions models and machine learning methods.^{167 168 165}

Even customers who are likely to both churn and respond still might not be worth rescuing because they might have low lifetime values.¹⁵² Hotels should always consider the potential profit that a retention action can generate, which depends on “the likelihood of churning, the incremental likelihood of responding, the customer’s CLV, and the incentive cost.”^{165 166 169}

In the majority of cases, most of the customer targeted in a proactive campaign will be those whom the company would have retained anyway.¹⁵² In their paper *Building Data Applications for CRM*¹⁷⁰, Berson et al. discovered that “customers targeted by a retention campaign who did not accept the retention offer ended up with a higher churn rate than average.” Ascarza et al. speculate this is because “the offer triggered these customers to examine whether they wanted to stay with the company, and the answer turned out to be ‘no.’”¹⁵² Although Ascarza et al. found the study provocative, they did also point out that, the data did “not permit rejection of the alternative explanation that the retention offer bifurcated non-churners (satisfied customers who therefore accepted the offer) and churners (dissatisfied customer who therefore churned without accepting the offer).”¹⁵²

More troublingly, in their article *The Perils of Proactive Churn Prevention Using Plan Recommendations: Evidence from a Field Experiment*¹⁷¹, Ascarza, Iyengar and Schleicher showed that some would-be non-churners could be provoked by the retention effort to churn. “Non-churners may be continuing to transact with the firm partly out of habit or inertia,”¹⁷¹ and the retention efforts may inadvertently make people realize they are unhappy with the status quo, and paradoxically cause churn.¹⁷¹

According to Ascarza et al., another factor to consider in deciding whom to target is the position of the customer in the firm’s social network.¹⁷¹ “Taking a social perspective, a customer with many contacts, or highly connected with customers who themselves are highly connected, can be very valuable because his/her defection could cause others to churn,” warn Ascarza et al.¹⁷¹ Individuals who are central in a network might have a lower risk of churning because of the high social cost of leaving.¹⁷² Because of the tendency of individuals to be in social networks with others like them, high profitability customers may have a strong effect on each other, which provides even more of an incentive to target high CLV customers, as well as to provide channels to market virally.¹⁷³

Hogan, Lemon and Libai point out that product life cycle should also be kept in mind as “socially related monetary loss due to customer churn would be much higher early in the product life cycle, when social influence is critical in driving product growth.”¹⁷⁴

One important consideration that needs to be kept in mind is the selection of the best action to take to prevent churn.¹⁷¹ Price incentives are one of the top considerations and they can be effective in the short term, but they are easily

replicated by competitors.¹⁷¹ This might put pressure on margins as customers can become overly price sensitive. Ascarza et al. argue that “non-price incentives, such as product improvements (e.g., a gaming company adds additional levels in a game) may work better in the long term.”¹⁷¹

Another approach is to let customers pick the incentive amongst a set of options.¹⁷¹ Research by Shrift and Parker¹⁷⁵ has shown that including in that set the option of no-choice (i.e., doing nothing) increases persistence among customers, which would likely result in higher retention. Hotels can also “design the retention effort in a way that it will mainly affect customers at high risk of churn and/or in a way that all customers, targeted or not, would appreciate it (e.g., product or service improvement).”¹⁷¹

The element of surprise has proven to be quite positive for customer retention as well. Research by Oliver, Rust and Varki¹⁷⁶ showed that surprising positive events attach a customer to the company. This is particularly important because the retention campaign will most likely target many non-would-be churners and it should enhance retention in the long run even among those uninterested in churning.¹⁷¹

Ascarza et al. argue that “the best way to conceptualize when-to-target is to consider the different type of marketing campaign throughout the customer’s lifecycle: acquisition => pre-emptive => proactive => reactive => win-back => post win-back”¹⁷¹ (see Figure 17). Although it won’t be necessary to target immediately after customer acquisition, this is the time a company needs to start thinking about retention.¹⁷¹ Ascarza et al. give an example from the telco industry in which the provider would make sure the customer is on the right data plan from the very beginning, thereby ensuring there won’t be any nasty bill surprises.¹⁷¹

“Pre-emptive timing would be to target the customer before the customer shows any sign of diminished retention,”¹⁷¹ while proactive timing would be the launching of a “campaign targeted at customers who are identified as a retention risk based on predictive models.”¹⁷¹ “Reactive timing is when the firm tries to prevent the customer from churning, while that customer literally is in the act of churning.”¹⁷¹ Win-back is when the customer has churned and the company attempts to re-acquire that customer.¹⁷¹ Post win-back actions refers to contacts initiated after the customer has rejected a win-back offer.¹⁷¹

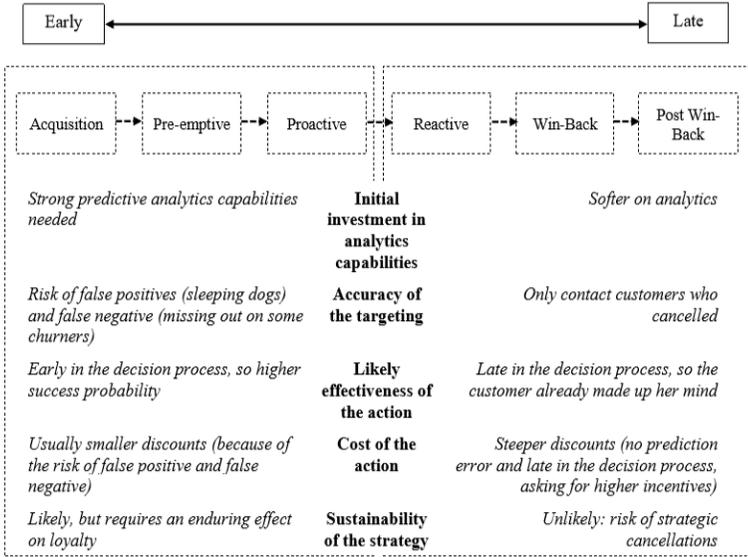


Figure 17: Alternative Timing of Retention Campaigns

Source: Ascarza, Neslin, Netzer, Lemmens, Aurelie¹⁷¹

Once campaigns have been initiated they need to be evaluated, if possible by using a control group randomly selected not to be targeted.¹⁷¹ “This allows top-line results to be compiled easily without formal causal modeling,” note Ascarza et al.¹⁷¹ Overall profitability metrics and various retention measures should be calculated.¹⁷¹ The rescue rate should be calculated for all of the hotel’s retention campaigns.¹⁷¹ This will allow the hotel to “undertake a meta-analysis across multiple campaigns to understand which factors influence rescue rates (incentive characteristics, characteristics of customers targeted, the match between these two, etc.).”¹⁷¹ This meta-analysis could reveal both immediate insights as well as long-term trends that affect the hotel’s business.

Long-term impacts of the campaign should also be part of the evaluation.¹⁷¹ As Ascarza et al. note, “Yes, the customer might have been retained this time, but what impact did that have on the customer’s future profitability? What happened to the customer’s retention rate after the campaign? Did it increase because the customer was more satisfied, or decrease because now the customer expected if not demanded incentives?”¹⁷¹

Multiple campaign management is similar to single campaigns except now the following questions need to be asked in a dynamic setting across several campaigns:

- Who is at risk?
- Why are they at risk?

- Who should be targeted?
- When should they be targeted?
- With what efforts?
- What was gained by these actions?¹⁵²

In their article *Database Marketing: Analyzing and Managing Customers*¹⁷⁷, Blattberg, Kim, and Neslin discuss two key issues in multiple CRM campaign management: wear-in and wear-out. As Ascarza et al. note, “A campaign may take time before it reaches its maximal impact (wear-in) and then decline at some rate afterwards (wear-out). These concepts have important implications for the spacing of retention campaigns.”¹⁵²

On the individual level, multiple campaign management is tricky because any current campaign can influence what “state” a customer might be in for the next campaign.¹⁵² A customer who receives an incentive that is clearly of lesser value than a previous incentive might be offended and so put off by the offering that the incentive works against the giving company. This, Ascarza et al. suggest that dynamic optimization is required.¹⁵²

In terms of integrating strategy, it is important to coordinate both the company’s acquisition and retention as well as its retention spending with the company’s marketing strategy and its segmentation, targeting and positioning (STP) approach.¹⁵² Optimizing both acquisition and retention can be a tricky endeavor, but it is important to do.¹⁵²

Ascarza et al. provide an example from the financial services industry that show how easy it is for things to get out of sync.¹⁵² They consider the STP of a financial services company that may be trying to segment the market by customer value and also wants to target high-value customers with premium products and services.¹⁵² A retention campaign emphasizing promotional discounts would then be “off-strategy.”¹⁵²

Ascarza et al. believe that emotions and social connections are important when it comes to identifying who is at risk of churn, but what’s more important is understanding *why* the customer is at risk and *whom should be targeted*.¹⁵² “Social connections data could be particularly important for key ‘influencers’, i.e., customers that provide network value to other customers, as Ascarza, Ebbes et al. put it.¹⁶¹

“Emotional and other indicators gleaned from text data should provide key insights on why customers churn,” argue Ascarza et al.¹⁵² They add, “Textual analysis approaches such as Linguistic Inquiry and Word Count (LIWC) and topic modeling may be used to extract measures of emotions and other useful insights from consumer data and leverage these for churn prediction and management.”¹⁵²

Engagement metrics do have the potential to identify what retention actions

need to be taken.¹⁵² Ascarza et al. conclude that, “knowledge management will be necessary to ensure the firm’s entire experience base in retention management is codified and accessible to planners. This is especially important for planning multiple campaigns and integrating strategy, since these tasks require a broad understanding of the firm’s experiences.”¹⁵²

When it comes to building the actual models, Ascarza et al. proffer that, tried and true regression-based predictive modeling is useful for constructing the following¹⁵²:

- “Predictive models for identifying who is at risk and who will respond to targeting.
- “Meta analyses of field data that provide insights needed for multiple campaign planning.
- “Marketing mix model that can drive strategy integration.”¹⁵²

Deep learning has been used to uncover the probability that a customer might defect¹⁷⁸ and it may also help in modeling response to retention offers.¹⁵² Ascarza et al. add that, boosted varying-coefficient regression models have been studied for dynamic predictions and optimization in real time¹⁷⁹, which have shown to offer major improvements over the classic stochastic gradient boosting algorithm currently used for churn prediction.^{180 169} Ascarza et al. see these methods as promising discoveries for retention management.

“Dimensionality reduction and variable selection techniques form another major development in the machine learning field, and may be useful for retention research and practice, which face an overflow of potential defection predictors,” add Ascarza et al.¹⁵² Companies wanting to build models predicting *who is at risk*, *whom to target*, and *when to target* should look at modern regularization techniques like Lasso¹⁸¹, elastic net¹⁸², and adaptive regularization¹⁸³. Churn modelers should consider the Cox proportional hazard models^{184 185} as it has been proven particularly effective, and it is available in the R package ‘glmnet’.¹⁵²

“State-of-the-art regularization models, which systematically control for overfitting and thus allow modeling with larger feature sets, also offer the potential to expand the set of predictors to include interactions between churn predictors,” explain Ascarza et al.¹⁵² They also believe that when estimating the effects of churn incentives it helps to include “interactions between the treatment variable (i.e., being targeted with a retention action) and customer or campaign design covariates.”¹⁵²

The use of analytics and data management to help detect and avoid the act of attrition is something that can benefit all hotels. Churn questions that a hotel should be asking include:

- How is the hotel detecting behavioral changes in its patrons?

- Does the hotel have steps in place to identify when the customer experience is going wrong, or when the customer is about to leave?

Hotel operators can use Master Data Management (MDM) techniques to communicate important customer preference information to staff who sit at interaction points throughout the operation.

To ensure customer retention is front and center, hotels should be scoring their databases on a regular basis in order to understand the likelihood of a customer churning from their venue. This kind of modeling is prevalent in the telecommunications, finance, and utilities industries, and should be utilized in the gaming industry as well. While a slightly different set up due to those industries mostly having their customers locked into contracts, hospitality companies need to stay ahead of the game in retaining their customers.

One of the hardest parts for a hotel to determine — as opposed to commercial entities that have their customers on contract and definitely know they are tied down — is whether the customer has categorically churned. It may be that a change in location, circumstances or something else has caused a customer to disappear from the hotel, with every intention of returning. However, statistical measures could be used to identify customer's whose behavior has changed and the change wouldn't be attributed to chance.

Historical internal data can be used to model the difference between a churned customer and one who is still engaged. There would be significant metrics in the data that identify the likelihood of churning. Similar to the acquisition model described above, a parametric equation could be constructed that elicits the association and relationship between the target variable and the predictors.

This model would serve as an early warning system for the hotel. It would also be a strategic tool useful to predict whether a customer was deemed worth retaining or not. The model should be run on a regular basis across the entire customer database to understand which customers have reached or are reaching a critical value in their churn score. The theory: these customers would then be targeted with an offer to return to the hotel, in the process avoiding the likelihood of them churning. Alternatively, if the customer is deemed to be of little or no value, there would be no offer forthcoming to entice them to return.

Optimizing Offers

As Sutton explains, "In addition to predicting the future worth of patrons, it is important to know which marketing campaigns are the most effective for driving response, revenue, and profit. In general, certain offers are better than others, and specifically certain offers will be better for certain patrons."¹²⁸

"While knowing the probable future worth of a patron is critical for determining the reinvestment level for which a patron is eligible, patrons' behaviors and

interests can be used to identify the offer(s) that will be most appealing to each patron as well as the ones generating the most profitable response,” Sutton explains.¹²⁸ By analyzing the likelihood that a patron will respond to a certain offer or offers, hotelier and hotelier analysts can optimize the offer that each patron is given in order to maximize the amount of revenue and profit driven by the marketing campaigns as a whole.¹²⁸

As previously mentioned, A/B testing is one of the best ways to identify which offers work best. A/B testing involves “testing two different offers against one another in order to identify the offer that drives the highest response and the most revenue/profit,” explains Sutton.¹²⁸ “More advanced statistical methods can be used to generate likelihood of response scores and classification scores. Some of the more common statistical approaches are logistic regression, decision trees, and discriminant analysis,” Sutton states.¹²⁸

“Essentially, these statistical methods use historical data to find the factors that are related as to why a patron responds. Those factors can then be used to assess the likelihood of response based on the similarity of a patron profile to that of responders,” adds Sutton.¹²⁸

“These methods have historically been used in direct marketing analysis to identify the best types of offers and the most likely responders,” says Sutton.¹²⁸ “In order to build accurate and predictive response models, historical data about response is required. The likelihood of response might be a broad measure of response that refers to the likelihood a patron will respond to any offer, or it might be specific to the likelihood of response to a specific type of offer.”¹²⁸

In addition, Sutton adds, “it’s a good idea to select test segments of customers for the purpose of continually testing new offers. Doing so will help to ensure that there is a large amount of response data that can be used to build models and continually improve the efficacy of marketing.”¹²⁸ “Effective response models will help identify which patrons are most likely to respond to an offer, and in turn to which offer patrons are most likely to respond,” concludes Sutton.¹²⁸

Chronological View of a hotelier Analytics Implementation

Data reduction via cluster analysis and segmentation is a logical starting point and the initial work should be around identifying patron preference(s). Reducing the customer database into more manageable and meaningful segments has many advantages; the preferences that can be derived are dependent on the availability of meaningful distinguishing factors.

- *Segmentation models* use customer metrics that help reduce and profile the customer database and should be constructed as this information can be the underpinning for further analyses, such as patron acquisition worth models.

- *A Propensity to Respond Model* is heavily dependent on the marketing data and the veracity and richness of it. The hotelier would need to develop the whole view of the customer first, but, once developed, this is one of the most powerful marketing models available.
- *Customer Conversion Model* could be viewed as an extension of a number of the above models, with the idea to derive a data driven metric that scores a customer's likelihood of returning after his or her first trip.
- *Patron Likelihood to Return Model* requires a complete view of the customer along with considerable marketing data. This would help with offers sent, who was sent offers, who responded to the offers, etc., etc. The derived metric on its own would have value, but it could also be a significant input into a two stage model to predict next trip value and worth.
- *A Patron Worth Model* would identify the hotelier's most valuable patrons. The assumption is that a hotelier would be looking to predict different metrics, such as worth on the next trip, worth over the next 12 months, lifetime value, etc., etc.
- *RFM* is a method used for analyzing customer value and it is commonly utilized in database marketing and direct marketing and has received particular attention in the hotelier industries. Hoteliers should keep scores of data about a customer's purchases that includes a table with the customer name, date of purchase and purchase value. From this data, a hotelier can score the true value of a customer and this information can be fed to the marketing department, which can decide to send an offer to the client if it is worth it.
- *A Customer Acquisition Model* would then be built by using the results of the segmentation modeling models (or a different metric for desirable customers). A deeper investigation of a hotelier's source systems is needed and this could be part of the analysis to help understand what is available, and what might be able to be used from external parties. Different jurisdictions would have different models.
- *Customer Churn Models* would require preliminary analysis to extract only engaged customers. The hotelier would need to derive a statistically driven metric that indicated whether a customer had churned or not. The hotelier could then build models to detect upcoming patron attrition.
- *An Identifying Patrons at Risk of Abuse Model* would likely take into account the factors that predict whether a guest will play on a future trip, but it also makes sense to build a separate model to identify patrons who are likely to use a future offer and not play at all.

Customer analytics have evolved in six core dimensions: strategy, organization, data, technology, analytics and measurement, and process. In terms of analytics,

hoteliers should start with segmentation to build a comprehensive view of their customers. Segmentation provides multiple payoffs across the customer life cycle, from acquisition through retention. Segmentation might start with simple attributes such as bets, or even geography, but it should evolve over time to characteristics such as lifetime value.

Table 7 shows the other types of analytics that should be used during a customer lifecycle. Many of these models require complex data integration / data virtualization, CRM, social, and analytics systems working in harmony with each other.

Life-cycle stage	Business objective	Analytical method
Discover	Profile customers	Segmentation
	Evaluate prospects	Lead scoring
	Reach the right prospects	Customer lookalike targeting
Explore	Analyze customers' responses	Offer/contact optimization
	Optimize marketing mix	Marketing mix modeling
	Delivering contextually relevant content	Customer location analysis
	Test marketing inputs	A/B and multivariate testing
Buy	Predict future events	Propensity models
	Expand wallet share	Cross-sell/upsell
	Target accurately	In-market timing models
Use	Drive deeper product use	Product & recommendation analysis
	Understand use	Customer device use analysis
	Understand customer satisfaction	Customer satisfaction analysis
Ask	Learn about drivers of engagement	Engagement analysis
	Improve customer service	Customer device use analysis
	Identify customer pain points	Voice of the customer analysis
Engage	Manage defection of customers	Churn models
	Personalize marketing efforts	Next-best-action models
	Maximize customer value	Lifetime value models
	Increase depth of relationship	Loyalty models

Life-cycle stage	Business objective	Analytical method
	Optimize customer interactions	Customer journey analysis
	Understand customer relationships	Social network analysis

Table 7: Analytics Across the Customer Lifecycle

Source: Forrester's *How Analytics Drives Customer Life-Cycle Management*¹⁸⁶

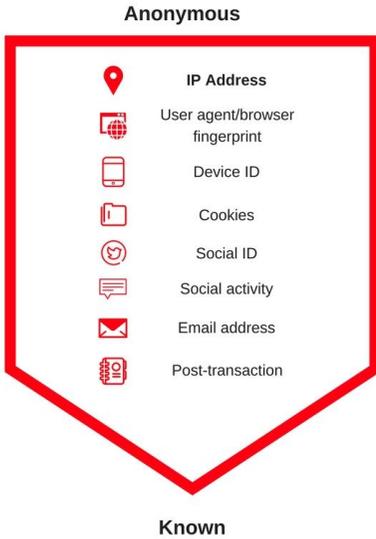
Clickstream Analysis

When a person browses a website, he or she leaves behind a digital trail, which is known as a clickstream. Clickstream analysis (also called clickstream analytics) is the process of collecting, aggregating, reporting and analyzing the browsing behavior of a web surfer to better understand the intentions of users and their interests in specific content or products on a website. Clickstream analysis is the process of collecting, analyzing and reporting aggregate data about which pages a website visitor visits — and in what order. The path the visitor takes though a website is, basically, the clickstream.

There are two levels of clickstream analysis: traffic analytics and e-commerce analytics. Traffic analytics operates at the server level and tracks how many pages are served to the user, how long it takes each page to load, how often the user hits the browser's back or stop button and how much data is transmitted before the user moves away from the website.

E-commerce-based analysis uses clickstream data to determine the effectiveness of a website as a channel-to-market. It is concerned with what pages the browser lingers on, what he or she puts in or takes out of a shopping cart, what items are purchased, whether or not the buyer belongs to a loyalty program and uses a coupon code, as well as his or her preferred methods of payment.

Utilizing clickstream analysis, a hotelier can help build a Master Marketing Record for each customer in real-time. This allows the hotel to test scenarios and



options for the website, as well as develop personalized responses for individuals. The system should include a combination of social listening, analytics, content publication and distribution, and tracking, as well as a strong workflow and rules engine that is geared around strong governance. All of these applications are built to ultimately feed a Master Marketing Profile — a centralized customer record that pulls in all data based on digital activity that can be identified by a single customer ID.

Figure 18 shows the customer funnel that takes an anonymous web browser to a known patron. Through clickstream analytics, personalization marketing can begin, and associating this activity with a customer once he or

Figure 18: Customer funnel

she walks through the front door should be a hotelier’s primary goal. This can be done by enabling new users to log into his or her account via web or mobile applications, like a hotel’s WeChat account.

In their article *Big Data and Competition Policy: Market Power, personalised pricing and advertising*¹⁸⁷, Marc Bourreau et al. explain that firms may collect personal and non-personal data about users, as well as machines, in several different ways, including:

- Publicly observed through device, operating system, IP address, etc.
- Voluntarily provided by the consumer, “either with knowledge when registering to a website, such as name, data of birth, email or postal address for delivery, etc., or often without knowledge when logging into a website (login-based data) such as products the consumer is looking for, purchases, etc.”¹⁸⁷
- Tracking the consumer online, which can be achieved in different ways, such as:
 - “tracking cookies, which are a specific type of cookie that is distributed, shared, and read across two or more unrelated websites for the purpose of gathering information or presenting customized data to a consumer”¹⁸⁷;

- “Browser and device fingerprinting, which is a method of tracking web browsers by the configuration and settings information they make visible to websites”¹⁸⁷;
- “History sniffing, which is the practice of tracking which sites a user has and has not visited (by hacking its browser history list)”¹⁸⁷;
- “Cross-device tracking offers the ability to interact with the same consumer across her desktop, laptop, tablet, wearable, and smartphone, using both online and offline information”¹⁸⁷;
- “Through the use of applications by the user, this information is accessible for the Operating System owner as well as for the developer of the application.”¹⁸⁷

In his article *Google Attribution Allows Clear, Seamless Campaign Analysis for Marketers*¹⁸⁸, Matthew Bains explains that Google has released a new tool called Google Attribution that “uses machine learning and data to help marketers measure the impact of each of their marketing touch points, across multiple channels, and across multiple devices.” “It uses data that’s already there from Adwords and Google Analytics; it just takes that data and shows you how each customer moved through their buyer’s journey and attributes those conversions respectively. It provides a single view of the path to purchase to help marketers learn what is actually working compared to what seems to be working,”¹⁸⁸ adds Bain.

Wanamaker would be ecstatic as “marketers can finally begin to answer the age-old question that is typically at the forefront of their minds — is my marketing working?”, as Bains puts it¹⁸⁸

Moving away from the flawed last-click attribution idea, “Google Attribution uses machine learning and data to help marketers measure the impact of each of their marketing touch points, across multiple channels, and across multiple devices.”¹⁸⁸ Google Attribution shows users how each customer moves through his or her buyer’s journey and attributes those conversions respectively.¹⁸⁸ “It provides a single view of the path to purchase to help marketers learn what is actually working compared to what seems to be working,” Bains explains.¹⁸⁸

As Bains warns¹⁸⁸:

“With last click, the reward for the conversion often went to the last touch point that the user made, often with a sale after a click on an ad. This could lead to false impressions about the effectiveness of an ad campaign versus display ads, organic search, social, email affiliates, and many other interactions that a customer made with a business along the buyer’s journey. Maybe organic search is actually more important than display ads or vice versa.”

“The aim of Google Attribution is to simplify the complex problem of multichannel, multi-device attribution by leveraging data advertisers already have in Google Analytics, AdWords, or DoubleClick Search,” adds Kishore Kanakemedela, director of product management at Google.¹⁸⁸

With Attribution, users can see how effective each step of a campaign is, whether that step is a video ad, a banner ad, a carousel ad, an email, a social campaign, or any other quantifiable digital content.¹⁸⁸ Attribution will show users how these micro-moments worked together to spot leads and drive them to conversions.¹⁸⁸

Marketers will now have more transparency on what is actually driving their business, which in turn, can help them better allocate their budgets between channels¹⁸⁸; quantifiable success on one channel leads to increased budget spend for that channel, that is until numbers drop off, then reallocation commences.

Conclusion

In this chapter, I wanted to lay out the many ways in which *The A.I. Hotelier* can track and understand its customer base on both a micro and a macro level. Many of the analytical models I mention in this chapter have been around for decades and every hotel should be aware that creativity with these models is what will separate them from their competitors.

With today’s IT budgets in the millions of dollar per year, every hotelier can afford to buy software that segments its customers, creates marketing campaigns and predicts customer churn, but it’s what it does with this information that matters most. Customers want to be wowed and this is not an easy thing to do.

Analytics can be useful for the entire customer journey process, from the initial moment a customer is picked up in a clickstream, through the descriptive analytics process of understanding website traffic, to data mining and diagnostic analytics utilized to understand customer spend. Predictive analytics can help forecast which offers a customer might use, while prescriptive analytics can optimize things like hotel room occupancy rates.

The complexity coming to this world, however, will radically alter the customer experience and hoteliers need to prepare for these radical changes now. In chapter four, I will delve into the future of marketing, a place where data is used for everything from website morphing to psychometrics, to affective computing, a place where the psychology of personalization becomes an integral part of real-time marketing.

In this chapter, I delved into the history of analytics and it is important to

understand what today's analytics environment was built upon to truly grasp where it might be going. In the next chapter, I break down the various analytical processes that are important to hotel executives; some of these are decades old, while others are quite new; more are surely on the way as computing power is increasing exponentially and software is getting much more powerful and much more sophisticated by the day. Vast sets of data can be culled through and acted upon by cloud-based servers that can be spun up, utilized to build highly sophisticated models and then turned off almost instantly, meaning data can be crunched only as needed, thereby reducing unnecessary costs.

In the next couple of chapters, I will look at how these technologies can shape the customer experience so that true personalization can be delivered to a market of one. Capturing a first time visitor's IP address can be an important — and necessary — first step in the customer relation and once a user signs up for a patron card all of his or her customer information becomes relevant, which means personalization marketing should be in the cards, so to speak.

Analyzing clickstream data, customer card data, marketing data, as well as social media data can help hoteliers develop three dimensional profiles on each of their customers and, once these profiles are perfected, the behavioral marketing work can begin to ensure that the hotelier is bringing in the customers that will produce the highest ROI. Matching customer needs with the hotelier's staffing and operation requirements then becomes an added cost reduction per

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CHAPTER FOUR: MARKETING

“Business has only two functions - marketing and innovation.”
~ Milan Kundera

Overview

One of the recurring themes of this book is self-reliance. I’m trying to lay out a case for hotels to become much more self-reliant than they probably currently are. Software companies are providing the tools for hotels to become self-sufficient in areas like AI, BI, CRM, CX, SEO, marketing, website personalization, social media, and even analytics.

Today’s advertising environment is nothing like the advertising environment of just a few short years ago, as Dan Woods showed in his amusing comparison of the differing environments that marketers face today as compared to what their 1980s counterparts faced.²³

Right now, there is a radical realignment going on in the advertising industry. As Derek Thompson points out in his *The Atlantic* article *The Media’s Post-Advertising Future Is Also Its Past*¹⁸⁹, it might be tempting to blame media’s advertiser problem and the current state of its demise as the inevitable end game of the Google and Facebook’s duopoly because the two companies already receive more than half of all the dollars spent on digital advertising, as well as command 90 percent of the growth in digital ad sales in 2017.¹⁹⁰ However, Thompson argues what’s happening in media right now is more complex.¹⁸⁹ He sees the convergence of the following four trends¹⁸⁹:

1. Too many players.
2. Not enough saviors.
3. No clear playbook.
4. Patrons with varying levels of beneficence.

It isn’t just Facebook and Google, Thompson states¹⁸⁹, “just about every big tech company is talking about selling ads, meaning that just about every big tech company may become another competitor in the fight for advertising revenue.”¹⁸⁹

“Amazon’s ad business exploded in the past year; its growth exceeded that of every other major tech company, including the duopoly,” notes Thompson.¹⁸⁹ Wanting to move beyond just selling people iPhones, Apple is shifting its growth strategy to selling services not just iPhones.¹⁹¹ Meanwhile, “Microsoft will make about \$4 billion in advertising revenue this year, thanks to growth from LinkedIn

and Bing.”¹⁸⁹ “AT&T is building an ad network to go along with its investment in Time Warner’s content, and Roku, which sells equipment for streaming television, is building ad tech,” adds Thompson.¹⁸⁹

As Sara Fischer explains in her article *The Next Big TV Tech Platform: Roku*¹⁹², “Roku, the connected TV hardware company, is quietly building a large software business, driven mostly by advertising revenue.” Fischer adds: “Roku typically doesn’t sell advertising through an open exchange (open bidding system), like some of the big tech companies do, but it does use programmatic infrastructure to digitally target those ads — a tactic commonly referred to as ‘programmatic direct’ or ‘programmatic reserved.’”¹⁹²

At the Adobe Summit in March 2019, Adobe announced¹⁹³ a new partnership with Roku that would help advertisers engage with Roku’s 27 million OTT viewers. These kinds of deals, which allow businesses to directly connect with consumers are the wave of the future. According to *Adweek*, “marketers can now use elements of the Adobe Advertising Cloud to match their own audience data with Roku’s in a way that provides an unprecedented degree of targeting granularity for those eager to engage with the streaming provider’s 27 million viewers.”¹⁹³

“Keith Eadie, VP and general manager of Adobe Advertising Cloud, said the partnership would enable advertisers to better manage elements of their cross-screen campaigns such as frequency capping and that it would also help them to better measure the outcomes of their media buys on OTT — the fastest-growing channel on the Adobe media buying platform.”¹⁹³

Meanwhile, Scott Rosenberg, general manager, business platform, Roku, added, “Programmatic trading is already a material part of our business, but it is still a minority but some of that is a function of the fact that TV marketers are not by and large as yet trading programmatically.”¹⁹³

This is because the majority of TV ad space is still traded manually, rather than programmatically. However, Rosenberg explained to *Adweek* that “this is about to change. ‘Programmatic is not the predominant methodology for TV marketers, but it’s coming in strong ... this partnership is so important because one of the friction points, that holds programmatic trading of OTT back is scale.’”

The standard ad business methodology is also rapidly evolving. As Sara Fischer points out in her *Axios* article *How Media Companies Lost the Advertising Business*¹⁹⁴, the great irony is that “many of the tech companies began with an aversion¹⁹⁴ to advertising, fearing it would be a disruption towards the consumer experience.” Fischer notes that Google initially feared that advertising-based search engines were “inherently biased towards the advertisers and away from the needs of consumers.”¹⁹⁴ “Facebook CEO Mark Zuckerberg reportedly only accepted advertising on his platform initially so he could pay the bills.”¹⁹⁴ “Snapchat boss Evan Spiegel initially criticized some targeted ads as ‘creepy,’ but

four years later, 90% of the ads sold on Snap's platform are sold in an automated fashion.”¹⁹⁴

Today, most tech companies are embracing the advertising model in one form or another. Fischer adds that, “Some publishers are banding together to offer marketers to [sic] cheaper advertising against traditional media content at scale.” Fischer’s examples include¹⁹⁴:

- Several digital websites, such as Quartz, New York Media, PopSugar and Rolling Stone are all joining Concert, a digital advertising marketplace operator whose stated goal is to combat the tech giants' ad dominance.
- News Corp launched a global digital ad network in 2018 called News IQ, which will pull audience data from sites like *The Wall Street Journal*, *New York Post* and *Barron's*, as well as give advertisers a way to reach highly specific audiences.
- AT&T is hoping to create a similar type of ad network through its Time Warner partnership, with plans to bring on other media and technology partners in time.
- Disney and Verizon are looking into building their own ad networks.

According to George P. Slefo, “Quartz won't be selling the sort of junk display ads that are scattered across the web. Instead, the company offers only a single ad unit that's both high impact and fits with the overall scheme of the website.”¹⁹⁵

Joy Robins, chief revenue officer at Quartz, admitted that, “We remain in a position where we aren't in any available open marketplaces.”¹⁹⁵ Robins added that “the company has also started programmatic advertising through closed, private marketplace deals.”¹⁹⁵ “We are doing both private and very specific deals that are able to be traded using programmatic technology, but they have to be direct and use our custom units, which we believe provide value,” he says.¹⁹⁵

Quartz “has an in-house team of 35 employees dubbed Quartz Creative — separate from its sales team — that works with brands and advertisers in creating ads beyond standard display units for its website.”¹⁹⁵

Fischer adds that, “It's not just tech firms, but retail and consumer package goods companies, too. Ad-serving has become so democratized that any company with an audience is now able to steal advertising dollars away from traditional media companies. Kroger has an ad business and so does its grocery rival Albertsons. Target has a media network and so does Walmart.”¹⁹⁴

Thompson notes that, “These tech companies have bigger audiences and more data than just about any media company could ever hope for. The result is that more advertising will gravitate not only toward ‘programmatic’ artificial-intelligence-driven ad sales but also toward companies that aren’t principally (or even remotely) in the news-gathering business.”¹⁸⁹

In his *Where Did All the Advertising Jobs Go?*¹⁹⁶ Derek Thompson explains that,

“The emergence of an advertising duopoly has coincided with the rise of ‘programmatic advertising,’ a torpid term that essentially means ‘companies using algorithms to buy and place ads in those little boxes all over the internet.’” Thompson adds that, “advertising has long been a relationship-driven business, in which multimillion-dollar contracts are hammered out over one-on-one meetings, countless lunches, and even more-countless drinks. With programmatic technology, however, companies can buy access to specific audiences across several publishing platforms at once, bypassing the work of building relationships with each one.”¹⁹⁶ Because advertising has become more automated, more ads can be produced with fewer people.¹⁹⁶ AI needs to be a part of this programmatic advertising process because the sheer volume of work these processes entail would be overwhelming otherwise.

In her article *Experts Weight in On the Future of Advertising*¹⁹⁷, Giselle Abramovich quotes Keith Eadie, VP and GM of Adobe Advertising Cloud, who argues that, “Programmatic advertising is no longer a silo or a distinct media channel — it’s simply how brands are buying ads.” “As a result,” Eadie says, “the focus is shifting from execution to strategy and better connecting marketing and advertising.”¹⁹⁷

“With programmatic, the big lure for advertisers is its efficiency, according to Amy Avery, Droga5’s chief intelligence officer.”¹⁹⁷ “But it also needs to be about effectiveness, too,” Avery argues.¹⁹⁷ “I don’t think we will ever go to 100% [programmatic ad buying]. But I do think it can increase to much more than it is now once the effectiveness variables come into play.”¹⁹⁷ Avery believes this will happen once AI is integrated to help understand context and it uses this information to inform messaging.¹⁹⁷

Eadie says the \$70 billion TV advertising market is a great example of progress on this front.¹⁹⁷ Specifically, NBCUniversal recently “made its full portfolio of broadcast and cable television available to advertisers through a DSP, essentially automating ad buying for its TV market.”¹⁹⁷

“The old story about programmatic advertising was that both marketers and digital publishers — think AOL, or any news site — embraced the technology, as it allowed companies to cheaply target specific audiences on a budget,” explains Thompson.¹⁹⁶ However, Thompson notes that, “the new reality is that programmatic advertising has placed many advertisements in controversial places, next to low-quality news sources or outright offensive content.”¹⁹⁶ This has caused marketers to both cut back on running programmatic ad campaigns, as well as bringing their operations in-house, where they have more control over both who sees their ads and where they are seen.¹⁹⁶ “The upshot,” Thompson contends is that, “Programmatic ads have been a double blow to media agencies, first automating their function and then encouraging companies to insource the work.”¹⁹⁶

Becoming more self-sufficient may not be a bad thing for typical hotel brand marketers. Software that does everything from automating marketing campaigns to inexpensively segmenting customers, to simplifying the mundane and repetitive processes of producing and categorizing content can help marketers speed up the creative process enormously.

Thompson argues that currently there is a “merging of the advertising and entertainment businesses.”¹⁹⁶ “As smartphone screens have edged out TV as the most important real estate for media, companies have invested more in ‘branded content’ — corporate-sponsored media, such as an article or video, that resembles traditional entertainment more than it does traditional advertising.”¹⁹⁶ Thompson concludes that, “In short, the future of the advertising business is being moved to technology companies managing ad networks and media companies making branded content — that is, away from the ad agencies.”¹⁹⁶ These are cross-currents that hotel brands need to be aware of because they are not just radically changing the marketing landscape but also offering huge marketing opportunities to the hotel brands willing to embrace and exploit them.

If software solutions can alleviate the mundane and repetitive tasks humans are currently toiling away at — and they most definitely can — then businesses can redeploy their staff to handle the more interesting and probably more profitable work, like programmatic functions.

Data & Marketing

The history of the methodical use of data in marketing begins in 1910, with the work of Charles Coolidge Parlin for the Curtis Publishing Company in Boston.¹⁹⁸ As Wedel & Kannan explain in their article *Marketing Analytics for Data-Rich Environments*¹⁹⁹, “Parlin gathered information on markets to guide advertising and other business practices, prompting several major U.S. companies to establish commercial research departments.”¹⁹⁹

Questionnaire survey research, which Gallup popularized in the 1920s with its opinion polling, became increasingly common in the 1920s.²⁰⁰ At about the same time, “concepts from psychology were being brought into marketing to foster greater understanding of the consumer,” explain Wedel and Kannan.¹⁹⁹ Today, psychology has taken an oversized role in the marketing process, as will be shown throughout this chapter and book. Starch’s attention, interest, desire, action (AIDA) model²⁰¹ is an example of this. Starch is widely considered to be one of the pioneers of marketing and consumer research. This is also the era when eye-tracking technology debuted, including the ability to collect data that followed the movements of the eye.²⁰² It is also a technology that is making a strong comeback almost a century later.

“In 1923, A.C. Nielsen founded one of the first market research companies. Nielsen started by measuring product sales in stores, and in the 1930s and 1950s, he began assessing radio and television audiences.”¹⁹⁹ Today, Nielsen is a household name in the United States and it dominates TV ratings in the US and several other countries. Recognizing that social is becoming an important channel, Nielsen has also moved into social media measurement now.

Beginning in the late 1970s, geo-demographic data was collected from government databases and credit agencies by the market research firm Claritas.¹⁹⁹ “The introduction of the Universal Product Code and IBM’s computerized point-of-sale scanning devices in food retailing in 1972 marked the first automated capture of data by hoteliers.”¹⁹⁹

Companies like Nielsen “quickly recognized the promise of using point-of-sale scanner data for research purposes and replaced bimonthly store audits with more granular scanner data,” notes Wedel and Kannan.¹⁹⁹ Shortly after the start of the data collection process, individual customers could be traced through their loyalty cards use, which led to the emergence of scanner panel data.²⁰³

The introduction of IBM’s personal computer in 1981 enabled the collection of customer data on a massive scale.¹⁹⁹ Personal computers allowed marketers to store data on current and potential customers¹⁹⁹, contributing to the emergence of database marketing, which was pioneered by Robert and Kate Kestenbaum and Robert Shaw.²⁰⁴

“In 1990, CRM software emerged, for which earlier work on sales force automation at Siebel Systems paved the way.”¹⁹⁹ Personal computers simplified survey research through personal and telephone interviewing.¹⁹⁹

In 1995, after more than two decades of development at the Defense Advanced Research Projects Agency and several American universities, the internet was born, and this meant large volumes of marketing data were suddenly accessible.¹⁹⁹

Clickstream data extracted from server logs allowed businesses to track page views and website clicks using cookies.¹⁹⁹ Click-through data revealed the true effectiveness of online advertising.¹⁹⁹ “The Internet stimulated the development of CRM systems by firms such as Oracle, and in 1999 Salesforce was the first company to deliver CRM systems through cloud computing,” state Wedel and Kannan.¹⁹⁹

Founded in 1998, Google championed keyword search and the capture of search data.¹⁹⁹ Google emerged from the highly competitive 1990s search environment, beating out the likes of Alta Vista, Yahoo!, Infoseek, and Lycos.

The launch of Facebook in 2004 opened up an era of social network data and it quickly eclipsed MySpace as the dominant social network.¹⁹⁹ The arrival of user-generated content (UGC), including pictures, online product reviews, blogs, and

videos, resulted in an explosion in the volume and variety of data.¹⁹⁹

“With the advent of YouTube in 2005, vast amounts of data in the form of user-uploaded text and video became the raw material for behavioral targeting,” explains Wedel and Kannan.¹⁹⁹ Twitter, with its much simpler 140-character messages, appeared in 2006. While the social network, blogging, and micro-blogging scene solidified in the early 2000s, another important step for marketing measurement appeared in 2007 when Apple introduced the iPhone. With its global positioning system (GPS) capabilities, the first iPhone meant one could capture consumer location data at an unprecedented rate.¹⁹⁹

Analytics

The initiative of the Ford Foundation and the Harvard Institute of *Basic Mathematics for Applications in Business in late 1950s and early 1960s* is widely credited for providing the catalyst that introduced analytics into marketing.²⁰⁵ By then, statistical methods, such as analysis of variance, had been utilized in marketing research for more than a decade²⁰⁶, but the development of statistical and econometric models tailored to specific marketing problems only took off “when marketing was recognized as a field of decision making through the Ford/Harvard initiative.”²⁰⁷

The development of Bayesian decision theory at the Harvard Institute²⁰⁸ also played a key role, demonstrated by its successful application to, among other things, pricing decisions.²⁰⁹ Academic research in marketing then started focusing more on the development of statistical models and predictive analytics.¹⁹⁹

New product diffusion models²¹⁰ involved applications of differential equations from epidemiology. Stochastic models of buyer behavior²¹¹ were “rooted in statistics and involved distributional assumptions on measures of consumers’ purchase behavior,” argue Wedel and Kannan.¹⁹⁹

The application of decision calculus^{212 213} to optimize spending on advertising and the sales force became popular after its introduction to marketing by John Little in his *Models and Managers: The Concept of a Decision Calculus*²¹⁴. Nakanishi and Cooper introduced market share and demand models for store-level scanner data in 1974, which were derived from econometric models of demand.²¹⁵

According to Wedel and Kannan, multidimensional scaling and unfolding techniques, founded in psychometrics²¹⁶, also became an active area of research.¹⁹⁹ “These techniques paved the way for market structure and product positioning research by deriving spatial maps from proximity and preference judgments and choice,” contend Wedel and Kannan.¹⁹⁹

Conjoint analysis²¹⁷ and, later, conjoint choice analysis²¹⁸ are unique

contributions that evolved from work in psychometrics by Luce on the quantification of psychological attributes.²¹⁹ Also, “The nested logit model that captures hierarchical consumer decision making, i.e., understanding the factors that influence the way a consumer shops, was introduced in marketing²²⁰, and it recognized that models of multiple aspects of consumer behavior (e.g., incidence, choice, timing, quantity) could be integrated²²¹ into the marketing mix. This proved to be a powerful insight for models of recency, frequency, and monetary (RFM) metrics²²², which is the method for analyzing customer value by looking at how recently someone has purchased an item, how often they purchase and how much they spend. Time-series methods²²³ can help hotels forecast sales, project yields and workloads, analyze budgets, as well as enable researchers to test whether marketing instruments result in permanent or transient changes in sales.

In their paper *A Probabilistic Choice Model for Market Segmentation and Elasticity Structure*²²⁴, Kamakura and Russell state that heterogeneity in the behaviors of individual consumers becomes a core premise on which marketing strategy should be based, and the mixture choice model is the first to enable managers to identify response-based consumer segments from scanner data.²²⁴

Wedel and DeSarbo expounded upon this, arguing that the model should be generalized to accommodate a wide range of models of consumer behavior.²²⁵ Rossi, McCulloch and Allenby concluded that consumer heterogeneity was represented in a continuous fashion in hierarchical Bayes models.²²⁶

Although scholars have hotly debated which of these two approaches best represents heterogeneity, research has revealed that the two different approaches each match specific types of marketing problems, with few differences between them.²²⁷ Today, it can safely be stated that the Bayesian approach is one of the most dominant modeling approaches in marketing, offering a powerful framework to develop integrated models of consumer behavior.²²⁸ Bayesian models have been successfully applied to advertisement eye tracking²²⁹, e-mail marketing²³⁰, web browsing²³¹, social networks²³², and paid search advertising.²³³

Data-driven analytics in marketing has progressed from its inception around 1900 up to the introduction of the Internet in 1995 through approximately three stages:

1. “The description of observable market conditions through simple statistical approaches.
2. “The development of models to provide insights and diagnostics using theories from economics and psychology.
3. “The evaluation of marketing policies, in which their effects are predicted and marketing decision making is supported using statistical, econometric, and OR approaches.”¹⁹⁹

In many cases, throughout the history of marketing analytics, once new sources of data get introduced, methods to analyze them are immediately developed. Figure 19 contains an outline of the history of data and analytical methods. “Many of the methods developed by marketing academics since the 1960s have now found their way into practice and support decision making in areas such as CRM, marketing mix, and personalization and have increased the financial performance of the firms deploying them,” note Wedel and Kannan.¹⁹⁹

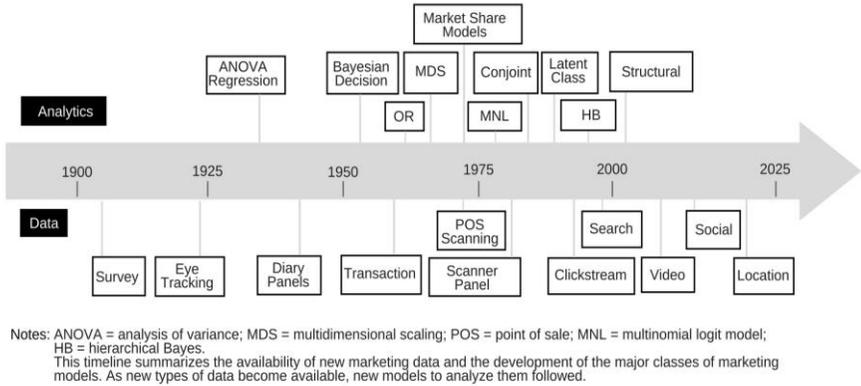


Figure 19: Timeline of Marketing Data and Analytics

Source: *Marketing Analytics for Data-Rich Environments*¹⁹⁹

“Since 2000, the automated capture of online clickstream, messaging, word-of-mouth (WOM), transaction, and location data has greatly reduced the variable cost of data collection and has resulted in unprecedented volumes of data that provide insights on consumer behavior at exceptional levels of depth and granularity,” explain Wedel and Kannan.¹⁹⁹

Although academics have risen to the challenge of developing diagnostic and predictive models for the variety and velocity of data, we’ve seen over the last decade, these developments are admittedly still in their infancy.¹⁹⁹

On the one hand, descriptive metrics displayed on dashboards are popular in practice.¹⁹⁹ Perhaps because of “constraints on computing power, a need for rapid real-time insights, a lack of trained analysts, and/or the presence of organizational barriers to implementing advanced analytics.”¹⁹⁹ In particular, unstructured data in the form of blogs, reviews, and tweets offer opportunities for deep insights into the economics and psychology of consumer behavior, which could usher in the second stage in digital marketing analytics once appropriate models are developed and applied,” argue Wedel and Kannan.¹⁹⁹

On the other hand, machine learning methods have become popular in practice,

but have been infrequently researched in marketing academia.¹⁹⁹ “It is reasonable to expect that the third step in the evolution of analytics in the digital economy — the development of models to generate diagnostic insights and support real-time decisions from big data — is imminent,” contend Wedel and Kannan.¹⁹⁹

Mobile Marketing

If an advertising executive had set about to create the perfect marketing and advertising tool, she could hardly have created something more superior to the mobile phone. Not only is the mobile phone within reach of its owner almost every single hour of every single day but, because it can connect to a marketer in a highly personalized way with the simple touch of a button, it has the potential to become not only more effective than television or radio advertising but, just as importantly, more analyzable.

As the authors of *Mobile Advertising*²³⁴ point out that, “With respect to targeting, no other medium can provide the accurate and rich user profile, psychographic, social engagement and demographic data available from mobile. No other medium has the viral capability that mobile possesses — within seconds following a simple click, a unit of advertisement can spread like wildfire.”

No other media comes even remotely close to the data measurement capacity that mobile offers either, which begins with exposure to the advertisement, followed by the persuasive effect of the advertisement and, finally, to the actual purchase of a product.²³⁴ Just about every link in the marketer’s chain is touched by mobile.

In 1996, the Internet advertising landscape changed forever when Procter & Gamble convinced Yahoo! that it would only pay for ads on a cost-per-click basis, rather than for banner ads²³⁴ Procter & Gamble realized the importance of gaining truthful user metrics for internet advertising and this move ushered in the world of internet analytics; eyeballs were no longer the goal, click-thrus that showed actual product interest became paramount.

As Sharma et al. state in their book *Mobile Advertising*²³⁴ the time is right for mobile marketing because “the heavy lifting of measurements and metrics; of banner ad standards; of search keyword auctions; of advertising cost models and the new, digital ad networks that support them have been built. The groundwork for digital advertising in mobile is largely in place.” However, because there are so many players involved, the mobile advertising value chain is incredibly complicated.²³⁴

As Sharma et al. explain, “the mobile value chain comprises advertisers, agencies, solution providers and enablers, content publishers, operators and consumers. Phone manufacturers or original equipment manufacturers (OEMs)

are enablers in this value chain rather than active participants.”²³⁴ The bottleneck in the chain arises because, even though there are only a limited number of mobile operators, the number of vendors in the value chain is exceedingly high.²³⁴ Although this was written almost a decade ago, the complexity of the advertising environment still remains and it is something that must be kept in mind when developing mobile marketing campaigns.

In their article *The Typological Classification of the Participants’ Subjectivity to Plan the Policy and Strategy for the Smart Mobile Market*²³⁵, Kim et al. argue that the core technologies of cloud computing can greatly enhance mobile marketing efforts. Without cloud computing, it would be impossible to successfully produce targeting context-aware ads, real-time LBS ads, interactive-rich media ads, mobile semantic webs or in-app ads, advanced banner ads or incentive-based coupon ads, AR or QR codes, social network ads, and n-screen ads.²³⁵ It would be especially difficult integrating and converging multifunctional mash-up ads involving a mix of the aforementioned.²³⁵ “Smart mobile advertising products continuously derive combined services where two or more advertising techniques integrate and interlock due to innovative hardware or software technologies.”²³⁵

Mobile advertising has the potential to give hotels the best bang for their marketing buck, but a mobile marketing campaign should not simply be viewed as an extension of a company’s internet marketing brought to the mobile phone. In *Mobile Advertising*, the authors state that the three basic types of mobile advertisements are²³⁴:

- Broad-based brand advertising: broad-based campaigns that take advantage of user filtering and targeting. These can include subsidized premium content, sponsorships, video pre-rolls or intracommercials, post-roll video, on-demand mobile media and contextual or behavioral advertising.
- Interactive, direct response campaigns: these are opt-in campaigns in which the mobile user usually exchanges some personal information for some type of content. TXT short codes, mobile subscription portals, and user registration campaigns are all examples of this type of campaign.
- Highly targeted search advertising: mobile’s ability to inform advertiser of the user’s basic age, sex, and address information is far better than any other form of advertising around. These campaigns include content targeted search advertising and paid placement or paid inclusion search.

Although there were hints that a marketing revolution was underway at the beginning of the 21st Century, few people would have predicted the radical changes that have transformed the industry today. In their article *Interactivity’s Unanticipated Consequences for Marketers and Marketing*²³⁶, Deighton and Kornfeld argue that:

“Mass communication technology empowered marketers with marketer-to-consumer tools such as radio, television and database-driven direct marketing. The digital innovations of the last decade made it effortless, indeed second nature, for audiences to talk back and talk to each other. They gave us peer-to-peer tools like Napster, eBay, TiVo, MySpace, YouTube, Facebook, Craigslist and blogs, and information search tools like Google and Wikipedia. Mobile platforms have given us ubiquitous connectivity, context-aware search, and the ability to tag and annotate physical spaces with digital information that can be retrieved by others. In sum, new traffic lanes were being built, not for the convenience of marketers, but for consumers.”

Successful marketing is about reaching a consumer with an interesting offer when he or she is primed to accept it. Knowing what might interest the consumer is half the battle to making the sale and this is where customer analytics comes in.

Howard Luck Gossage was probably onto a marketing truism when he stated, “The real fact of the matter is that nobody reads ads. People read what interests them, and sometimes it’s an ad.”²³⁷ The great advertising maven David Ogilvy would agree – “What really decides consumers to buy or not to buy is the content of your advertising, not its form.”²³⁸ It is the hotel’s marketing department’s duty to use customer analytics to glean as much information as it can about its customers and then use this information about the customer’s interests and behavior to devise a marketing message that captures the imagination of its customers. If they can do this skillfully, an increase in sales should quickly follow.

Customer analytics have evolved from simply reporting customer behavior to segmenting customers based on their profitability, to predicting that profitability, to improving those predictions (because of the inclusion of new data), to *actually manipulating customer behavior* with target-specific promotional offers and marketing campaigns.

Data must be gathered from disparate sources and seamlessly integrated into a data warehouse that can then cleanse it and make it ready for consumption.²³⁹ Trends that surface from the data mining process can help in monetization, as well as in future advertising and service planning.²³⁴ As the authors’ state in *Mobile Advertising*²³⁴:

“The analytical system must have the capability to digest all the user data, summarize it, and update the master user profile. This functionality is essential to provide the rich user segmentation that is at the heart of recommendations, campaign and offer management, and advertisements. The

segmentation engine can cluster users into affinities and different groups based on geographic, demographic or socio-economic, psychographic, and behavioral characteristics.”

Of course, with all of this data collection comes justified privacy concerns and the most important aspect of mobile marketing is ensuring the consumer has control of the advertising.²³⁴ Without this, it is doubtful mobile marketing will reach its true potential.²³⁴ If mobile advertisers do allow users to configure and control the ads depending on where they are, what mood they are in, who they are with, and what their current needs and desires happen to be, mobile marketing could prove to be one of the most successful forms of advertising available to hotelier marketers ever devised.²³⁴

The potential to market to an individual when she is primed to accept the advertising is advantageous for both parties involved. Marketers don't waste time advertising to consumers when they aren't primed to accept the advertisements but do market to consumers when and where they might want to use the advertisements.

Digital Interactive Marketing: The Five Paradigms

In their article *Interactivity's Unanticipated Consequences for Marketers and Marketing*²³⁶, Deighton and Kornfeld write that in this new media environment, there are five emerging marketing paradigms that are responses to the decrease of marketing's power relative to the consumer. Digital interactive marketing has little use for words such as “viewer” and “listener”.²³⁶ Even the label “consumer” is of limited value because today's interactions with a person will include encounters that have nothing to do with consuming or being part of a “target market.” Deighton and Kornfeld see this new digital interactive marketing breaking down into five different paradigms²³⁶, as per Table 8.

Today, when a user searches for information or entertainment on sites such as Google, she leaves a trail (also known as a “clickstream”) that reveals what is on her mind.²³⁶ This information, which Deighton and Kornfeld refer to as “thought tracing”, may be “available to marketers in exactly the sense that it is available to marketers through Google, as a clue to our thoughts, goals and feelings.”²³⁶

Mobile and social media alter the marketing landscape because the ubiquitous nature of computing makes it an “always on” proposition; both the thought *and* the activity are being traced.²³⁶ “The argument is that when a person is always connected to the Internet, the person is always in the market, always available to be communicated with, and always an audience” contend Deighton and Kornfeld.²³⁶

Of course, most people don't like to be marketed to continuously throughout the day so technology that allows people to filter out messages that don't interest them needs to be developed.²³⁶ However, customized marketing

messages will be allowed to get through. Just as television demands its audience to sit through commercials in order to enjoy free programming, Deighton and Kornfeld contend that, “we will enjoy ubiquitous computer connectivity for the price of voluntary exposure to context-specific persuasion efforts.”²³⁶

Interactive marketing paradigm	How people use interactive technology	How firms interpose themselves to pursue marketing goals	Resulting digital media markets
Thought tracing	People search the web for information and browse for entertainment.	Firms infer states of mind from search terms and Web page content and serve relevant advertising.	A market in search terms develops.
Activity tracing	People integrate always-on computing into everyday life.	Firms exploit information on proximity and pertinence to intrude.	A market in access and identity develops.
Property exchanges	People participate in anonymous exchanges of goods and services.	Firms compete with these exchanges, rather than participating with them.	A market in service and reputation and reliability develops.
Social exchanges	People build identities within virtual communities.	Firms sponsor or co-opt communities.	A market in community develops, competing on functionality and status.
Cultural exchanges	People observe and participate in cultural production and exchange.	Firms offer cultural products or sponsor their production.	Firms compete in buzz markets.

Table 8: Digital Interactive Marketing: Five Paradigms

Source: *Journal of Interactive Marketing*²³⁶, 23 pg. 4-10

If businesses want to succeed in this new marketing environment they must become an ally to the marketed individual, someone who is actually sought out as a person with cultural capital.²³⁶ “Property exchanges”, “social exchanges” and “cultural exchanges” are all paradigms that are “built on peer-to-peer interactivity motivated by the desire to exchange, to share information, or to express one’s self,” state Deighton and Kornfeld.²³⁶

Arguably, internet property exchanges were introduced on a mass scale by Napster, which was the first company to allow users to share and exchange files

in an anonymous way.²³⁶ Unsurprisingly, Napster ran into trouble with copyright holders and quickly left the content exchange business, but sites such as eBay, Flickr and YouTube allow users to share and even sell their property over the Internet. This is a trend that is probably never going away.

While the property exchange deals in things, the social exchange deals in identities and reputations.²³⁶ In general, social networking sites let a person present a face to the world, “including information about whereabouts and action and a ‘wall’ on which friends can post short, often time-sensitive notes, allows people to exchange digital gifts, provides a marketplace for buying and selling, and allows posting of photographs and video clips.”²³⁶

These sites allow for contextually relevant advertising because friends can share information amongst each other and some of this information can include a marketer’s message. Since this messaging is coming from a trusted source, the message is considered much more trustworthy and enticing and, therefore, much more likely to be acted upon. For example, “a recent Nielsen analysis of 79 campaigns on Facebook over six months showed that, on average, social ads — those that are served to users who have friends that are fans of or have interacted with the advertised brand and prominently call the relationship out — generate a 55 percent greater lift in ad recall than non-social ads.”²⁴⁰

One of the key criteria of mobile marketing is that a consumer must opt-in to the service. Mobile marketing is primarily a “pull” media model, meaning a consumer must sign up for the service rather than the traditional “push” media model, which gives the consumer no choice in whether they want to be marketed to or not.

Hotel mobile marketers must spend money to get users to sign up, but, if they do, the potential market for mobile marketing is huge. It is also a market that is rapidly evolving, and its advantages include:

- Ubiquity: mobile devices and their users are everywhere.
- Effective: over 90% of received text messages are read by the recipient.
- Powerful two-way dialogue: an instantaneous link between the business and its customer is created.
- Economical: compared to other marketing channels, mobile marketing is incredibly cheap per marketed individual.
- Spam-free: in the U.S. (but not in many other parts of the world) it is illegal to send a text message to someone who hasn’t opted-in to a marketing campaign.

In her book, *The Mobile Marketing Handbook*²⁴¹, Kim Dushinski lists eight types of advertising campaigns that a mobile marketer can engage in:

1. Voice: this includes text-to-call messages in which users are sent a link that, when clicked upon, initiates a phone call to the company sending

out the message. These days, Apple's SIRI, Microsoft's Tellme and Google's Now are adding a whole new dimension to voice.

2. Text messaging: this used to be the "now" marketing tool of mobile, and it is still one of the most important tools available. Text messaging includes both SMS and Common Short Codes (CSC), which are abbreviated phone numbers. Text messages are sent to mobile users, the content of which are limited only by SMS character limitations and the marketer's overall imagination.
3. Mobile web: most smart phones have the ability to connect to the web and many of them have graphic capabilities that rival computer screens.
4. Mobile search: as previously discussed, a mobile user can search company listings through his or her mobile phone, just as he or she can find this information on the Internet.
5. Mobile advertising: placing banner ads and text ads on mobile websites can build brand awareness.
6. Mobile publicity: presenting a company's executives as experts in his or her field can be useful to members of the media who need instant information for fast approaching deadlines.
7. Social networking: done right, this can help marketers tap into word-of-mouth campaigns, which will, hopefully, have their marketing messages lighting up social media websites.
8. Proximity marketing: Bluetooth and geofencing campaigns that invite users to accept a multimedia message can deliver unique and location-specific marketing messages.

To these eight, I would add another two — OTT and mobile apps marketing — and I will break each of these campaigns down throughout the rest of this book.

Website Morphing

It is all well and good to offer personalized service to customers face-to-face, but what happens when a customer visits a brand's website for the first time, or even the hundredth time? Today, personalized web pages can be rendered during the web page load and elements of the page can take into account past purchase history, clickstream behavior, as well as a whole host of other data points. For a marketer, their website can really be a powerful customer center.

In her article *The Art and Science Behind Every "Add to Cart"*²⁴², Christie Chew argues that, "Neuroscience and the way people make decisions impact what compels people to click and buy. Together, these considerations and best practices can work together to drive customers to take action."

Guliz Sicotte, head of product design and content for Magento, says to prompt a customer purchase, brands must create online experiences that focus on four principal characteristics — they must be personalized, reflective, transparent,

and use pleasing aesthetics.²⁴²

Morphing is one of the ways a brand can hyper-personalize the customer shopping experience. So, what exactly is morphing? In their article *Website Morphing*²⁴³, Hauser et al. state that, “‘Morphing’ involves automatically matching the basic ‘look and feel’ of a website, not just the content, to cognitive styles.” Hauser et al. use Bayesian updating to “infer cognitive styles from clickstream data.”²⁴³ Then they “balance exploration (learning how morphing affects purchase probabilities) with exploitation (maximizing short-term sales) by solving a dynamic program (partially observable Markov decision process).”²⁴³

In a world of deep personalization, website design becomes a major profit driver.²⁴³ As Hauser et al. see it, “Websites that match the preferences and information needs of visitors are efficient; those that do not forego potential profit and may be driven from the market.”²⁴³ The authors believe that businesses “might serve their customers better and sell more products and services if their websites matched the cognitive styles of their visitors.”²⁴³

Keeping with the themes of simplicity and seamlessness, Hauser et al. do not believe personal self-selection — the process in which a customer is given many options and allowed to select how to navigate and interact with the site — is viable.²⁴³ “As the customer’s options grow, this strategy leads to sites that are complex, confusing, and difficult to use,” they argue.²⁴³ The second option, which requires “visitors to complete a set of cognitive style tasks and then select a website from a predetermined set of websites”²⁴³ is just as problematic. Website visitors probably won’t see value in taking the time to answer these questions and there is always the problem of self-bias hindering any potential results.²⁴³

Hauser et al. propose another approach: “‘morphing’ the website automatically by matching website characteristics to customers’ cognitive styles.”²⁴³ A cognitive style is “a person’s preferred way of gathering, processing, and evaluating information.”²⁴⁴ It can be identified as “individual differences in how we perceive, think, solve problems, learn and relate to others.”²⁴⁵ “A person’s cognitive style is fixed early on in life and is thought to be deeply pervasive [and is] a relatively fixed aspect of learning performance.”²⁴⁶

The “goal is to morph the website’s basic structure (site backbone) and other functional characteristics in real time.”²⁴³ “Website morphing complements self-selected branching (as in <http://www.Dell.com>), recommendations (as in <http://www.Amazon.com>), factorial experiments (Google’s Website Optimizer), or customized content.”^{247 248 243}

For Hauser et al., cognitive styles dimensions “might include impulsive (makes decisions quickly) versus deliberative (explores options in depth before making a decision), visual (prefers images) versus verbal (prefers text and numbers), or analytic (wants all details) versus holistic (just the bottom line).”²⁴³ For example,

“a website might morph by changing the ratio of graphs and pictures to text, by reducing a display to just a few options (broadband service plans), or by carefully selecting the amount of information presented about each plan. A website might also morph by adding or deleting functional characteristics such as column headings, links, tools, persona, and dialogue boxes.”²⁴³ There are, literally, hundreds of thousands or even millions of ways a website can morph to better serve its customers.

Because of its real-time nature, website morphing is not easy. It presents at least the following four technical challenges²⁴³:

1. The customer acquisition problem, i.e., the website must morph based on relatively few clicks of a first-time visitor; otherwise, the customer sees little benefit.
2. Even knowing a customer’s cognitive style is not enough, the website must learn which characteristics are best for which customers (in terms of sales or profit).
3. To be practical, a system needs prior distributions on parameters.
4. Implementation requires a real-time working system, which is one of the most complex systems to set up, run, and maintain.

For their website morphing, Hauser et al. used:²⁴³

“a Bayesian learning system to address the rapid assessment of cognitive styles and a dynamic program to optimally manage the tension between exploitation (serving the morph most likely to be best for a customer) and exploration (serving alternative morphs to learn which morph is best). Uncertainty in customer styles implies a partially observable Markov decision process (POMDP), which we address with fast heuristics that are close to optimal. Surveys, using both conjoint analysis and experimentation, provide priors and ‘prime’ the Bayesian and dynamic programming engines. We demonstrate feasibility and potential profit increases with an experimental website developed for the BT Group to sell broadband service in Great Britain.”

Hauser et al. expect different different morphs to appeal differentially depending on the visitors’ cognitive style.²⁴³ “For example, impulsive visitors might prefer less-detailed information, whereas deliberative visitors might prefer more information. Similarly, the more focused of the two morphs might appeal to visitors who are holistic, while the ability to compare many plans in a table might appeal to analytic visitors.”²⁴³ If preferences match behavior, then, by matching a website’s characteristics to a customer’s cognitive style, the morphing website should be able to sell more effectively, thereby producing greater profits for the brand.

Hauser et al. applied a “Bayesian updating and dynamic programming to an experimental BT Group (formerly British Telecom) website using data from 835 priming respondents.”²⁴³ The challenge was to infer the cognitive-segment to which each visitor belonged, “while simultaneously learning how to maximize profit by assigning morphs to cognitive-style segments.”²⁴³

Web visitor cognitive style segments are inferred from their clickstreams.²⁴³ This was possible “because each visitor’s click is a decision point that reveals the visitor’s cognitive-style preferences.”²⁴³ Hauser et al. believe that with enough observed clicks, they could have been able to identify a visitor’s cognitive-style segment quite conclusively.²⁴³ However, in any real application, the number of clicks observed before morphing would be quite small, yielding at best a noisy indicator of segment membership.²⁴³

Hauser et al. observed about ten clicks, inferred probabilities for the visitor’s cognitive-style segment, then morphed the website based on their inference of the visitor’s segment.²⁴³ “The visitor continued until he or she purchased a BT broadband service or left the website without purchasing.”²⁴³

In most cases, cognitive styles are measured with methods that “include direct classification, neuro-fuzzy logic, decision trees, multilayer perceptrons, Bayesian networks, and judgment.”²⁴³ Hauser et al. acknowledge that, while most authors match the learning or search environment based on judgment by an expert pedagogue or based on predefined distance measures, they inferred cognitive styles from a relatively small set of clicks, then automatically balanced exploration and exploitation to select the most appropriate morph.²⁴³

To set a baseline cognitive style standard Hauser et al. used “a professional market research company (Applied Marketing Science, Inc.) and a respected British online panel (Research Now).”²⁴³ They invited “current and potential broadband users to complete an online questionnaire that combined BT’s experimental website with a series of preference and cognitive style questions.”²⁴³

835 respondents completed the questionnaire, which contained the following sequential sections²⁴³:

- Identify whether respondent was in the target market.
- Identify which of 16 broadband providers they might be considering, along with purchase-intention probabilities.
- Eight randomly assigned potential morphs of the BT website. Each respondent was encouraged to spend at least five minutes on BT’s experimental website.
- Post-visit response consideration and purchase-intention probabilities.
- Identify their preferences between eight pairs of websites, with a choice-based conjoint analysis-like exercise. These data augment clickstream data when estimating.

- A cognitive style measure.

Hauser et al. expected “these scales to identify whether the respondent was analytic or holistic, impulsive or deliberative, visual or verbal, and a leader or a follower.”²⁴³ “The analytic versus holistic dimension is widely studied in psychology and viewed as being a major differentiator of how individuals organize and process information,”²⁴³ including by Riding and Rayner²⁴⁹, Allinson and Hayes²⁵⁰, Kirton²⁵¹, and Riding and Cheema.²⁵² According to Hauser et al., “Researchers in both psychology and marketing suggest that cognitive styles can be further differentiated as either impulsive or deliberative.”^{253 254}²⁴³

In summary, Hauser et al. identified the following four empirical constructs to measure respondents’ cognitive styles²⁴³:

- Leader versus follower.
- Analytic/visual versus holistic/verbal.
- Impulsive versus deliberative.
- (Active) reader versus (passive) listener.

In conclusion, Hauser et al. “used segments of cognitive styles rather than continuously defined cognitive styles because the dynamic program requires finitely many ‘arms.’”²⁴³ Websites were morphed once per visit, in part, because Hauser et al. observed a single subscription decision per customer.²⁴³

In her article *The Art and Science Behind Every “Add to Cart”*, Christie Chew notes that the central question driving most purchases is, “What’s in it for me?”²⁴² “Customers should feel that products are relevant to their intentions,” adds Guliz.²⁴² “This sense of relevance can be traced back to what Carmen Simon, Ph.D., cognitive neuroscientist at Memzy, describes as habitual decision-making — habits are conscious at first but eventually become subconscious,” adds Guliz.²⁴²

“Link your techniques, content, value proposition, or whatever you’re offering, to something that feels familiar to the customer’s brain,” says Simon.²⁴² This increases a person’s comfort level, which makes them more likely to take a favorable action for your brand because what you’re asking them will feel easy.²⁴²

Guliz concurs: “In the end, customers are faced with a barrage of e-commerce opportunities. Expedite the shopping experience and increase conversions by identifying products that ‘people like me’ have purchased. Once I can vet a product based on people who closely match my profile, I am that much closer to feeling comfortable in making the purchase.”²⁴²

“It’s also essential that each step in your e-commerce experience reflects intention,” says Chew.²⁴² “For example, the category page should include curiosity-triggering components,” adds Guliz.²⁴² “If you’re displaying an array of products online, make it easy to determine the sentiment around each, without

customers needing to invest time to dive into each.”²⁴² “From here, be sure to show customers the most important details and features relevant to them and their purchase experience,” recommends Chew.²⁴²

“This process can help create a series of clicks that drive those customers closer to making a purchase,” says Chew.²⁴² “Don’t pitch immediately. Don’t make people think too hard. Work toward a series of smaller, more habitual ‘yeses,’” advises Simon.²⁴² “This creates more momentum and a pattern of ‘yes,’ which can make a customer more comfortable with a bigger, riskier purchase decision,” she says.²⁴²

For example, if you’re promoting high-end travel, query users about their overall travel experience, rather than asking them outright if they are booking travel for a vacation or business.²⁴² These kinds of questions will likely elicit positive responses, whereas direct questions can often be off-putting.²⁴²

Posing questions about a customer’s travel habits and preferences can lead potential customers to the critical “yes” — and they might at least consider booking a luxury vacation.²⁴² By that point, Chew argues, “they’ve been habituated toward a positive response and will be more open to bigger considerations — and bigger purchases.”²⁴²

According to Carmen, “the brain makes decisions in a reflexive, habitual, and/or goal-oriented way.”²⁴² “The mistake some businesses make is asking people to tap into their goals too quickly, at the expense of tapping into reflexes and habits first,” argues Chew.²⁴² She recommends brands, “Create opportunities for the buyer to take small steps first, toward a larger goal or purchase.”²⁴²

Transparency is essential to ensure positive customer experiences that will drive customers toward a purchase.²⁴² “It’s important to bring high visibility to the critical decision-making factors like return policies and shipping times, by writing them in clear, simple ways,” Guliz says.²⁴² “If an array of products is displayed, make it easy to determine the sentiment around these products without needing to invest time to dive into each product offering.”²⁴²

“This type of layout will play well to a customer’s need to feel like they’re in control of their environment,” says Chew.²⁴² Guliz adds that brands should ensure users can “easily navigate to different aspects of the product page.”²⁴² “Take them to reviews when they click on star ratings. Let them filter product reviews.”²⁴²

“Retailers are making people think way too much,” Simon says.²⁴² He adds that, “If you start with something that feels familiar and habitual, you’ll have an easier time when it comes to persuasion. Show customers something that doesn’t require a lot of cognitive energy to process.”²⁴² What is true for retailers is certainly true for hoteliers; when it comes to simplifying the buying process probably more so for hotels.

“Humans are innately emotional — we react to everything from people to environments to colors and sounds, based on our existing and real-time experiences. This insight can help e-commerce brands better structure their retail experiences,” argues Guliz.²⁴² The same is true for hospitality companies. “The right aesthetics are major elements of trustworthiness,” explains Guliz.²⁴² “Lots of detailed photos of key features is crucial to a good experience.”²⁴²

Simon adds that “there are a series of innate behaviors in which you already know what to do next. In the buying process, that includes your reflex toward something beautiful.”²⁴²

Marcia Flicker, Ph.D., associate professor at Fordham University’s Gabelli School of Business, argues that, “Creating this aesthetic experience requires having the right visuals.”²⁴² E-commerce brands need bigger and more detailed photos, especially apparel brands.²⁴² “It can be hard for customers to buy apparel online because they want to try it on, feel the fabric,” contends Flicker.²⁴² “Retailers need to reproduce that experience of being able to see the actual item. Customers need to see large images from a variety of angles — or even video,” advises Flicker.²⁴²

“This aesthetics-focused notion can, then, be woven into an e-commerce brand’s UX design to help pave a customer’s path to purchase,” says Guliz.²⁴² “When you design an interface, you’re more likely to have people use it if it’s aesthetically appealing,” Simon says.²⁴² “Principles like proximity, balance, unity, and contrast are important to this notion of aesthetics.”²⁴² Hotels would also profit from a liberal use of aesthetically pleasing visuals.

“Understanding why customers buy and designing experiences to match their patterns is just the beginning. Going forward, brands will continue to fine-tune these strategies, layering in more future-forward technologies,” predicts Guliz.²⁴² “Augmented reality could be a game-changer,” says Flicker.²⁴² hoteliers in Macau have already started using AR in some of their non-hotelier attractions and the technology has great potential in helping IRs connect with visitors in unique and exciting ways.

However, Guliz concludes that, “even with the most cutting-edge understanding of what makes us tick — and click — and stunning aesthetics and powerful UX design, none of it matters if the experience doesn’t fill a need in the customer’s purchase path.”²⁴² Experience is both the fallback and the reason for purchases.

Psychology of Personalization

So, what does “personalization” really mean? It is a word that has been kicking around the marketing community for at least a decade or two now. The underlying psychology of the individual being marketed to is one of the key elements of personalization marketing. In his Buffer article *15 Psychological*

*Studies That Will Boost Your Social Media Marketing*²⁵⁵, Kevan Lee lists several psychological techniques that marketers should be using to reach today's audience. Lee's list is as follows²⁵⁵:

1. The endowment effect — the hypothesis that people ascribe more value to things merely because they own them.²⁵⁶
2. Reciprocity — in social psychology, reciprocity is a social norm of responding to a positive action with another positive action, rewarding kind actions.²⁵⁷
3. Consistency principle — People like to be consistent with the things they have previously said or done.²⁵⁸
4. Foot-in-the-door technique — “a strategy used to persuade people to agree to a particular action, based on the idea that if a respondent will comply with a small initial request then they will be more likely to agree to a later, more significant, request, which they would not have agreed to had they been asked it outright.”²⁵⁹
5. Framing effect — a cognitive bias where people decide on options based on if the options are presented with positive or negative semantics; e.g. as a personal loss or gain.²⁶⁰
6. Loss aversion — the disutility of giving up an object is greater than the utility associated with acquiring it, i.e., you're leery of giving something up once you have it, as compared to seeing that something as gain if you don't have it in the first place.²⁶¹
7. Conformity and social influence — the theory that people will conform their ideas to the ideas of a group under social pressure.²⁶²
8. Acquiescence effect — a tendency to respond in the affirmative to survey items irrespective of substantive content.²⁶³
9. Mere exposure effect — the more often a person sees something new, the more positive meaning they will give it.²⁵⁵
10. Informational social influence — social influence occurs when a person's emotions, opinions or behaviors are affected by others intentionally or unintentionally.
11. The decoy effect — the phenomenon whereby consumers will tend to have a specific change in preference between two options when also presented with a third option that is asymmetrically dominated.²⁶⁴
12. Buffer effect or social support — the process in which a psychosocial resource reduces the impact of life stress on psychological well-being.²⁶⁵
13. Proximity effect — the tendency for people to form friendships or romantic relationships with those whom they encounter often, forming a bond between subject and friend.²⁶⁶
14. Availability heuristic — “a mental shortcut that relies on immediate examples that come to a given person's mind when evaluating a specific topic, concept, method or decision.”²⁶⁷

15. Scarcity principle — “economic theory in which a limited supply of a good, coupled with a high demand for that good, results in a mismatch between the desired supply and demand equilibrium.”²⁶⁸

Throughout the rest of this section, I will break down the 15 principles that can be utilized by hotel marketers. In the ensuing chapters, I will delve deeper into how technology and psychology can be used together to increase personalization.

The endowment effect was revealed in a famous study from Duke University, which discovered that students who had won some coveted basketball tickets in a raffle valued the tickets at \$2,400, while those who had not won the tickets would only agree to pay \$170 for them.²⁵⁵

The marketing takeaway here is that a brand’s customers will attribute a higher value to things they already own.²⁵⁵ Hotels should try to increase their customer’s ownership in their products by encouraging feedback and making it easier to upload suggestions and comments through social media.²⁵⁵ Scott Cook believes that, “A brand is no longer what we tell the consumer it is — it is what consumers tell each other it is.”²⁶⁹ This is a sentiment echoed in Jonah Sachs statement that, “Your brand is a story unfolding across all customer touch points.”²⁷⁰

In terms of reciprocity, a 2002 research found that “waiters could increase tips with a tiny bit of reciprocity.”²⁵⁵ Tips rose by 3 percent when diners were given an after-dinner mint, but went up to 20 percent, when the server delivered the mint while looking the customer in the eye and telling them the mint was specifically for them.²⁵⁵

In another example, “BYU sociologist Phillip Kunz sent Christmas cards to 600 completely random strangers. He received 200 Christmas cards back in response.”²⁵⁵

The consistency principle was displayed in a study where “Princeton researchers asked people if they would volunteer to help with the American Cancer Society. Of those who received a cold call, 4 percent agreed. A second group was called a few days prior and asked if they would hypothetically volunteer for the American Cancer Society. When the actual request came later, 31 percent agreed.”²⁵⁵

The marketing takeaway here is for hoteliers to “help current customers and potential users create an expectation of what they may say or do. For instance, get users to opt-in to a marketing course and offer tools at the end that are used by expert marketers. Subscribers may wish to stay consistent with their stated goal of improving their marketing, and signing up for recommended tools will fall right in line with this expectation.”²⁵⁵

According to Lee, “The first study on the foot-in-the-door method was

performed in the 1960s by Jonathan Freedman and Scott Faser.”²⁵⁵ Researchers called several homemakers to inquire about the household products they used.²⁵⁵ Three days later, the researchers called again, this time asking to send a group of workers to the house to manually note the cleaning products in the home. The research found that “the women who responded to the first phone interview were two times more likely to respond to the second request.”²⁵⁵

The marketing takeaway here: provide strong enough content that customers will be motivated to frequently open your brand emails, as well as download your content or generally go along with your requests.²⁵⁵ The more little things they do, the more likely they are to comply with a larger request, like sharing your content and inviting their friends to join in the brand conversation.²⁵⁵

Researchers Amos Tversky and Nobel prize winning Daniel Kahneman found the way they framed a question was more important than the question itself.²⁵⁵ The researchers “polled two different groups of participants on which of two treatments they would choose for people infected with a deadly disease.

- Treatment A: ‘200 people will be saved.’
- Treatment B: ‘a one-third probability of saving all 600 lives, and a two-thirds probability of saving no one.’²⁵⁵

The majority of participants picked Treatment A because of the clear and simple gain in saving lives. However, in Group 2, participants were told the following:

- Treatment A: ‘400 people will die.’
- Treatment B: ‘a one-third probability that no one will die, and a two-thirds probability that 600 people will die.’²⁵⁵

According to Lee, “The majority of participants picked Treatment B because of the clear negative effect of Treatment A.”²⁵⁵

The marketing takeaway here is that the “words you use and the way you frame your content has a direct impact on how your readers will react.”²⁵⁵ Lee recommends that, whenever possible, brands “frame things in a positive light so that readers can see a clear gain.”²⁵⁵ Word use is imperative as well. As Mark Twain put it so succinctly, “The difference between the almost right word and the right word is the difference between the lightning bug and the lightning.”²⁷¹

According to Decision Lab, “The framing effect has consistently proven to be one of the strongest biases in decision making. The ways in which framing can be used are nearly unlimited; from emotional appeals to social pressure to priming.”²⁷²

When a positive frame is presented people are more likely to avoid risks but will be risk-seeking when a negative frame is presented. The effect does seem to increase with age, which could be highly important when designing health and financial policies, as well as marketing to an older audience.²⁷²

In a famous loss aversion study, several Chicago Heights teachers were split into two groups.²⁵⁵ “One group of teachers stood to receive bonuses based on the performance of their students on standardized testing. Another group received their bonus at the beginning of the year and stood to either keep it or lose it based on the results of their students’ tests,” explains Lee.²⁵⁵ The results showed that “the prepaid bonuses — the ones that could have been lost — had a bigger impact on teachers.”²⁵⁵

The marketing takeaway here is that brands need to discover their customer’s challenges and reservations, and then try to alleviate those concerns up front.²⁵⁵ “Risk-free trials and money-back guarantees are one way to deal with loss aversion,” argues Lee, since it removes the fear of loss from the equation.²⁵⁵

In 1951, social psychologist Solomon Asch conducted an experiment to investigate whether an individual would conform under social pressure.²⁶² As detailed in Saul McLeod *Solomon Asch — Conformity Experiment*²⁶², Solomon Asch experimented on 50 male students from Swarthmore College to study whether they would allow peer pressure to affect their judgment. “Using a line judgment task, Asch put a naive participant in a room with seven confederates/stooges. The confederates had agreed in advance what their responses would be when presented with the line task.”²⁶²

According to McLeod, “The real participant did not know this and was led to believe that the other seven confederates/stooges were also real participants like themselves.”²⁶² “Each person in the room had to state aloud which comparison line (A, B or C) was most like the target line. The answer was always obvious. The real participant sat at the end of the row and gave his or her answer last.”²⁶²

In 12 of the 18 trials, the confederates gave the wrong answer.²⁶² “On average, about one third (32%) of the participants who were placed in this situation went along and conformed with the clearly incorrect majority on the critical trials,” says McLeod.²⁶²

After the test, the subjects were asked why they conformed and most of them “said that they did not really believe their conforming answers, but had gone along with the group for fear of being ridiculed or thought ‘peculiar.’”²⁶² Asch concluded that, “Apparently, people conform for two main reasons: because they want to fit in with the group (normative influence) and because they believe the group is better informed than they are (informational influence).”²⁶² The key takeaway for marketers here is that, “influencers and industry leaders can help your product appear more valuable to others.”²⁵⁵

According to the psychology website “Changing Minds”²⁷³ there are three scenarios in which we are most likely to acquiesce to the request of others:

1. They seem to be a superior in some way.

2. They have a need whereby we can easily help them.
3. Answering the question fully seems like hard work.

Lee states that, “Leading questions are one way that the acquiescence effect impacts the answers that one gives.”²⁵⁵

The marketing takeaway here is that hotels should be aware of the leading questions they may be asking in customer development calls, surveys, or questionnaires.²⁵⁵ “People can be easily swayed to answer in a certain way if the question seems tilted in a certain direction,” warns — and recommends — Lee.²⁵⁵

Robert Zajonc’s Chinese character study showed how the mere exposure to something could increase positive feelings about it. Zajonc showed several Chinese characters to non-Chinese-speaking participants, either once or up to 25 times, then asked the participants to guess the meaning of the characters.²⁵⁵ The study revealed that the “more often a participant saw a character, the more positive meaning they gave.”²⁵⁵

The marketing takeaway here is brands shouldn’t be afraid to repeat their messaging.²⁵⁵ Social media is the perfect channel for brands to share their content, as reposting helpful content can have a direct impact on an audience.²⁵⁵ The repetition seen here probably goes unnoticed because customers can easily surf away from a brand’s messaging by visiting other social media pages and/or websites.

In an effort to curtail energy usage, Alex Lasky of Opower ran an experiment to study how messaging could best encourage others to save energy.²⁷⁴ Opower sent customers one of the following four messages²⁵⁵:

- You can save \$54 this month.
- You can save the planet.
- You can be a good citizen.
- Your neighbors are doing better than you.

Only the fourth message worked, leading to a 2 percent reduction in household energy usage.²⁵⁵ The study showed that brands should use the experience of others to help people see the benefits of their product or services.²⁵⁵ There’s a close correlation between informational social influence and social proof.²⁵⁵

The decoy effect can be seen in an old subscription advertisement for *The Economist*, which stated²⁵⁵:

- Web Subscription – \$59
- Print Subscription – \$125
- Web and Print Subscription – \$125

When Professor Dan Ariely tested this model with his students at MIT, he asked them to choose a subscription option among the three choices.²⁵⁵ The results

were as follows²⁵⁵:

- Web Subscription – \$59 (16 students)
- Print Subscription – \$125 (0 students)
- Web and Print Subscription – \$125 (84 students)
- *Total revenue: \$11,444*

When the print subscription was removed, the results looked like this²⁵⁵:

- Web Subscription – \$59 (68 students)
- Web and Print Subscription – \$125 (32 students)
- *Total revenue: \$8,012*

Obviously, adding the decoy increases sales and the marketing takeaway is for brands to add a decoy in their pricing.²⁵⁵ Lee concludes that, “The inclusion of an option that is ‘asymmetrically dominated’ (a plan that seems out of whack or a feature list that doesn’t quite add up) will make the other options more appealing.”²⁵⁵

In terms of the buffer effect, in a study of pregnant women, “researchers found that 91 percent of those with high stress and low social support suffered complications whereas only 33 percent of pregnant women with high stress and high social support suffered complications.”

The marketing takeaway here is for brands to be consistent with availability and support for their customers.²⁵⁵ “Constant support — in the form of email communication, blogging, in-app messages etc. — may help others feel more comfortable and less stressed,” advises Lee.²⁵⁵

For the propinquity effect, researchers discovered that “tenants in a small two-floor apartment had closer friendships with their immediate neighbors. Least likely friendships were between those on separate floors. And tenants who lived near staircases and mailboxes had friendships on both floors.”²⁵⁵ The marketing takeaway here is for brands to be a constant presence on social media, as well as in the inbox of its customers and subscribers.²⁵⁵

In the late 1960s, Amos Tversky and Daniel Kahneman began their work on “heuristic and biases.”²⁶⁷ They discovered “that judgment under uncertainty often relies on a limited number of simplifying heuristics rather than extensive algorithmic processing.”²⁶⁷ Tversky and Kahneman coined the term “availability heuristic” to explain these biases.

According to Wikipedia, an “availability heuristic is a mental shortcut that relies on immediate examples that come to a given person's mind when evaluating a specific topic, concept, method or decision. As follows, people tend to use a readily available fact to base their beliefs about a comparably distant concept.”²⁶⁷

In their *New Yorker* article, *The Two Friends Who Changed How We Think About*

*How We Think*²⁷⁵, Cass Sunstein and Richard Thaler explain that there were two distinct themes in the work of Tversky and Kahneman – judgment and decision-making. “Judgment is about estimating (or guessing) magnitudes and probabilities. *How likely is it that a billionaire businessman from New York with no experience in government gets elected President?* Decision-making is about how we choose, especially when there is uncertainty (meaning almost all the time). *What should we do now?*” say Sunstein and Thaler.²⁷⁵

“Kahneman and Tversky showed that, in both of these domains, human beings hardly behave as if they were trained or intuitive statisticians. Rather, their judgments and decisions deviate in identifiable ways from idealized economic models,” explain Sunstein and Thaler.²⁷⁵ “Most of the importance of Kahneman and Tversky’s work lies in the claim that departures from perfect rationality can be anticipated and specified. In other words, errors are not only common but also predictable,” they say.²⁷⁵

Sunstein and Thaler explain the heuristic principle as such²⁷⁵:

For instance: ask people what they think is the ratio of gun homicides to gun suicides in the United States. Most of them will guess that gun homicides are much more common, but the truth is that gun suicides happen about twice as often. The explanation that Kahneman and Tversky offered for this type of judgment error is based on the concept of “availability.” That is, the easier it is for us to recall instances in which something has happened, the more likely we will assume it is. This rule of thumb works pretty well most of the time, but it can lead to big mistakes when frequency and ease of recall diverge. Since gun homicides get more media coverage than gun suicides, people wrongly think they are more likely. The availability heuristic, as Kahneman and Tversky called it, leads people to both excessive fear and unjustified complacency — and it can lead governments astray as well.

“The influence of their work has been immense — not only in psychology and economics, where it has become part of the normal conversation, but in every other field of social science, as well as medicine, law, and, increasingly, business and public policy,” note Sunstein and Thaler.²⁷⁵

The marketing takeaway here is for brands to make their products or services easy to grasp by providing examples of the actions users should take.²⁵⁵

Also known as the ‘Fear of missing out’ syndrome, the scarcity principle plays upon the idea that people covet things that are scarce. As Investopedia explains it, “Consumers place a higher value on goods that are scarce than on goods that are abundant. Psychologists note that when a good or service is perceived to be scarce, people want it more. Consider how many times you’ve seen an

advertisement stating something like: limited time offer, limited quantities, while supplies last, liquidation sale, only a few items left in stock, etc. The feigned scarcity causes a surge in the demand for the commodity.”²⁶⁸

“Marketers use the scarcity principle as a sales tactic to drive up demand and sales,” says Investopedia.²⁶⁸ The psychology behind the scarcity principle dovetails well with the concepts of social proof and commitment.²⁶⁸ “Social proof is consistent with the belief that people judge a product as high quality if it is scarce or if people appear to be buying it. On the principle of commitment, someone who has committed himself to acquiring something will want it more if he finds out he cannot have it,” argues Investopedia.²⁶⁸

The FYRE festival played up the fear of missing out principle as well as any promotional event ever, promising concertgoers the experience of a lifetime in the Bahamas. Having now been dubbed ‘the best festival that never was’, Fyre Festival was then touted by hip hop mogul JaRule as being the ‘cultural experience of the decade’. It has now become both legendary and the most talked about festival flop ever.²⁷⁶

As explained in *The Tonic Communications Fyre Festival: How Millennial FOMO Enabled High-end Fraud*, “A promotional video was produced with the specific intent of giving audiences FOMO (Fear of Missing Out), a form of social anxiety rooted in the concern that others might be having rewarding experiences that the individual is not a part of.”²⁷⁶ “The video combined persuasive messaging such as ‘immersive’, ‘transformative’, ‘remote and private island’ with imagery of supermodels living their best lives — a carefully crafted illusion of what was in store for attendees, should they be willing to spend thousands of dollars to partake.”²⁷⁶

Billy McFarland, the CEO of the festival’s production company, “commented that the video’s release would be known as the ‘Best coordinated social influencer campaign ever’. 400 of the ‘hottest’ celebrities around the world including artists, comedians, influencers and models posted an ambiguous burnt orange ‘Fyre tile’ across their Instagram accounts using the #FyreFestival and each inviting their followers to ‘join me’. That was it.”²⁷⁶ The campaign amazingly “garnered over 300 million impressions within 24 hours.”²⁷⁶ The event immediately “sold out and rival festival organisers were stunned as investors tried to pull money out of their events to put into Fyre.”²⁷⁶

As two documentaries of the event have shown, it was all a scam. McFarland defrauded investors to the tune of \$27.4M and he is currently serving six years in prison for these and other crimes.²⁷⁶ Thanks to the fear of missing out and a brilliant social media marketing campaign, thousands of unwitting concert-goers descended upon a little known island in the Bahamas for what turned out to be the experience of a lifetime all right, just not quite the one they were expecting.

As the world becomes numb to advertising, marketers need to find a way to

connect with an audience on a visceral and emotional level and utilizing the above psychological methods could be a good first step in the long process of customer personalization.

Social Proof

Besides the 15 psychological methodologies described above, there are a few others to consider, including social proof as well as the principle of authority. “Think of it as building the foundation for massively scalable word-of-mouth” — these are the words of venture capitalist and blogger Aileen Lee describing the concept of social proof in her article *Social Proof Is The New Marketing*.²⁷⁷ Lee believes that the best way to market a product or service “is by harnessing a concept called social proof, a relatively untapped gold mine in the age of the social web.”²⁷⁷ Lee contends social proof can generate sharing on a viral level through social channels that can multiply the discovery of a brand and add to its influence.²⁷⁷

Wikipedia describes social proof as “a psychological phenomenon where people assume the actions of others reflect the correct behavior for a given situation... driven by the assumption that the surrounding people possess more information about the situation.”²⁷⁸ In other words, “people are wired to learn from the actions of others, and this can be a huge driver of consumer behavior.”²⁷⁷

Eric Hoffer’s quote that, “when people are free to do as they please, they usually imitate each other”²⁷⁹ is quite amusing and, unquestionably, true. It speaks volumes about the herd mentality humans seem to succumb to as they individually take cues for proper behavior in most situations from the behavior of others. Psychologists call it the “conformity bias” and it is something that politicians and marketers have tapped into to enormous effect for centuries.

Oscar Wilde’s quip that, “Most people are other people. Their thoughts are someone else’s opinions, their lives a mimicry, their passions a quotation”²⁸⁰ strikes a similar chord and it’s an idea that brands should keep in mind as they devise marketing plans aimed at the market of one.

According to Robert Cialdini, who studied the principle of social proof in-depth in his book *Influence: The Psychology of Persuasion*²⁸¹, “we view a behavior as more correct in a given situation to the degree that we see others performing it.”

In his article *The Psychology of Marketing: 18 Ways Social Proof Can Boost Your Results*²⁸², Alfred Lua concurs, stating, “So often in situations where we are uncertain about what to do, we would assume that the people around us (experts, celebrities, friends, etc.) have more knowledge about what’s going on and what should be done.” Besides that, “we often make judgments based on our overall impression of someone — A.K.A. the halo effect (named by psychologist Edward Thorndike).”²⁸²

In general, Lua claims there are six types of social proof, including²⁸²:

1. Expert: an expert in one's industry recommends your products and/or services or is associated with your brand.
2. Celebrity: a celebrity endorses your products.
3. User: current users recommend your products and/or services based on personal experiences with your brand.
4. The wisdom of the crowd: a large group of people endorse your brand for a myriad of reasons.
5. The wisdom of your friends: people see their friends approve of a product or service.

In his influential *Harvard Business Review* paper *Harnessing the Science of Persuasion*²⁸³, Robert B. Cialdini looked at the science behind the power of persuasion and, since advertising is little more than trying to persuade a person to choose one's product and/or service over another, I think it is important to explore persuasion through the lens of social media. Cialdini contends that²⁸³:

"For the past five decades, behavioral scientists have conducted experiments that shed considerable light on the way certain interactions lead people to concede, comply or change. This research shows that persuasion works by appealing to a limited set of deeply rooted human drives and needs, and it does so in predictable ways. Persuasion, in other words, is governed by basic principles that can be taught, learned and applied."

Cialdini's six principles are²⁸³:

1. Like: People like those who like them.
2. Reciprocity: People repay in kind.
3. Social proof: People follow the lead of similar others.
4. Consistency: People align with their clear commitments.
5. Authority: People defer to experts.
6. Scarcity: People want more of what they can have less of.

For the reciprocity principle, people tend to give what they want to receive.²⁸³ Praise is likely to have a warming and softening effect on people because there is a human tendency to treat people the way they are themselves treated.²⁸³ All kinds of companies use this concept in their marketing to customers and brands should emulate these offerings.

For the principle of social proof, people tend to follow the lead of similar others.²⁸³ People use peer power whenever it's available.²⁸³ Cialdini adds that, "Social creatures that they are, human beings rely heavily on the people around them for cues on how to think, feel, and act."²⁸³ We know this intuitively, Cialdini says "because intuition has also been confirmed by experiments, such as the one

first described in 1982 in the *Journal of Applied Psychology*.²⁸³ In that study, “A group of researchers went door-to-door in Columbia, South Carolina, soliciting donations for a charity campaign and displaying a list of neighborhood residents who had already donated to the cause. The researcher found that the longer the donor list was, the more likely those solicited would be to donate as well.”²⁸³

“To the people being solicited, the friends’ and neighbors’ names on the list were a form of social evidence about how they should respond. But the evidence would not have been nearly as compelling had the names been those of random strangers,” explains Cialdini.²⁸³ The lesson here is that “persuasion can be extremely effective when it comes from peers.”²⁸³ Cialdini argues that, “The science supports what most sales professionals already know: Testimonials from satisfied customers work best when the satisfied customer and the prospective customer share similar circumstances.”²⁸³

For the principle of consistency, brands should make their commitments active, public, and voluntary. Cialdini states that, “Liking is a powerful force, but the work of persuasion involves more than simply making people feel warmly toward you, your idea, or your product. People need not only to like you but to feel committed to what you want them to do. Good turns are one reliable way to make people feel obligated to you. Another is to win a public commitment from them.”²⁸³

For the principle of authority, people defer to experts, so brands should project their expertise and not assume things are self-evident.²⁸³ As Lee explains, “Approval from a credible expert, like a magazine or blogger, can have incredible digital influence.”²⁷⁷ Her examples include the following²⁷⁷:

- “Visitors referred by a fashion magazine or blogger to designer fashion rentals online at Rent the Runway drive a 200% higher conversion rate than visitors driven by paid search.”²⁷⁷
- “Klout identifies people who are topical experts on the social web. Klout invited 217 influencers with high Klout scores in design, luxury, tech and autos to test-drive the new Audi A8. These influencers sparked 3,500 tweets, reaching over 3.1 million people in less than 30 days — a multiplier effect of over 14,000x.”²⁷⁷
- “Mom-commerce daily offer site Plum District also reached mom influencers thru Klout, and found customers referred by influential digital moms shop at 2x the rate of customers from all other marketing channels.”²⁷⁷

However, Lee warns that²⁷⁷:

“I don’t think a social proof strategy will be effective if you don’t start with a great product that delights customers, and that people like well enough to recommend. How do you know if you have a great product? Track organic traffic growth,

reviews, ratings and repeat rates. And measure your viral coefficient — if your site includes the ability to share, what percentage of your daily visitors and users share with others? How is the good word about your product being shared outside your site on the social web? Do you know your Net Promoter Score, and your Klout score?”

In his *Fast Company* article *How to use the psychology of social proof to your advantage*²⁸⁴, Ed Hallin argues that, “A lot of things go into a person’s decision to purchase a product, and social proof is certainly one of those important factors. Studies show that 70% of consumers say they look at product reviews before making a purchase, and product reviews are 12x more trusted than product descriptions from manufacturers.”²⁸⁴ This isn’t really that surprising.

One subset of social proof is celebrity social proof. This is, of course, “celebrity approval of your product or endorsements from celebrities.”²⁸⁴ However, Hallin warns that, “Celebrity endorsement is always a double-edged sword. If the celebrity is properly matched to the brand, it can do wonders for the company. If it’s a mismatch, it may produce a bad image of the company and its brand.”²⁸⁴ Celebrities are also human beings and there can be a flavor-of-the-month aspect to them, especially amongst athletes, but, for every Aaron Hernandez disaster there might be a William Shatner Priceline endorsement that strikes internet and financial gold, for both parties involved.

As Hallin explains, “To understand why celebrity endorsements work from a psychological perspective, it’s important to familiarize yourself with the concept of the extended self.”²⁸⁴ “The extended self,” Hallin contends, “is made of up the self (me) and possessions (mine). It suggests that intentionally or unintentionally we view our possessions as a reflection of ourselves. This is why consumers look for products that signify group membership and mark their position in society.”²⁸⁴ Apple is the perfect example of a company that produces goods that people gladly overpay for in order to signify membership within an exalted – or they think is an exalted – group.

“User social proof is approval from current users of a product or service,” explains Hallin.²⁸⁴ This includes customer testimonials, case studies, and online reviews and it is particularly effective when storytelling is involved.²⁸⁴

Hallin believes that “We tend to imagine ourselves in other people’s shoes when we read or hear a story. This is why stories are so persuasive and often more trustworthy than statistics or general trends. Individual examples stick with us because we can relate to them. Although statistics can be effective, it can be tougher to really see yourself in the aggregate the way you can with a personal account.”²⁸⁴

‘Wisdom of the Crowds’ social proof is “approval from large groups of other people. It’s showing evidence that thousands, millions, or even billions have

taken the action that the company wants you to take — making a purchase, subscribing, etc.”²⁸⁴

Hallin argues, “We kind of joke about FOMO in pop culture, but actually the Fear of Missing Out is a real thing. It’s a form of social anxiety, and it’s a compulsive concern that one might miss out on an opportunity. This anxiety is especially relevant for social media, as the sharing of what’s going on in our daily lives means you can constantly compare your status to others on these platforms.”²⁸⁴

Unsurprisingly, Hallin contends, “Social media has sparked dozens of different ways to provide this kind of social proof. Facebook widgets that show other Facebook friends that ‘like’ a brand, Twitter’s display of people you follow that also follow another person, and the various ways that company offer rewards for referring others to the brand are all examples of this.”²⁸⁴

Social proof is a powerful marketing tool and one that brands of all kinds need to exploit. “One study of 10,000 accounts at a German bank revealed that customers who came from customer referrals had 16% higher lifetime value than those who came from other acquisition sources. Additionally, the customers churned 18% less,” says Hallin.²⁸⁴

“The concept of implicit egotism is that most people subconsciously like things that ‘resemble’ them in some way,” explains Hallin.²⁸⁴ He adds that, “Studies show that we value the opinions of people we perceive as most like us. We tend to become friends with people that we have a lot in common with, so it makes sense that social triggers like Facebook’s Like Box or referral programs are successful.”²⁸⁴

Aileen Lee concludes that, “In the age of the social web, social proof is the new marketing. If you have a great product waiting to be discovered, figure out how to build social proof around it by putting it in front of the right early influencers. And, engineer your product to share the love. Social proof is the best way for new users to learn why your product is great, and to remind existing users why they made a smart choice.”²⁸⁴

One word of caution when it comes to influencers and this is a rather sad story in a few ways. In my former career/other life, I was a fledgling screenwriter and film producer and I worked with a partner who production managed a movie directed by her son that featured controversial YouTube personality Logan Paul. The film was *Airplane Mode* and it contained a cast of social media influencers, with Paul as the lead actor. Just as the film was about to be released, it was pulled because Logan Paul filmed his infamous and controversial *Suicide Forest* video²⁸⁵, which was uploaded to YouTube. The film quickly received worldwide condemnation and was taken down. YouTube removed Paul from Google Preferred, its preferred ad program. Suddenly, Paul became toxic.

Airplane Mode’s distributors cancelled its theatrical run, claiming Paul had

violated the moral clause in his contract. Ultimately, the movie went straight to video and/or streaming and must have lost considerable money for its backers. In many cases, when dealing with influencers, you're not dealing with seasoned professionals, but rather a flavor of the month celebrity. These are generally younger people who are just getting their feet wet in a new marketing channel, so caution should be taken. Sometimes you're also dealing with professionals who like to push the envelope because that's what gets them noticed and flocks of followers. It's a tricky balance, but one that can be quite profitable if proper caution is taken.

Psychometrics

According to Amit Paul Chowdhury, Psychometrics "is a field of study concerned with the theory and technique involved behind psychological measurement. This field is primarily concerned with testing, measurement, assessment, and related activities. The field entails two key aspects for research purposes — a) construction of instruments, b) revolves around the development of procedures for measurement."²⁸⁶

Social media can also be a wonderful place to capture a customer's personality traits. As Hannes Grassegger and Mikael Krogerus explain in their *Das Magazin* article *I Just Showed That the Bomb Was There*²⁸⁷, "Psychologist Michal Kosinski developed a method of analyzing people's behavior down to the minutest detail by looking at their Facebook activity."²⁸⁷ According to Grassegger and Krogerus²⁸⁷:

"Psychometrics, sometimes also known as psychography, is a scientific attempt to 'measure' the personality of a person. The so-called Ocean Method has become the standard approach. Two psychologists were able to demonstrate in the 1980s that the character profile of a person can be measured and expressed in five dimensions, the Big Five: Openness (how open are you to new experiences?), Conscientiousness (how much of a perfectionist are you?), Extroversion (how sociable are you?), Agreeableness (how considerate and cooperative are you?), and Neuroticism (how sensitive/vulnerable are you?). With these five dimensions (O.C.E.A.N.), you can determine fairly precisely what kind of person you are dealing with — her needs and fears as well as how she will generally behave. For a long time, however, the problem was data collection, because to produce such a character profile meant asking subjects to fill out a complicated survey asking quite personal questions. Then came the internet. And Facebook. And Kosinski."

In 2008, with a fellow Cambridge student, Kosinski created a small app for

Facebook called *MyPersonality* that asked users a handful of questions from the Ocean survey and they would receive a rating, or a “Personality Profile”, consisting of traits defined by the OCEAN method.²⁸⁷ The researchers, in turn, got the users’ personal data, which soon amounted to millions and millions of reviews.²⁸⁷ “It was, literally, the then-largest psychological data set ever produced,” state Grassegger and Krogerus.²⁸⁷

In the ensuing years, Kosinski and his colleagues continued the research; “first surveys are distributed to test subjects — this is the online quiz. From the subjects’ responses, their personal Ocean traits are calculated. Then Kosinski’s team would compile every other possible online data point of a test subject — what they’ve liked, shared, or posted on Facebook; gender, age, and location.”²⁸⁷

Once the researchers dug into the data, they discovered that amazingly reliable conclusions could be drawn about a person by observing their online behavior.²⁸⁷ For example, “men who ‘like’ the cosmetics brand MAC are, to a high degree of probability, gay,” which isn’t that surprising. However, there were other, more interesting findings; for example, one of the best indicators of heterosexuality is liking Wu-Tang Clan.²⁸⁷ Also, followers of Lady Gaga are most probably extroverts, while someone who likes philosophy is probably an introvert.²⁸⁷

Kosinski and his team continued their work, tirelessly refining their models. “In 2012, Kosinski demonstrated that from a mere 68 Facebook likes, a lot about a user could be reliably predicted: skin color (95% certainty), sexual orientation (88% certainty), Democrat or Republican (85%).”²⁸⁷ Level of intellect, religious affiliation, alcohol, cigarette, and drug use could all be calculated as well.²⁸⁷ For businesses, employee Facebook pages could be scanned by HR to screen out potentially problematic candidates.

As Kosinski continued refining his model, he discovered that, with a mere ten likes as input, his model could appraise a person’s character better than an average coworker.²⁸⁷ With seventy, “it could ‘know’ a subject better than a friend; with 150 likes, better than their parents. With 300 likes, Kosinski’s machine could predict a subject’s behavior better than their partner. With even more likes it could exceed what a person thinks they know about themselves,”²⁸⁷ which is a pretty frightening thought in-and-of-itself.

The day Kosinski published his findings, he received two phone calls, both from Facebook; one a threat to sue, the other a job offer.²⁸⁷

Since the publication of Kosinski’s article, Facebook has introduced a differentiation between public and private posts so the data isn’t as easily accessible now.²⁸⁷ In “private” mode, “only one’s own friends can see what one likes. This is still no obstacle for data-collectors: while Kosinski always requests the consent of the Facebook users he tests, many online quizzes these days demand access to private information as a precondition to taking a personality test.”²⁸⁷

Kosinski and his team are now adding variables beyond Facebook Likes.²⁸⁷ Offline activity is now traceable and “motion sensors can show, for example, how fast we are moving a smartphone around or how far we are traveling (correlates with emotional instability).”²⁸⁷

Flipping this idea on its head, Kosinski speculated his research could become a search engine for people.²⁸⁷ By using all of this data, psychological profiles could not only be constructed, but they could also be sought and found.²⁸⁷ For example, if a company, or a politician, wants to find worried fathers, or angry introverts, or undecided Democrats, these profiles could be uncovered in the data.²⁸⁷

To Kosinski’s chagrin, one company he had been partnered with — Cambridge Analytica — was involved with Donald Trump’s 2016 presidential election.²⁸⁷ Cambridge Analytica has now become infamous and was shut down in 2018 because of its questionable activities during the U.S. 2016 presidential election. It had bought extensive personal data on American voters — “What car you drive, what products you purchase in shops, what magazines you read, what clubs you belong to” — and used the data in highly unethical ways to help elect Donald Trump.²⁸⁷

In America, detailed personal consumer data is available for a price and Cambridge Analytica snapped it up and the company crosschecked these data sets with Republican Party voter rolls and online data, such as Facebook likes.²⁸⁷ OCEAN personality profiles were built from this data and, from a selection of digital signatures, there suddenly emerged real individual people with real fears, needs, and interests — and home addresses.²⁸⁷ By the time of the 2016 presidential election, Cambridge Analytica had assembled psychograms for all adult US citizens — 220 million people — and they used this data to influence electoral outcomes.²⁸⁷

Chowdhury puts it succinctly when he says, the success of the Cambridge Analytica work “can be attributed to the combination of three core techniques, behavioral science using the *OCEAN Model*, Big Data analysis, and ad targeting.”²⁸⁶ Cambridge Analytica bought “personal data from a range of different sources, like land registries, automotive data, shopping data, bonus cards, club memberships, and more.” It aggregated “this data with the electoral rolls of the Republican party and online data, to calculate a Big Five personality profile.”²⁸⁶

According to Chowdhury, Nix showed “how psychographically categorized voters can be differently addressed. The messages differed for the most part only in microscopic details, to target the recipients in the optimal psychological way by including different headings, colors, captions, with a photo or video.”²⁸⁶ Digging down into such granular detail helped Trump reach down to the most granular group-level of a customer. “Pretty much every message that Trump put out was

data-driven,” states Nix.²⁸⁶

The return on investment was extraordinary. “The embedded Cambridge Analytica team comprised of only a dozen people. The firm received \$100,000 from Trump in July, \$250,000 in August, and \$5 million in September. According to Nix, the company earned over \$15 million overall.”²⁸⁶

Most importantly, “The decision to focus on Michigan and Wisconsin in the final weeks of the campaign was made on the basis of data analysis done by the organization.”²⁸⁶

“Trump’s conspicuous contradictions and his oft-criticized habit of staking out multiple positions on a single-issue result in a gigantic number of resulting messaging options that creates a huge advantage for a firm like Cambridge Analytica: for every voter, a different message,” explains Grassegger and Krogerus.²⁸⁷

Mathematician Cathy O’Neil notes that Trump is like a machine learning algorithm that adjusts to public reactions.²⁸⁷ On the day of the third 2016 presidential debate, “Trump’s team blasted out 175,000 distinct variations on his arguments, mostly via Facebook,”²⁸⁷ which is an astounding number of unique ads. “The messages varied mostly in their microscopic details, in order to communicate optimally with their recipients: different titles, colors, subtitles, with different images or videos” were utilized, explains Grassegger and Krogerus.²⁸⁷ This is personalization marketing at its finest.

Small towns, city districts, apartment buildings, and even individual people could be targeted, explains Grassegger and Krogerus.²⁸⁷ Blanket advertising — the idea that a hundred million people will be sent the same piece of marketing collateral, the same television advert, the same digital advert — is over, forever, note Grassegger and Krogerus.²⁸⁷ Micro and personalization targeting has reached the point where politicians — and regular companies — can advertise highly detailed and personalized messages to a market of one.

Cambridge Analytica separated the entire US population into 32 different personality types, and focused their efforts on only seventeen states.²⁸⁷ “Just as Kosinski had determined that men who like MAC cosmetics on Facebook are probably gay, Cambridge Analytica found that a predilection for American-produced cars is the best predictor of a possible Trump voter.”²⁸⁷ Among other things, this kind of information helped the Trump campaign focus in on what messages to use, and where to use them, perhaps even what channel to use them on.²⁸⁷ In effect, the candidate himself became an implementation instrument of the model.²⁸⁷

As Grassegger and Krogerus note, the first results seen by *Das Magazin* were amazing: psychological targeting increased the clickthru rate on Facebook ads by more than sixty percent. And the so-called conversion rate (the term for how

likely a person is to act upon a personally-tailored ad, i.e., whether they buy a product or, yes, go vote) increases by a staggering 1,400 percent.”²⁸⁷

Now, what does all of this mean for a marketer? How can a marketer use Facebook Likes to gain a deeper understanding of its customers? Well, potentially, by analyzing these ‘Likes’, a marketer could predict how open, conscientious, outgoing and neurotic an individual user and/or customer is. It could be as simple as doing a Facebook graph search of “Pictures liked” or “Videos liked” and/or “Stories Liked” with the customer’s name. In addition to predicting a user’s personality, these tests could estimate a user’s/customer’s age, relationship status, intelligence level, life satisfaction, political and religious beliefs, and education.

A brand’s HR department would also find these personality test results interesting as matching a candidate with jobs based on their personality might make more sense than the current scattershot approach HR often takes in hiring — and firing. These personality tests could also reveal troubling traits, like alcohol and/or drug use that should give pause to the hiring of a potential prospect.

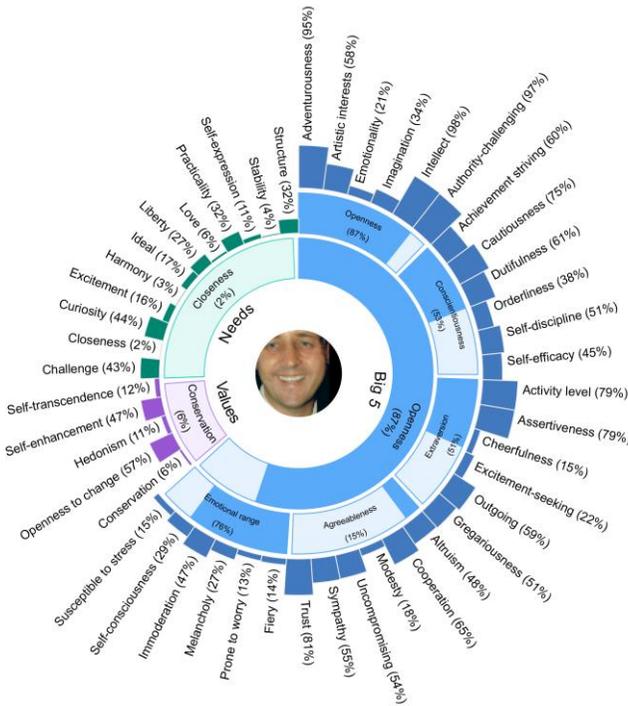


Figure 20: IBM Watson’s Personality Insights Sunburst Chart Visualization on Author’s Twitter Feed.

Source: <https://personality-insights-demo.ng.bluemix.net/>

In its *Artificial Intelligence in Logistics*²⁸⁸, DHL Customer Solutions & Innovation describe the IBM Watson Personality Insights tool, which allows users to develop a highly specific understanding of a person's character, as seen in Figure 20. As per the DHL Customer & Innovation team, "The tool can be used for the creation of novel and personalized services. For example, in the wealth management industry, IBM Watson Investment Advisor can draw correlations between a customer's personality, life situation, and the vast ocean of financial market data."²⁸⁸

According to the DHL team, "These inputs can be matched with various investment alternatives to recommend an optimal personalized wealth management strategy."²⁸⁸ In addition, the system "uses deep learning to provide financial advisors with a highly efficient and personalized way to serve clients, while indicating how to deepen relationships through other channels in their firms, such as lending solutions."²⁸⁸

Facial Recognition

Facial recognition technology is the capability to identify or verify a person from a digital image or a video frame from a video source by comparing the actual facial features of someone on camera against a database of facial images, or fingerprints, as they are also known.

As patrons enter a hotel property, "security cameras feed video to computers that pick out every face in the crowd and rapidly take many measurements of each one's features, using algorithms to encode the data in strings of numbers,"²⁸⁹ as explained in the *Consumer Reports* article *Facial Recognition: Who's Tracking Who in Public*.²⁸⁹ These are called faceprints or templates.²⁸⁹ The faceprints are compared against a database, and when there's a match, the system alerts hosts, sales people or security guards, if anyone has been caught cheating, stealing or shoplifting in the past.

Hotel personnel can receive alerts through a mobile app or an SMS when a member of a VIP loyalty program enters the hotel property. A screen can display the patron's name, or a photo just taken from the video feed. Shopping preferences and other details, like a customer's average daily Theo or ADT can also be displayed.

Currently, facial recognition technology can be more useful for security departments than customer service.²⁸⁹ At the 2014 Golden Globe Awards, facial recognition technology was used to scan for known celebrity stalkers.²⁸⁹ The technology has also been used to bar known criminals from soccer matches in Europe and Latin America.²⁸⁹ "Police forces and national security agencies in the U.S., the UK, Singapore, South Korea, and elsewhere are experimenting with facial recognition to combat violent crime and tighten border security."²⁸⁹

Facial recognition technology is becoming second nature to consumers, who are used to tagging themselves in photos on Facebook, Snapchat, Picasa, and/or WeChat. In 2015, Google launched a photo app that helped users organize their pictures by automatically identifying family members and friends.²⁸⁹ Google, however, suffered a public relations and social media disaster when its system labeled a photo of two black people as gorillas.²⁸⁹ The search giant quickly apologized profusely and promised to fix its algorithms²⁸⁹, but this does show that the technology isn't foolproof and sensitivity is imperative.

Currently, MasterCard is "experimenting with a system that lets users validate purchases by snapping a selfie. Like fingerprint scanners and other biometric technologies, facial recognition has the potential to offer alternatives to passwords and PINs."²⁸⁹

This technology is moving so fast, privacy advocates are having trouble keeping up with it all. In this regard, today's facial recognition technology is reminiscent of the World Wide Web of the mid-1990s.²⁸⁹ Back then, few people would have anticipated that every detail about what we read, watched, and bought online would become a commodity traded and used by big business and sometimes, more sinisterly, hacked and used by nefarious individuals to perpetrate crimes.²⁸⁹

Facial recognition technology "has the potential to move Web-style tracking into the real world, and can erode that sense of control."²⁸⁹ Experts such as Alvaro Bedoya, the executive director of Georgetown Law's Center on Privacy & Technology, and the former chief counsel to the Senate's subcommittee on privacy, technology, and the law finds this attack on privacy alarming.²⁸⁹

"People would be outraged if they knew how facial recognition" was being developed and promoted, Bedoya states.²⁸⁹ "Not only because they weren't told about it, but because there's nothing they can do about it. When you're online, everyone has the idea that they're being tracked. And they also know that there are steps they can take to counter that, like clearing their cookies or installing an ad blocker. But with facial recognition, the tracker is your face. There's no way to easily block the technology," warns Bedoya.²⁸⁹

Right now, facial recognition is largely unregulated and few consumers seem to even be aware of its use. "Companies aren't barred from using the technology to track individuals the moment we set foot outside. No laws prevent marketers from using faceprints to target consumers with ads. And no regulations require faceprint data to be encrypted to prevent hackers from selling it to stalkers or other criminals," Bedoya warns.²⁸⁹ This is true for both the United States, Asia, and Europe.

Users might be happy to tag their face and the faces of their friends and acquaintances on a Facebook wall, but they might shudder if every mall worker was jacked into a system that used security-cam footage to access their family's

shopping habits.²⁸⁹ This could, however, be the future of retail, according to Kelly Gates, associate professor in communication and science studies at the University of California, San Diego.²⁹⁰

In her article *Our Biometric Future: Facial Recognition Technology and the Culture of Surveillance*²⁹⁰, Gates argues that “Regardless of whether you want to be recognized, you can be sure that you have no right of refusal in public, nor in the myriad private spaces that you enter on a daily basis that are owned by someone other than yourself.” Gates concludes that by entering a retail establishment filled with facial recognition technology, you are tacitly giving your consent to the hotelier to use it, even if you are unaware of its use.²⁹⁰

Facial recognition technology in the offline world is now becoming more and more prevalent, particularly in the hospitality industry. “On Disney’s four cruise ships, photographers roam the decks and dining rooms taking pictures of passengers. The images are sorted using facial recognition software so that photos of people registered to the same set of staterooms are grouped together. Passengers can later swipe their Disney ID at an onboard kiosk to easily call up every shot taken of their families throughout the trip.”²⁸⁹

Starting in 2010, the 1,200-room Hilton Americas-Houston in Texas used a facial recognition system that was mainly designed as a security tool to identify VIP guests so the hotel staff could greet them by name.²⁸⁹ The hotel won’t confirm if the system is still active, but similar technology is being rolled out at hotels and hoteliers worldwide.²⁸⁹

“In a recent study of 1,085 U.S. consumers by research firm First Insight, 75 percent of respondents said they would not shop in a store that used the technology for marketing purposes. Notably, the number dropped to 55 percent if it was used to offer good discounts.”²⁸⁹

However, consumers may warm to facial recognition technology once it becomes more widespread, especially if hoteliers offer enough incentives to make it worthwhile. In some cases, full facial recognition isn’t needed, some marketers just want to determine the age, sex, and race of shoppers.

In Germany, the Astra beer brand recently created an automated billboard directed solely at women, even to the point of shooing men away.²⁸⁹ The billboard approximates the women’s age, then plays one of 80 pre-recorded ads to match.²⁸⁹ For a hotelier, this could help if they want to direct specific advertising towards women, or to men, or to a certain age group.

Hospitality companies can also utilize “facial recognition systems to see how long people of a particular race or gender remain in the shop, and adjust displays and the store layout to try to enhance sales.”²⁸⁹ Using related technology, some high-end retailers in the U.S. have experimented with “memory mirrors” that perform tricks such as storing images of what shoppers tried on so that they can be

revisited, or emailed directly to friends for feedback.

In 2014, Facebook announced a project it calls DeepFace, “a system said to be 97.35 percent accurate in comparing two photos and deciding whether they depicted the same person — even in varied lighting conditions and from different camera angles. In fact, the company’s algorithms are now almost as adept as a human being at recognizing people based just on their silhouette and stance.”²⁸⁹

“Entities like Facebook hold vast collections of facial images,” says Gates, the UC, San Diego professor.²⁸⁹ “People have voluntarily uploaded millions of images, but for their own personal photo-sharing activities, not for Facebook to develop its facial recognition algorithms on a mass scale.”²⁸⁹

Potentially Facebook, Instagram, WeChat, Pinterest, Snapchat, Google, or a whole host of other social media companies could use their vast databases of faceprints to power real-world facial recognition.²⁸⁹ “Hypothetically, a tech giant wouldn’t need to share the faceprints themselves. It could simply ingest video feeds from a store and let salespeople know when any well-heeled consumer walked through the door.”²⁸⁹ It could also, potentially, do this for a hotel operator as well, to prevent money laundering, Know Your Customer (KYC), or AML activities.

Affective Computing

In his article *We Know How You Feel*²⁹¹, Raffi Khatchadourian profiles Rana el Kaliouby, co-founder and CEO of Affectiva, a startup that specializes in AI systems that sense and understand human emotions. Affectiva develops “cutting-edge AI technologies that apply machine learning, deep learning, and data science to bring new levels of emotional intelligence to AI.”²⁹² It has been ranked by the business press as one of the United States’ fastest-growing startups.²⁹¹ Affectiva is the most visible among a host of competing startups that are building emotionally responsive machines.²⁹¹ Its competitors include Emotient, Realeyes, and Sension.²⁹¹

Khatchadourian explains that, “Our faces are organs of emotional communication; by some estimates, we transmit more data with our expressions than with what we say, and a few pioneers dedicated to decoding this information have made tremendous progress.”²⁹¹ Arguably, The most successful of these pioneers is Rana el Kaliouby.²⁹¹

“Since the nineteen-nineties a small number of researchers have been working to give computers the capacity to read our feelings and react, in ways that have come to seem startlingly human,” explains Khatchadourian.²⁹¹ Researchers “have trained computers to identify deep patterns in vocal pitch, rhythm, and intensity; their software can scan a conversation between a woman and a child

and determine if the woman is a mother, whether she is looking the child in the eye, whether she is angry or frustrated or joyful.”²⁹¹ “Other machines can measure sentiment by assessing the arrangement of our words, or by reading our gestures. Still others can do so from facial expressions,” says Khatchadourian.²⁹¹

In his book *Architects of Intelligence*²⁹², Martin Ford interviews the CEO of Affectiva, Rana el Kaliouby, and she explains her work in the following way:

“If you think about a lot of people who are building these devices, right now, they’re focused on the cognitive intelligence aspect of these devices, and they’re not paying much attention to the emotional intelligence. But if you look at humans, it’s not just your IQ that matters in how successful you are in your professional and personal life; it’s often really about your emotional and social intelligence. Are you able to understand the mental states of people around you? Are you able to adapt your behavior to take that into consideration and then motivate them to change their behavior, or persuade them to take action? All of these situations, where we are asking people to take action, we all need to be emotionally intelligent to get to that point. I think that this is equally true for technology that is going to be interfacing with you on a day-to-day basis and potentially asking you to do things.”

Kaliouby’s thesis “is that this kind of interface between humans and machines is going to become ubiquitous, that it will just be ingrained in the future human-machine interfaces, whether it’s our car, our phone or smart devices at our home or in the office.”²⁹² Kaliouby sees a world where, “We will just be coexisting and collaborating with these new devices, and new kinds of interfaces.”²⁹² “I think that, ten years down the line, we won’t remember what it was like when we couldn’t just frown at our device, and our device would say, ‘Oh, you didn’t like that, did you?’” says Kaliouby.²⁹¹

Affectiva’s signature software, Affdex, tracks four emotional “classifiers” — happy, confused, surprised, and disgusted.²⁹¹ “The software scans for a face; if there are multiple faces, it isolates each one. It then identifies the face’s main region — mouth, nose, eyes, eyebrows — and it ascribes points to each, rendering the features in simple geometries,” explains Khatchadourian.²⁹¹

“Affdex also scans for the shifting texture of skin — the distribution of wrinkles around an eye, or the furrow of a brow — and combines that information with the deformable points to build detailed models of the face as it reacts,” says Khatchadourian.²⁹¹ The algorithm identifies an emotional expression by comparing it with countless others that it has previously analyzed. “If you smile, for example, it recognizes that you are smiling in real time,” says Kaliouby.²⁹¹

Like every company working in the emotional intelligence field, “Affectiva relies on the work of Paul Ekman, a research psychologist who, beginning in the sixties, built a convincing body of evidence that there are at least six universal human emotions, expressed by everyone’s face identically, regardless of gender, age, or cultural upbringing.”²⁹¹ Classifying human expressions into combinations of forty-six individual movements called “action units”, Ekman compiled the Facial Action Coding System, or FACS — a five-hundred-page taxonomy of facial movements.²⁹¹ FACS “has been in use for decades by academics and professionals, from computer animators to police officers interested in the subtleties of deception.”²⁹¹

Although widely used, Ekman and FACS has its critics, “among them social scientists who argue that context plays a far greater role in reading emotions than his theory allows.”²⁹¹ However, context-blind computers appear to support Ekman’s conclusions.²⁹¹ “By scanning facial action units, computers can now outperform most people in distinguishing social smiles from those triggered by spontaneous joy, and in differentiating between faked pain and genuine pain,” says Khatchadourian.²⁹¹ “Operating with unflagging attention, they can register expressions so fleeting that they are unknown even to the person making them,” notes Khatchadourian.²⁹¹

“The human face is a moving landscape of tremendous nuance and complexity. It is a marvel of computation that people so often effortlessly interpret expressions, regardless of the particularities of the face they are looking at, the setting, the light, or the angle,” notes Khatchadourian.²⁹¹ He adds that, “A programmer trying to teach a computer to do the same thing must contend with nearly infinite contingencies. The process requires machine learning, in which computers find patterns in large tranches of data, and then use those patterns to interpret new data.”²⁹¹

In March, 2011, Kaliouby and her team were invited to demonstrate an early version of their technology to executives from Millward Brown, a global market-research company.²⁹¹ “Kaliouby was frank about the system’s limitations — the software still was having trouble distinguishing a smile from a grimace — but the executives were impressed,” reports Khatchadourian.²⁹¹ Ad testing relies heavily on subjective surveys, which is easily tainted by human bias.²⁹¹ Spontaneous, even unconscious, sentiment is what really interests marketers and Kaliouby’s technology promised that, along with better results.²⁹¹

“A year earlier, Millward Brown had formed a neuroscience unit, which attempted to bring EEG technology into the work, and it had hired experts in Ekman’s system to study video of interviews,” explains Khatchadourian.²⁹¹ However, these ideas had proved impossible to scale up.²⁹¹ The Millward Brown executives proposed a test to Kaliouby: “If Affectiva could successfully measure people’s emotional responses to four ads that they had already studied, Millward Brown would become not just a client but also an investor.”²⁹¹

Millward Brown chose the Dove TV commercial “Onslaught,” which begins with an image of a young girl, then “shifts to her perspective as she is bombarded by a montage of video clips — a lifetime of female stereotypes compressed into thirty-two seconds — before the ad ends with the girl, all innocence, and the tagline ‘Talk to your daughter before the beauty industry does.’”²⁹¹

Although the ad was critically acclaimed, surveys revealed that many people considered it emotionally difficult to watch.²⁹¹ In its study, Affdex scanned more than a hundred respondents watching the ad, and discovered more complicated responses. Although respondents were uncomfortable during the ad, at the moment of resolution this uneasiness vanished.²⁹¹ “The software was telling us something we were potentially not seeing,” Graham Page, a Millward Brown executive, explained.²⁹¹ Recognizing the power of Affectiva’s technology, Millward Brown’s parent company, WPP, invested \$4.5 million in the company.²⁹¹ Affdex was soon being used to test thousands of ads per year.²⁹¹

Kaliouby claims that her company has analyzed more than two million videos, of respondents from over eighty countries.²⁹¹ “This is data we have never had before,” says Kaliouby.²⁹¹ When Affectiva began, she had trained the software on just a few hundred expressions, but, once she started working with Millward Brown, hundreds of thousands of people on six continents began turning on web cams to watch ads for testing, and all their emotional responses — natural reactions, in relatively uncontrolled settings — flowed back to Kaliouby’s team.²⁹¹

Affdex can now read the nuances of smiles better than most people can. As the company’s database of emotional reactions grows, the software is getting better at reading other expressions, including furrowed eyebrows. “A brow furrow is a very important indicator of confusion or concentration, and it can be a negative facial expression,” explains Kaliouby.²⁹¹

Today, Kaliouby says companies pay millions of dollars to create funny and emotionally compelling ads, but the advertisers and the brands have no idea if they are striking the right emotional chord with their audience.²⁹² The only way to find out, before emotional response technology existed, was to ask people.²⁹² So, if you are the person watching the ad, you’d get a survey with some basic questions, but the answers wouldn’t be very reliable because it is biased, or so believes Kaliouby.²⁹²

With Affdex, however, Kaliouby explains that, “as you’re watching the ad, with your consent it will analyze on a moment-by-moment basis all your facial expressions and aggregate that over the thousands of people who watched that same ad.”²⁹² The result: “an unbiased, objective set of data around how people respond emotionally to the advertising.”²⁹² Affectiva can “then correlate that data with things like customer purchase intent, or even actual sales data and virality.”²⁹²

“People are pretty good at monitoring the mental states of the people around them,” says Kaliouby.²⁹² “We know that about 55% of the signals we use are in facial expression and your gestures, while about 38% of the signal we respond to is from tone of voice. So how fast someone is speaking, the pitch, and how much energy is in the voice. Only 7% of the signal is in the text and the actual choice of words that someone uses!”²⁹²

A multi-billion-dollar industry that tracks people’s sentiments about this product or that service has been built within just a couple of years, which is amazing when you think that all of these tweets, likes and posts only account for about 7% of how humans communicate overall.²⁹² “What I like to think about what we’re doing here, is trying to capture the other 93% of non-verbal communication,” contends Kaliouby.²⁹²

According to Kaliouby, Affectiva looks “at the tone of voice and the occurrence of speech events, such as how many times you say ‘um’ or how many times you laughed. All of these speech events are independent of the actual words that we’re saying.”²⁹² Affectiva combines “these things and takes what we call a multimodal approach, where different modalities are combined, to truly understand a person’s cognitive, social or emotional state,” explains Kaliouby.²⁹²

“If you take facial expressions or even the tone of a person’s voice, the underlying expressions are universal,” says Khatchadourian.²⁹² A smile is a smile no matter where in the world it breaks across a face. “However, we are seeing this additional layer of cultural display norms, or rules, that depict when people portray their emotions, or how often, or how intensely they show their emotion,” says Khatchadourian.²⁹² “We see examples of people amplifying their emotions, dampening their emotions, or even masking their emotions altogether.”²⁹² Masking often occurs in Asian markets, where Asian populations are less likely to show negative emotions.²⁹² In Asia, there is an increased incidence of what’s known as a “social smile”, or a “politeness smile.”²⁹² These are not expressions of joy, but rather expressions that say, “I acknowledge you,” and, in that sense, they are very social signals.²⁹²

Affdex is sold “as a tool that can make reliable inferences about people’s emotions — a tap into the unconscious,”²⁹¹ if you will. Clients like CBS use it to tests new TV shows.²⁹¹ Affectiva is also working with Oovoo, an instant messaging service, to integrate the technology into video calls.²⁹¹ “People are doing more and more videoconferencing, but all this data is not captured in an analytic way,” says Kaliouby.²⁹¹ “Capturing analytics, it turns out, means using the software — say, during a business negotiation — to determine what the person on the other end of the call is not telling you,” writes Khatchadourian. “The technology will say, ‘O.K., Mr. Whatever is showing signs of engagement — or he just smirked, and that means he was not persuaded,’” says Kaliouby.²⁹¹

Kaliouby believes Affectiva’s technology has the potential to monetize what she

calls an 'Emotion Economy'.²⁹¹ "Tech gurus have for some time been predicting the Internet of Things, the wiring together of all our devices to create 'ambient intelligence' — an unseen fog of digital knowingness," explains Khatchadourian.²⁹¹ Emotion could be a part of this IoT.²⁹¹

Kaliouby predicts that, in the coming years, mobile devices will contain an "emotion chip," which constantly runs in the background, the way geolocation currently works on phones now.²⁹¹ "Every time you pick up your phone, it gets an emotion pulse, if you like, on how you're feeling," Kaliouby says.²⁹¹ "In our research, we found that people check their phones ten to twelve times an hour — and so that gives this many data points of the person's experience," she explains.²⁹¹

The free economy is, in fact, an economy of the bartered self, but attention can never be limitless.²⁹¹ Thales Teixeira, a business professor who collaborated with Kaliouby on her technology, explains that, "There are three major fungible resources that we as individuals have. The first is money, the second is time, and the third is attention. Attention is the least explored."²⁹¹ Teixeira calculated the value of attention, and found that, like the dollar, its price fluctuates.²⁹¹

Using Super Bowl ads as a rough indicator of the high end of the market, Teixeira "determined that in 2010 the price of an American's attention was six cents per minute. By 2014, the rate had increased by twenty per cent — more than double inflation."²⁹¹ The jump was attributed to the fact that attention, at least, the kind worth selling, is becoming increasingly scarce as people spend their free time distracted by a growing array of devices and services.²⁹¹ "What people in the industry are saying is 'I need to get people's attention in a shorter period of time,' so they are trying to focus on capturing the intensity of it," explains Teixeira.²⁹¹ "People who are emotional are much more engaged. And because emotions are 'memory markers' they remember more. So the idea now is shifting to: how do we get people who are feeling these emotions?" says Teixeira.²⁹¹

Affectiva filed a patent for "a system that could dynamically price advertising depending on how people responded to it."²⁹¹ However, they soon discovered that they were not alone; more than a hundred similar patents for emotion-sensing technology existed, many of them, unsurprisingly, also focused on advertising.²⁹¹

Companies like AOL, Hitachi, eBay, IBM, Yahoo!, and Motorola are also developing technology in this space.²⁹¹ Sony had filed several patents; "its researchers anticipated games that build emotional maps of players, combining data from sensors and from social media to create 'almost dangerous kinds of interactivity,'" notes Khatchadourian.²⁹¹ There are "patents for emotion-sensing vending machines, and for A.T.M.s that would understand if users were 'in a relaxed mood,' and receptive to advertising," claims Khatchadourian.²⁹¹

Incredibly, Verizon had drafted a plan for "a media console packed with sensors,

including a thermographic camera (to measure body temperature), an infrared laser (to gauge depth), and a multi-array microphone. By scanning a room, the system could determine the occupants' age, gender, weight, height, skin color, hair length, facial features, mannerisms, what language they spoke, and whether they had an accent."²⁹¹

According to Khatchadourian, "the console could identify pets, furniture, paintings, even a bag of chips."²⁹¹ It could track "ambient actions," such as "eating, exercising, reading, sleeping, cuddling, cleaning, playing a musical instrument."²⁹¹ It could even probe other devices, learning what a person might be browsing on the web, or writing in an e-mail.²⁹¹ The console could scan for affect, tracking moments of laughter or the raised voice of an argument.²⁹¹ All of this data tracking would then shape the console's choice of TV ads.²⁹¹ "A marital fight might prompt an ad for a counsellor. Signs of stress might prompt ads for aromatherapy candles. Upbeat humming might prompt ads 'configured to target happy people,'" which is a pretty scary idea.²⁹¹ Verizon's plan was for the system to then broadcast the ads on every device in the room.²⁹¹

Although Verizon's system seems very Big Brotheresque, it was not an anomaly, explains Khatchadourian.²⁹¹ Microsoft's Xbox One system already contains many of these features, including "a high-definition camera that can monitor players at thirty frames per second."²⁹¹ "Using a technology called Time of Flight, it can track the movements of individual photons, picking up minute alterations in a viewer's skin color to measure blood flow, then calculate changes in heart rate."²⁹¹ "The software can monitor six people simultaneously, in visible or infrared light, charting their gaze and their basic emotional states, using technology similar to Affectiva's."²⁹¹ As Khatchadourian sees it, "the system has tremendous potential for making digital games more immersive."²⁹¹ Microsoft isn't stopping at game development either, they envision TV ads that target a viewer's emotions, and program priced according to how many people are watching in the room.²⁹¹ Google, Comcast, and Intel are charting a similar path.²⁹¹

Wearables like Nike's *FuelBand* and particularly Fitbit collect a tremendous amount of health data on a person.²⁹¹ Apple's Health app, a fitness app pre-installed on new iPhones "can track weight, respiratory rate, sleep, even blood-oxygen saturation."²⁹¹ This information could be used to build emotional profiles, says Khatchadourian.²⁹¹ Researchers at Dartmouth have already "demonstrated that smartphones can be configured to detect stress, loneliness, depression, and productivity, and to predict G.P.A.s."²⁹¹

For Affectiva, there is now plenty of interest in its Affdex solution.²⁹¹ The company has conducted research for Facebook, experimenting with video ads.²⁹¹ Samsung has licensed it and a company in San Francisco wants to give its digital nurses the ability to read faces.²⁹¹ A Belfast entrepreneur is interested in its use at night clubs.²⁹¹ A state initiative in Dubai, the *Happiness Index*, wants to

measure social contentment.²⁹¹ “Dubai is known to have one of the world’s tightest CCTV networks, so the infrastructure to acquire video footage to be analyzed by Affdex already exists,” explains Kaliouby.²⁹¹

All-in-all, Affectiva could be revealing the future of customer engagement. Although somewhat Big Brotheresque, all this data collection is incredibly seamless, which means it will probably be popping up in all kinds of technology in the coming years. For that reason alone, it is important for hoteliers to keep an eye on this potentially revolutionary technology.

Affectiva’s other use cases include:

- **Improve story flow** — Moment-by-moment emotion data can pinpoint viewer confusion and lack of engagement. This insight helps improve the story arch of an animatic or ad.
- **Create cut-downs** — Identify the most emotionally engaging moments in longer TV ads so you can retain the most impactful parts when cutting down to shorter online ads.
- **TV show character analysis** — Assess audience engagement with characters on TV shows and the interplay of characters — especially important when introducing new actors to a show.
- **Movie trailer creation** — Movie studios use emotion analytics to test different versions of a movie trailer and use the most engaging moments in each to create the final cut.
- **Determine media spend** — Test final ads for emotional engagement to identify potential wear out. Direct your advertising dollars to the ads with the best emotional impact on repeat view.
- **Test voice overs and brand reveal** — Use emotion data to see if your audiences are emotionally engaged at the moment of brand reveal in an ad and test the effectiveness of taglines and voice-overs.

SEO

A web search engine is a software system designed to search for information on the web and the search results are generally presented in a line of results often referred to as search engine results page (SERPs).²⁹³ “The information may be a mix of web pages, images, and other types of files. Some search engines also mine data available in databases or open directories. Unlike web directories, which are maintained only by human editors, search engines also maintain real-time information by running an algorithm on a web crawler.”²⁹⁴

In the US, Google is, by far, the biggest search engine around.²⁹⁵ Outside the U.S., Google’s main competitors are “Baidu and Soso.com in China; Naver.com and Daum Communications in South Korea; Yandex in Russia; Seznam.cz in Czech Republic; Yahoo! in Japan, Taiwan [sic].”²⁹⁶

Bit players like Bing compete with Google on standard search, but today Apple and Amazon are making big inroads into Google's dominance, with Facebook set to be a challenger in the not-too-distant future as well. With those latter two, search is organically included within their platforms, i.e., when someone searches for an item to buy on Amazon, it gets included in the overall search rankings, ergo, an ecommerce site has become an important search engine.

Why is search so influential? Because users flock to search engines to organize the vast amounts of information most buyers need to make purchase decisions. "The main purpose of Google Search is to hunt for text in publicly accessible documents offered by web servers, as opposed to other data, such as with Google Image Search."²⁹⁶ "The order of search on Google's search-results pages is based, in part, on a priority rank called a 'PageRank.'"²⁹⁶ As Sharma et al. state in their book *Mobile Marketing*, "Search is one of the best ways to find content and the absolute best way for a marketer to determine consumer intent."²³⁴

Google Search "provides at least 22 special features beyond the original word-search capability, and language translation of displayed pages."²⁹⁶ "In June 2011, Google introduced 'Google Voice Search' and 'Search by Image' features for allowing the users to search words by speaking and by giving images. In May 2012, Google introduced a new Knowledge Graph semantic search feature to customers in the U.S."²⁹⁶

"When Google was a Stanford research project, it was nicknamed BackRub because the technology checks backlinks to determine a site's importance."²⁹⁶ Backlinks — and the quality of them — are very important for search engine optimization (SEO). The higher the quality of backlinks, the higher a website's ranking.

Even today, backlinks count, and they likely count prominently for SEO and, although backlinks are not always within a company's control, they are highly important due to their stature as the earliest persisting Google ranking factor. According to the *Moz 2015 Ranking Survey*²⁹⁷, "the data continues to show some of the highest correlations between Google rankings and the number of links to a given page." Today, *quality* backlinks are of the utmost importance and Google is the one who decides the quality of those backlinks; links from known spammy sites or sites associated with them, or merely hosted on servers that also host spammy content negatively affect rankings.²⁹⁷

In the early days of the battle for internet search supremacy, "previous keyword-based methods of ranking search results, used by many search engines that were once more popular than Google, would rank pages by how often the search terms occurred in the page, or how strongly associated the search terms were within each resulting page."²⁹⁸ Google's PageRank algorithm instead "analyzes human-generated links assuming that web pages linked from many important pages are themselves likely to be important. The algorithm computes a recursive

score for pages, based on the weighted sum of the PageRanks of the pages linking to them.”²⁹⁸ As a result, PageRank is thought to correlate well with human concepts of importance.²⁹⁸

Google wants site owners to focus on developing great content — clear, accurate, highly-readable content that other site owners want to link to.²⁹⁷ The way modern engines make this determination is by using advanced natural language processing, artificial intelligence and machine learning.²⁹⁷ These evolving technologies enable the search engines to understand content without relying on a small set of specific keywords and phrases.²⁹⁷ Google has invested heavily in this area, as evidenced by the plethora of white papers and research posted on its ‘Machine Intelligence’ website.²⁹⁷

As Brian Alpert argues in his article *Search engine optimization in 2017: A new world where old rules still matter*²⁹⁹, “One aspect of today’s search engines that makes them very different from their predecessors is that advances in artificial intelligence and machine learning have enabled them to understand content and its underlying concepts independently of specific keywords.”²⁹⁹ Alpert adds: “This renders null and void the old concept that one must focus on keywords specific to a certain kind of content in order to be found via search engines. In today’s landscape, exact keyword matches are less influential than ever before as engines can understand the relationships between words that are semantically related.”²⁹⁹

With the introduction of its Knowledge Graph, Google is attempting to give users answers instead of just links.²⁹⁶ “If you want to compare the nutritional value of olive oil to butter, for example, Google Search will now give you a comparison chart with lots of details. The same holds true for other things, including dog breed and celestial objects. Google says it plans to expand this feature to more things over time.”²⁹⁶

Knowledge Graph also allows users to filter results.²⁹⁶ “Say you ask Google: ‘Tell me about Impressionist artists.’ Now, you’ll see who these artists are, and a new bar on top of the results will allow you to dive in to learn more about them and to switch to learn more about abstract art, for example,” explains Lardinois.²⁹⁶

Search advertising falls into two main types — natural search results, and paid sponsorship based on keywords.³⁰⁰ “Natural search requires high-quality, constantly updated content and search engine optimization (SEO). Paid search requires work to optimize keyword choice and messaging, but can be phenomenally expensive.”³⁰⁰ When not optimized for conversion, this can be a very pricey channel to use, with low conversion rates as well.³⁰⁰

Hotels should constantly be testing their web pages for the most searched for and/or visited pages. As Siroker and Komen explain, A/B testing is particularly good for website marketing, especially for uncovering a website’s best landing pages.¹⁴¹ “Defining success in the context of A/B testing involves taking the

answer to the question of your site's ultimate purpose and turning it into something more precise: *quantifiable success metrics*. Your success metrics are the specific numbers you hope will be improved by your tests," argue Siroker and Komen.¹⁴¹ An e-commerce website could easily define its success metrics in terms of revenue per visitor¹⁴¹, but it is still important to understand such things as traffic sources, bounce rate, top pages, conversion rates, conversion by traffic source, amongst other things.

In a Google Analytics enabled website, every user visiting a webpage is tracked from its immediately preceding website^{301 302}, which are divided into six main channels – search, referral, display advertising, email, social and direct. These analytics allow businesses to assess the contribution of each channel to their overall traffic volume, as well as evaluate investment in traffic driving measures.

According to Baye et al.³⁰³, *Search* is traffic delivered by internet search engines and it is the largest channel. The source of search traffic can either be sponsored (paid) or organic, which is highly dependent on SEO effectiveness.³⁰⁴ Search traffic has been extensively studied by Berman and Katona³⁰⁵, Jerath et al³⁰⁶, Yao and Mela³⁰⁷; unsurprisingly, the general consensus is that the top position on the search result is not necessarily the most profitable, as discovered in studies by Agarwal et al³⁰⁸, and Jeziorski and Segal³⁰⁹. Liu and Toubia³¹⁰ theorize that this might be because users conducting "informational" search queries are unlikely to have much awareness of the brand they ultimately visit and are therefore only on the first step of their customer journey.

As per Strzelecki³¹¹, *Referral* traffic originates from domains other than search engines or social media, its where users find links of interest and click from. Referral traffic may thus consist of users who have acquired awareness and enough interest in the linked brand from elsewhere to visit its site³¹².

Google states that *Display* traffic is traffic that "found your site by clicking on an ad that you ran on another website. Banner ads on blogs and image ads on news sites are some common generators of display traffic."⁵⁵

Email traffic "clicked on links from email campaigns, follow up emails, and even email signatures," says Google.⁵⁵ It is one of the best traffic tools, thought to generate website traffic at rates as high as 16%³¹³. Chittenden and Rettie³¹⁴ claim that it is often used to maintain transactional performance of existing customers by presenting discounts or offers.

Social traffic will be counted from people who find a company's page through an associated social media account.⁵⁵ Businesses can check in on users who are landing on their page as a result of social media accounts like Facebook, LinkedIn, or Twitter.⁵⁵ This channel is hugely important to marketers as the reach, influence and viral potential of social makes it a highly cost effective way to reach a motivated audience. Bickart & Schindler³¹⁵, Kumar & Benbasat³¹⁶, Zhang, Craciun, & Shin³¹⁷ found that electronic word of mouth (e-WOM) marketed

through social media is an effective brand communication tool, which has a strong influence on purchase intention, as per Chan & Ngai³¹⁸, Copley³¹⁹, and See-To & Ho³²⁰.

According to Google, *Direct* traffic occurs when browsers come to a site by entering the URL directly into the browser’s address bar.⁵⁵ Google recommends businesses “keep an eye on this one if you’ve been running offline or traditional media ads like print, TV, or radio, because they require audiences to remember and type out your web address.”⁵⁵

Ultimately, Analytics channels are all sources of traffic, says Google.⁵⁵ “As such, the same traffic metrics can be applied to all channels. The best part about being able to apply the same metrics to each channel is that you now have the ability to perform direct comparisons in order to diagnose issues and optimize performance.”⁵⁵

In his article *Supercharging Your SEO with AI Insights, Automation, and Personalization*³²¹, Jim Yu believes that, AI “is making search more human. Although search does not yet ‘speak’ to users in the same way the Google Duplex demo could, its objective is very similar.” He adds, “Google’s RankBrain technology uses machine learning to understand the meaning of the content it crawls; it infers intent from ambiguous search queries; and it uses feedback data to improve the accuracy of its results. In other words, it listens and it learns.”³²¹

Research by BrightEdge “into a dataset of over 50 million keywords revealed that 84.4 percent of queries return universal search results. This occurs as Google uses AI to match the layout of search results pages to the user’s intent.”³²¹ According to BrightEdge, “There are now 37 different search engine result page (SERP) categories, a number that will only increase over the coming months and years.”³²¹ These are:

Standard	Category	Weather
Taller Organic Cards	Images	Game scores
Local 3-pack	Video / Trailers	Twitter Tweets
Quick answers	Live	Discover more places
Shopping/PLA	Top sights	Send to Google home
Rich snippets	Reviews	People also search for
Site carousel	Blogs	See results about
Site links	Knowledge panel	Widgets
Site image carousel	Carousel	Found in related search
Top stories/News	Apps	Quotes

AMP	Google for jobs	Events
Google flights	Recipes	People also ask
Scholarly research		

Table 9: Search Engine keywords

Source: BridgeEdge³²¹

“The potential for personalization has not yet been truly tapped, but Google’s Sundar Pichai recently made public its goal to be an ‘AI-first’ company.”³²¹ This means, “we should all expect the search landscape to change dramatically as AI takes center stage in the way it has already done in products like Google Photos and Google Lens.³²¹ As co-founder Sergey Brin put it: “AI touches every single one of our main projects, ranging from search to photos to ads.”³²¹

The pace of development on this front is accelerating, as everything at Google seems to have something to do with AI.³²¹ “Google is all too aware that AI can simply deliver better, more personalized experiences for consumers,” says Yu.³²¹ “However, search marketers need to pay close attention to these technological advancements if they are to avail themselves of these opportunities for SEO,” claims Yu.³²¹

There are three key areas in which AI can improve SEO performance³²¹:

1. Insights
2. Automation
3. Personalization

AI can process and analyze data at a scale simply not possible for humans.³²¹ “This makes it an essential complement to any search strategist, as AI can deliver the information we need to make informed decisions out of noisy, unstructured data,” claims Yu.³²¹

AI can be used to glean SEO insights in the following ways³²¹:

- Understand underlying need in a customer journey.
- Identify content opportunities.
- Define opportunity space in the competitive context.
- Map intent to content.
- Use structured data and markup.
- Invest in more long-tail content.
- Ensure content can be crawled and surfaced easily by all user-agents.
- Automation.

“SEO is a labor-intensive industry that requires a huge amount of attention over the long term. Where we can automate tasks to receive the same output, we could produce ourselves, we should make this a top priority. The time saved

through automation can be applied to the areas that require our skills, like strategy and creative content,” advises Yu.³²¹

Ultimately, AI can be used for SEO personalization in the following ways³²¹:

- Create content by persona, customer journey stage and delivery mechanism.
- Enhance user experience and conversion through personalization.
- Use semantically specific pages to associate query and intent.
- Use personalization and audience lists to nurture leads across search and social.
- Use AI to help publish content at the right times on the right networks.

As reported by Tom Simonite in his *Wired* article *Google Search Now Reads at a Higher Level*³²², on 25 October 2019, Google announced that was enhancing “its search-ranking system with software called BERT, or Bidirectional Encoder Representations from Transformers to its friends.” “It was developed in the company’s artificial intelligence labs and announced last fall, breaking records on reading comprehension questions that researchers use to test AI software,” says Simonite.³²²

Pandu Nayak, Google’s vice president of search, said at a briefing Thursday that “the muppet-monickered software has made Google’s search algorithm much better at handling long queries, or ones where the relationships between words are crucial. You’re now less likely to get frustrating responses to queries dependent on prepositions like ‘for’ and ‘to,’ or negations such as ‘not’ or ‘no.’”³²²

“This is the single biggest positive change we’ve had in the last five years,” said Nayak.³²²

“One illustration of BERT’s power offered up by Google is how it helped its search engine interpret the query ‘Parking on hill with no curb.’ The current version of its search algorithm responded to that as if it referred to a hill that *did* have a curb. The BERT-powered version highlights a page advising drivers to point their wheels toward the side of the road,” explains Simonite.

“Another was the query ‘2019 brazil traveler to usa need a visa.’ To a human, that’s a clear attempt to discover the requirements for Brazilians heading to the US, but pre-BERT Google misunderstood the crucial ‘to’ and returned an article about US citizens traveling to Brazil as the top result. With BERT, the search engine correctly serves up a page about requirements for Brazilian citizens heading north,” notes Simonite.³²²

“Google says it receives billions of searches per day and that the BERT upgrade will affect rankings on one out of every 10. But Nayak says most users probably won’t notice,” says Simonite.³²² “People outside the US turning to Google for

help will see some of the most significant changes. Nayak said that the BERT upgrade helped its system get much better at identifying so-called featured snippets, particularly in languages other than English,” adds Simonite.³²²

“Google’s upgrade is a notable example of recent progress in software that attempts to understand language. It has made machine learning algorithms much better at decoding the subtleties of language by attending to the context around a particular word,” says Simonite.³²²

Although machine learning has proven to be a powerful way to teach software to sort or interpret data such as images or text, each program typically has to be “trained” using example data, which can be a long, involved and expensive proposition.³²² “That’s often been tricky to come by for text documents.”³²² Projects would depend on paying people to label specific examples, such as good and bad restaurant reviews,” notes Simonite.³²²

As Simonite explains it³²²:

“In the spring and summer of 2018, OpenAI and the Allen Institute for AI showed a simpler and more powerful method. They taught machine learning programs the differences between words — even homonyms like May the month, may the verb, and May the name — by looking at other words in the text, even if they’re in a different sentence. Models trained that way on very large collections of text picked up a kind of general sense for language and could then be specialized to particular tasks using relatively small collections of labeled data.”

“Allen AI christened its system ELMo, for Embeddings from Language Models,” says Simonite.³²² “That caused Google’s researchers to think of Sesame Street in October 2018 when they announced their own still-more-powerful take on the new way for machine learning to learn language, BERT,” notes Simonite.³²² “Like the systems from OpenAI and Allen AI, Google’s software set new records on AI language tests, such as answering questions.”³²²

“People are very excited, because progress is so quick,” says Jeff Wu, a research engineer who has worked on OpenAI’s language projects.³²² “One side effect: Researchers have had to invent new and more difficult tests for software on tasks such as basic reading comprehension,” explains Simonite.³²²

“That doesn’t mean BERT is ready to critique your college essay,” warns Simonite.³²² “Language is incredibly subtle and nuanced,” Nayak says.³²² “Each time Google improves the search box’s facility with language, he says, people submit more complex and challenging queries, effectively raising the bar for Google’s reading robots,” offers Simonite.³²²

Content Intelligence

In its article *The Magic of AI in a content-driven world. Using AI to create content faster*³²³, the Adobe Enterprise Content Team argues that we're currently in the midst of a content explosion. Perhaps because of this, it is also a time when "Consumers expect to have personalized, relevant experiences at all times, in all places, and on all platforms."³²³

"An IDC survey cites that 85 percent of marketing professionals feel under pressure to create assets and deliver more campaigns, more quickly. In fact, over two-thirds of respondents are creating over ten times more assets to support additional channels. This increased level of complexity is driving volume and associated costs."³²³

When thinking about what is needed to create this kind of content for thousands or even millions of customers at the near real-time speed that is necessary, doing it manually is impossible.³²³ Adobe's *State of Creativity in Business 2017* survey found that "40 percent of creatives are using AI in photo and design retouching,"³²³ so it's already happening.

Currently, it can take hours for a designer to find just the right image to use in a piece of marketing collateral, and that's not counting the time required to manipulate the image, to crop it, to find the right layout scenario, and then to publish it to an online catalog and/or social media channel.³²³ Serving the right content to the right person at the right time adds more time.³²³ The cost for all this work adds up, as does the cost of photo shoots to create new assets.³²³ AI and machine learning can help hotel marketers find and reuse assets more efficiently, as well as deliver new and personalized content at scale, thereby helping a brand get a better return on its marketing investments.³²³

According to the Adobe Sensei Team, "AI can help you create more relevant content and more engaging experiences across the customer journey at the speed your customers expect.

On the creative side, AI can speed up all kinds of tedious tasks, from identifying and organizing assets to adjusting and refining for specific channels."²⁶ "On the audience level, AI can help you better understand which audiences respond to which content, or how often people prefer to receive emails, so you can deliver the experiences your customers want while respecting their preferences and privacy," says the Sensei team.²⁶

Klein concurs, stating "because the technology becomes smarter and more intuitive as it ingests more data, AI also can play a valuable role in automating the content creation process."⁷² AI "offers capabilities for marketers that range from choosing the best image for a campaign or optimizing the content in a creative based on real-time user interactions," says Klein.⁷² "For example, from

a content creation perspective, this allows the ability to understand the focal — or sellable — point of hero images, and then to auto-crop them for best performance based on an understanding of millions of assets with similar meta-data,” explains Klein.⁷² “In this way, AI enhances creativity and enables a level of responsiveness and efficiency that until very recently was unachievable for marketers,” contends Klein.⁷²

The advertising maverick Dave Trott was probably correct when he said that “Creativity may well be the last legal unfair competitive advantage we can take to run over the competition”³²⁴, so anything that enhances creativity should be pursued. However, one should remember the award-winning copywriter Luke Sullivan’s warning that, “Creativity is like washing a pig. It’s messy. It has no rules. No clear beginning, middle or end. It’s kind of a pain in the ass, and when you’re done, you’re not sure if the pig is really clean or even why you were washing a pig in the first place.”³²⁵

“Designers simply don’t have time to tag the hundreds of images uploaded from every photo shoot. Even if they did, the list of keywords probably wouldn’t be as exhaustive as it should be. But when a photo isn’t tagged, it’s virtually impossible to find by searching in an image bank of thousands,” argue the Adobe Experience Cloud team.³²³ “According to IDC, marketers report that one-third of marketing assets go unused or underutilized with the average organization creating hundreds of new marketing assets each year.”³²³ Repurposing images is unlikely, which means ROI suffers.

To try to tackle this issue, Adobe has created “Auto Tag”, an Adobe Sensei capability that automatically tags images with key words.³²³ For example, a marketer might have a picture of a young girl on a beach under a clear blue sky, which could be tagged with keywords like “beach”, “girl”, “dancing”, “sundress”, “blue sky”, “white sand”, or even a place like “Aruba.”

“The Auto Tag service is used to power the Smart Tags features in Adobe Experience Manager, Photo Search in Adobe Lightroom, and Visual Search in Adobe Stock,” explains the Enterprise Content Team.³²³ “It’s exciting to see the capabilities of auto-tagging,” says Jonas Dahl, product manager for Adobe Experience Manager.³²³ “We did several manual search queries against a customer’s repository and showed the assets we were able to find. Then we applied Smart Tagging and did the same searches. This time the results were significantly better and much more comprehensive. And in a fraction of the time,” explains Dahl.³²³

“Adobe Sensei uses a unified AI and machine-learning framework, along with Adobe’s deep domain expertise in the creative, marketing, and document segments, to harness the company’s massive volume of content and data assets — from high-resolution images to customer clicks,” says the Enterprise Content Team.³²³

“Adobe Sensei technology has learned to automatically identify what is in a photo. And not just an object like a car or a girl, but the concept of the photo, including context, quality, and style.”³²³ Theoretically, someone could search for an image with the words “walking” and “slow” and “the search might result in an image of an elderly man using a walker, because the technology made the connection between slow and walker.”³²³ Sensei’s auto-phrasing service could tell you how each tag scored for prominence because the machine differentiates between the primary and secondary objects.³²³ “This enables the technology to build a simple sentence or caption that more accurately describes the photo, such as ‘An elderly man walking with a walker in a park.’”³²³

Using the Sensei framework, hotel marketing departments could train the AI and machine learning models to create their own unique auto tags.³²³ Identifying brand characteristics like the company logo could help the designers adhere to specific brand standards, or training it to identify a company’s products so that they can be tagged in pictures on social media, which helps identify true reach.³²³

Custom auto tagging not only has the potential to increase a marketing team’s efficiency, but it could lead to image-based shopping.³²³ “Auto tagging identifies what is in the photo and finds the best matches for the customer. Auto tagging also allows brands to gain a deeper understanding of their audience and can help uncover market trends on social media, without the brand having to rely on tags and text.”³²³ “If you run a social media feed through Adobe Sensei, it will tag places your brand is pictured — even if it’s not mentioned or tagged — allowing you to see what is trending,” explains the Enterprise Content Team.³²³

As any marketer can tell you, locating an image is simply step one in a multi-step process.³²³ Unless, that is, you’re using AI.³²³ With products like Adobe’s Deep Cutout, designers “can automatically remove an image’s background and replace it with one that fits the brand guidelines.”³²³ Soon, designers will “be able to mask out an area such as a highway, and in just a few clicks, see what it looks like with a river, neighborhood, or other background — completely reinventing the photo in seconds.”³²³

Auto Crop is another Adobe tool that can automate the cropping and sizing of images for different aspect ratios. The Enterprise Content Team gives the example of a shoe manufacturer who “may have guidelines that require only the shoe be shown, so they can automatically have all photos cropped accordingly.”³²³

The AI can be trained on image aesthetics as well, so it automatically selects the best image and rejects anything that is below a certain quality standard and/or criteria.³²³

Time savings in any one of these areas could be quite substantial, but combined together, the velocity of creating and delivering content gets faster and faster.³²³ Adobe argues that the real power of this technology comes from creating custom

workflows that allow brands to search, mask, crop, and publish in a fraction of the time it took in the past.³²³

For brands creating international marketing campaigns, this type of custom workflow can eliminate or reduce “the tedious, manual work involved in creating all of the different assets.”³²³ It allows brands to scale their campaigns to as many countries as needed.³²³ When a “designer uploads a file to Adobe Creative Cloud, a custom workflow kicks off a series of Adobe Sensei Content AI Services that expedites the entire process from tagging, to cropping, to delivery of your production-ready asset to Adobe Experience Manager.”³²³ Adobe claims all of this can happen in a matter of hours instead of days.³²³ Once again, creatives are allowed to focus on being creative, a place they would, undoubtedly, prefer to be anyway.

When this type of AI is coupled with a brand’s content and audience data, its value increases exponentially.³²³ “When you can combine what you know about the image with what you know about the customer from online and offline behaviors, you can micro-target customers with content that is truly relevant,” says Richard Curtis, principal solutions consultant for Adobe.³²³ “Furthermore, the machine will continue to learn customer patterns that help you fine-tune your personalization even further.”³²³ As Richard notes, “More personalization leads to more clicks,”³²³ to say nothing of stronger brand loyalty bonds.³²³

According to Adobe’s *Indelible content, incredible experiences*⁸⁴ article, the Adobe Enterprise Content team says that, “marketers are competing with brands that lure their customers not only with products and services, but also with individual experiences. And they’re setting some healthy expectations, from recommending a film that customers will love, including a personal treat in their orders.”

“To meet those expectations, marketers need to develop a steady flow of compelling content. You start the content journey with ideas and concepts, then create and manage assets, deliver and personalise experiences and finally analyse performance,” says the Adobe Enterprise Content team.⁸⁴ “And you need to do all of this fast enough for the experiences to adapt instantly to every channel and screen your customer may use. The goal is achieving what McKinsey calls marketing’s holy grail: digital personalization at scale.”⁸⁴

Machine learning is quickly becoming the “go-to tool to help marketers connect content with data and analytics, everywhere from lead scoring and retargeting to personalization and segmentation.” According to the Adobe Enterprise Content team, the following three ways can make content more potent⁸⁴:

1. Automate tedious tasks: “The complex, data-driven tasks that once only humans could perform are now in the realm of machines. They can easily and accurately handle repetitive tasks in specific contexts,

like categorizing or scheduling, and can free humans for more value-added activities.”⁸⁴

2. Gain insights from big data: “Humans can’t readily process massive amounts of data. Computers can. They can analyze big data — even unstructured data — to discover patterns, trends, and associations, and then offer actionable insights.”⁸⁴
3. Improve prediction accuracy: “Not only can computers analyze data, they can learn from it. And the more data they have, the savvier they become at making on-target recommendations and predictions.”⁸⁴

“Creating authentic one-to-one experiences requires extensive resources and an investment that your budget may not support. Even if you’re flush with cash, you can’t scale manually — you simply cannot hire that many people or analyse such vast datasets,” warns the Adobe Enterprise Content team.⁸⁴ The solution lies at the intersection of content marketing and AI — content intelligence.”⁸⁴

With machine learning, software can analyse images imported into an editor “to detect facial features, similar images and even which way the subject is looking,” claims the Adobe Enterprise Content team.⁸⁴ A designer can swap out images in real time to quickly preview as many options as a client might want to see.⁸⁴ If it doesn’t look quite right, no problem, the editor can go back to any point in the process and see how a different decision — perhaps a young couple in a mortgage ad look excitedly at each other rather than at their new home — and then judge how it impacts the emotional experience of the ad.⁸⁴

“AI can serve as your creative assistant, quickly assembling suggested content for audiences at every touchpoint and even optimizing it, so the burden’s not on you. If your AI application supports voice recognition, you can even tell your assistant what you want — like making the mountains disappear in a climbing shot to focus on the gear,” explains the Adobe Enterprise Content team.⁸⁴

“You want one place where everyone — marketers, creatives and outside agencies — can find approved images and video to ensure experiences will remain consistent across channels,” advises the Adobe Enterprise Content team.⁸⁴ “But manually tagging images with descriptive and contextual metadata is tedious, inconsistent and often incomplete. It’s the type of job where machines excel. AI-powered smart tags automatically provide consistent, content-based metadata in seconds — saving you hours,” they claim.⁸⁴ As Adobe’s Senior Product Marketing Manager Elliot Sedegah succinctly puts it, “Computers will not complain about having to add metadata, they will not try to avoid it and they will work just as hard on the hundred thousandth image as on the first.”⁸⁴

Adobe allows for personalised customer treatment as well. “You can introduce as many experience variations as you choose for your digital properties to personalise customer experiences. By evaluating all behavioural and contextual

variables, machine learning can determine the best experience for each consumer — regardless of channel, device or screen. As machine learning learns what works with each customer, predictive analytics can tell you what each one wants to see and buy — so you'll know whether they'll be excited by the image of the hotel on the island beach in Phuket or the snowy slopes at Whistler."⁸⁴

"Just as a doctor must address each patient's issues and concerns, you must appreciate each customer's needs and desires," argues the Adobe Enterprise Content team.⁸⁴ Meeting the expectations of each customer calls for new tools, "You can't win in the digital era with industrial-age technology," Adobe claims.⁸⁴ Integrating AI will help brands "deliver the truly surprising and delightful experiences that keep customers feeling on top of the world," promises the Adobe Enterprise Content team.⁸⁴

Measurement

In her article *Future of Advertising: Automated, Personalized, and Measurable*³²⁶, Giselle Abramovich details an Adobe Think Tank panel discussion at Advertising Week 2017, in which "Phil Gaughran, U.S. chief integration officer at agency McGarryBowen, made a bold prediction: By 2022, he said, 80% of the advertising process will be automated, 'a threshold that will never be surpassed.'" The remaining 20%, Gaughran claims, "will comprise such elements as brand value, storytelling, and other more experiential tactics that will always need a human driver."³²⁶

According to Gaughran, this means a "changing job description in terms of what it means to work in advertising, unlocking a huge well of opportunity for advertisers."³²⁶ "He reminded the audience that data doesn't deliver insights — people do."³²⁶ "The more automated we become, the more we need humanity," he said.³²⁶ Keith Eadie, VP of Adobe Advertising Cloud, agreed, "adding that as automation becomes mainstream, the big differentiator for brands will be human insight and creativity."³²⁶ "Brands will always need human capital to innovate," Eadie argued.³²⁶

"Measurement, the panelists agreed, is a huge topic in advertising today, and one that's growing in importance as more advertising becomes measurable," says Abramovich.³²⁶ One big hurdle to measurement is the concept of the "walled gardens" and the dark social of Facebook, Instagram, WeChat, and Google, which, according to Eadie, "have scaled media properties and tons of data, but the data and its ability to be activated stays within these platforms."³²⁶ However, Eadie believes these walls "will start to come down in as little as five years, as Facebook and Google gear up to compete against newer entrants."³²⁶ Time to plan for this change is now.

"Amazon is a rising walled garden, and this rise will mean a new set of

competition to the media landscape,” says Eadie.³²⁶ “If companies can’t get a sense of which garden is most impactful, they will move dollars to the platforms that do provide understanding of impact.”³²⁶ Facebook has proven to be very accommodating in this area any time advertisers are willing to put money on the table. This is a scenario that will not be ending any time soon, no matter how much privacy trouble Facebook gets into.

Will Warren, EVP, digital investment, at Zenith Optimedia, argues that measurement has improved with the onset of automation, because it allows companies to have a single view of their media, not just a single view of their customer.³²⁶ “Further digitization will allow more user level data, and we can tie that to an outcome,” he says.³²⁶ “[Automation essentially brings] multitouch attribution across the digital landscape. Consolidated ad buying means better measurement.”³²⁶

Jill Cress, National Geographic CMO, “believes the current state of measurement is more about ‘measure what you can’ than ‘measure what you need to measure.’”³²⁶ “Today, [advertisers] are focused a lot on the vanity metrics, like views, impressions, and clicks. But we need to figure out how far down the funnel these things are taking people,” she says. “We feel like we are at a moment where we will see an ambition and a shift to emotional connection and the psychology of the consumer. That’s how brands will differentiate.”³²⁶

Another panelist, Aubrey Flynn, SVP and chief digital officer of REVOLT TV & Media, believes Millennials and Gen Z not only want purpose in their lives, but they want the brands they use to share that purpose.³²⁶ “To understand each person’s individual purpose, brands need to move away from demographics and get closer to psychographics,” says Flynn.³²⁶ “In order to know people on an intimate level, companies will likely start investing in the study of human behavior to find authentic ways of personalizing experiences,” explains Abramovich.³²⁶

Today, Facebook is far, far down the psychographics road. Although Facebook and the now defunct Cambridge Analytica got into a lot of trouble by harvesting Facebook data to sway political elections, the lessons and tactics learnt during the turbulent year of 2016 are far too powerful to be ignored by future advertisers. There is a way to utilize Facebook data that is either considerate of privacy concerns or anonymized all-together and advertisers are currently salivating at the prospect of getting their hands on all that incredibly important psychographic detail.

Flynn believes that authenticity also is key when it comes to advertising to the Millennial and Gen Z demographic.³²⁶ “We market a lifestyle, and bringing that to life means different things to different people,” she says.³²⁶ “Telling people about your company is one thing, she adds, but empowering audiences to successfully pursue the purposes that are important to them is a totally different

type of engagement.”³²⁶ As companies learn about the drives and motivations of their customers, personalization will be key.³²⁶

“Most of the solutions to measure emotions are in beta, so it’s still the early stages,” says Abramovich. However, “the ability to understand not only how long someone engaged with an ad for but also how it made them feel is going to give advertisers an unprecedented understanding of the effectiveness of their ads,” concludes Abramovich.³²⁶

Geofencing Applications

Today, most smart phones have geofencing capabilities that tap into GPS or RFID technology to define geographical boundaries. Basically, geofencing programs allow an administrator to set up triggers — usually SMS push notifications or email alerts — so when a device crosses a “geofence” and enters or exits a set area, a user is notified. Applications such as Facebook, Foursquare and China’s WeChat and Jiebang use geofencing to locate users, as well as help users find their friends and/or check into physical places.

As TechTarget explains, geofencing has many uses, including³²⁷:

- Mobile Device Management — When a host’s tablet PC leaves the hotelier property an administrator receives a notification so the device can be disabled.
- Fleet management — When a truck driver breaks from his route, the dispatcher receives an alert.
- Human resource management — An employee smart card will send an alert to security if an employee attempts to enter an unauthorized area.
- Compliance management — Network logs record geofence crossings to document the proper use of devices and their compliance with established rules.
- Marketing — A retail business can trigger a text message to an opted-in customer when the customer enters a defined geographical area.
- Asset management — An RFID tag on a pallet can send an alert if the pallet is removed from the warehouse without authorization.

With geofencing applications, “users can also offer peer reviews of locations, which add a layer of user-generated content. In exchange for loyalty, more and more businesses — from local hoteliers to larger organizations like Bravo TV, Starbucks and The History Channel — are offering coupons, discounts, free goods and marketing materials.”³²⁸

As users continue to enter personal details as well as update and check-in to their locations, geofencing applications like Foursquare can “collect a historical view of consumer habits and preferences and, over time, possibly recommend a

much larger variety of targeted marketing materials in real time — as a consumer walks into a store to look for a specific item or service.”³²⁸

In their paper *On the Potential Use of Mobile Positioning Technologies in Indoor Environments*³²⁹, Giaglis et al. claim there are six different types of service uses for mobile positioning technology (see Table 10). Geofencing applications (aka Location Based Services (LBS)) like Jiebang and Foursquare are useful services for hotel and hotelier marketers as well. Macau hoteliers, specifically, should be exploiting this medium because of its high concentration of mobile subscribers.³³⁰

SERVICES	EXAMPLES	ACCURACY NEEDS	APPLICATION ENVIRONMENT
EMERGENCY SERVICES	Emergency calls	Medium to High	Indoor/outdoor
	Automotive Assistance	Medium	Outdoor
NAVIGATION SERVICES	Traffic Management	High	Outdoor
	Indoor Routing	Medium	Outdoor
	Group Management	Low to Medium	Indoor
INFORMATION SERVICES	Travel Services	Medium to High	Outdoor
	Mobile Yellow Pages	Medium	Outdoor
	Infotainment Services	Medium to High	Outdoor
MARKETING SERVICES	Banners, Alerts, Advertisements	Medium to High	Outdoor
TRACKING SERVICES	People Tracking	High	Indoor/Outdoor
	Vehicle Tracking	Low	Outdoor
	Personnel Tracking	Medium	Outdoor
	Product Tracking	High	Indoor
BILLING SERVICES	Location-sensitive billing	Low to Medium	Indoor/Outdoor

Table 10: Taxonomy of mobile location services

Source: Durlacher Research

In his article *LBS Opportunities for Casino Marketers in Macau*³³⁰, Chris Weiners offers the following ideas for casino operators to get their LBS promotions rolling:

1. Pick your LBS service and claim your location.
2. Offer tips to customers via LBS.
3. Reward loyalty creatively. Start by offering your most loyal customers rewards, special access, and other promotions. Those that become your “Mayor” — or any other significant title — should be rewarded for their loyalty. This is a great way to identify potential social influencers and utilize them to further promote your venue.
4. Reward new customers: First time check-ins should receive special promotions or incentives as it is important to give people a reason to continuously check in to your establishment.
5. Understand who your loyal customers are online, and work with them. Develop a plan to utilize these ‘influencers’ and tap into their social networks. “Casinos do it offline all of the time; develop a similar approach for high-valued customers online through social connections. Encourage your followers to promote their checked-in status to their friends via social networks and micro blogs like Sina and Twitter.”³³⁰
6. Promote your services both on- and off-line.

In May of 2013, Lighthouse Signal Systems launched its indoor positioning system as an open service for Android app developers.³³¹ Developers can use the technology to create Android apps that will help users find their way through the vast indoor terrain of Las Vegas’ hotels and casinos.³³¹

Although global positioning systems have made outdoor navigation as simple as following directions on a mobile device, indoor navigation isn’t so simple, it is actually one of the last major hurdles that smartphones have yet to truly conquer.³³¹ However, Cambridge, Mass.-based Lighthouse Signal Systems has launched a service that covers 20 million square feet of entertainment and retail space at leading casinos and hotels on the Las Vegas Strip.³³¹

Lighthouse is “making its service freely available to Android app developers, resort operators, hoteliers, and others seeking to enhance the visitor experience in Las Vegas. Indoor navigation is the Holy Grail for the mobile industry, and Lighthouse says it is the first to provide GPS-like indoor positioning on a wide scale in a major U.S. metro.”³³¹

“We are excited to support app developer partners as they create new mobile experiences with indoor positioning in Las Vegas, where large resort interiors have traditionally presented a vexing challenge for visitors,” said Lighthouse co-founder Parviz Parvizi.³³¹

The standard line is that casinos create circular floors that differ little from whichever direction you enter or exit them so that patrons will get lost on them

and, therefore spend more money at the casino's tables and slots, but times are changing. Casino operators now recognize the importance of getting their gamblers in front of their preferred gaming table or slot machine as quickly as possible.

A line stretching out the door at the entrance of a casino in Singapore (because every guest's passport must be checked to ensure a Singapore local isn't attempting to slip in without paying the local's entrance fee) means minutes of lost gaming time per person, which can add up to thousands of dollars of lost revenue per day.

Giving a gambler direction to his favorite slot machine bank or preferred baccarat table could mean, at minimum, decreasing a player's frustration at not being able to find what he or she is looking for or, at best, increasing gaming floor revenue by increasing the gaming handle.

"Providing location-based services does not really reduce how much time people spend at the resorts but instead has the potential to enhance the overall experience," said Parviz Parvizi.³³¹ "From a resort owner perspective, the time that a visitor spends wandering around being lost is a wasted opportunity that could be better and more profitably spent on gaming or entertainment."³³¹

The truly massive nature of today's integrated resorts also means helping people navigate through them as quickly as possible will cut down on property wear and tear. Moving twenty thousand people quickly and efficiently through the halls of an integrated resort will help reduce wear and tear on things like carpets, elevators, escalators, toilets, etc., thereby reducing operational costs for the property quite substantially.

Lighthouse's platform "includes indoor geofencing: a hosting platform for location-based offers and user analytics."³³¹ The apps include user opt-in agreements and developers cannot use the service to track mobile phone users without user consent.³³¹

The technology uses "a combination of WiFi fingerprinting and sensor data. As long as there are WiFi networks in the area, Lighthouse can provide positioning info."³³¹ Google, Cisco, Ekahau, Euclid, Shopkick, PointInside, Aisle411, Sensionlab, Indoor.rs, Yfind, and CSR are all developing similar systems.³³¹

Mobile marketing in general and OTT, MMS and SMS marketing in particular can help hoteliers create a one-to-one, two-way interactive experience with its patrons. These channels are not just about sending out a simple message, but rather they are about starting a customer relationship that can be analyzed so that the hotelier has a 360-degree understanding of its patron. It is an understanding that includes his or her wants, desires and needs.

Perhaps one of the best uses of location-based services is in the Meetings, Incentive, Conferencing and Exhibition (MICE) space. The massive size of some

integrated resorts exhibition halls can make finding a particular booth or floor section a daunting proposition. Indoor mobile communication technology with location awareness technology can help conference-goers navigate a vast conference floor.³²⁹ Also, before arriving at a conference, a mobile user would be able to register his personal preferences and, once he enters the exhibition hall, a route map would be sent to his or her mobile phone. Vendor appointments could even be set up so that they are located near each other so that the conference-goer wouldn't have to run around frantically trying to make meetings that are spread out all over the convention floor.³²⁹

Besides geo-fencing applications, social media channels like Facebook, Instagram, Twitter, WeChat, as well as many others can reveal a patron's location. Instagram tracks a user's photos even if he or she doesn't geo-tag them. As Cadie Thompson warns in her article *Social media apps are tracking your location in shocking detail*³³², "While the picture sharing app does give users the option to name the location of where they are uploading an image, it also geotags an uploaded pic regardless if the user has selected the 'Add to Photo Map' function."³³²

Foursquare's check-in app Swarm also broadcasts users' location even if they have not selected a specific location for check-in.³³² Many live-streaming apps like Periscope, YouTube, and several Chinese ones will also show the location of the user and this is information that can be utilized by an hotel's marketing department if it can exploit the information quickly enough.

Check-ins and geo-posts from sites like Foursquare, WeChat, Instagram, Facebook, WhatsApp, YouTube, as well as a whole host of other social networks can help hotel operators connect with a nearby audience. Underlying these check-ins is a treasure-trove of collected data.

As Aaron Gell explains in his *New Yorker* article *The Not-so-Surprising Survival of Foursquare*³³³, "Foursquare's stockpile of location-data breadcrumbs has allowed the company to steadily augment its map of the world, and to test the fuzzy signals it receives from users' phones (the service gleans from G.P.S., Wi-Fi, and Bluetooth, and from other markers) against the eleven billion definitive check-ins provided by its users over the past seven years."

"According to Mike Boland, a chief analyst at the market-research firm BIA/Kelsey, Foursquare can now pinpoint a phone's location with an accuracy that matches, and may in some cases surpass, that of much larger rivals," notes Gell.³³³ "Facebook has a much larger sample of data points," Bolands says, but "Foursquare has more accurate and reliable data."³³³ Foursquare claims its map now "includes more than a hundred million locations, many of them in tightly crowded areas, like office buildings and malls, that other services still struggle to identify."³³³ "The accuracy of Foursquare's *Places* database has led more than a hundred thousand other apps and developers — including Snapchat, Twitter,

Pinterest, Uber, and Microsoft — to use its application programming interface (API) to power their own features,” notes Gell.³³³

Foursquare in particular is taking this foot-traffic data very seriously. On March 20, 2017, the social network announced a new service, *Foursquare Analytics*, a foot-traffic dashboard for brands and retailers.³³⁴ The platform was made available to retailers with any number of stores, no matter how small.³³⁴ With the service, retailers could “use the dashboard to see foot-traffic data across metrics like gender, age and new versus returning customers — on a national or citywide scale.”³³⁴ “Retailers can also compare their foot traffic against a set of competitors and their category as a whole,” adds Tepper.³³⁴

“The data is collected via Foursquare’s existing database of locations (which powers more than 100,000 apps, including Snapchat), as well as anonymized in-store-visit data collected from users of Swarm and Foursquare who have opted in to always-on location sharing. Foursquare then normalizes this data to make sure it accurately represents the U.S. population as a whole,” explains Tepper.³³⁴

If you want to see where the future of location analytics might be headed, Foursquare’s ‘Hypertrending’ application, which was rolled out at SXSW 2019, would be a good place to start. As Dennis Crowley, executive chairman of Foursquare, explains in his company blob *Introducing Hypertrending, Where 10 Years of Foursquare Has Led Us*³³⁵:

“Hypertrending is a top-down view of all the places and phones that Foursquare knows about in Austin. The ‘Map’ view gives you a real-time look at how people are spread throughout the city — each dot represents a different place, the size of each dot corresponds to the number of people at each place, and each color represents a different type of place. If you see it on the map, you’re seeing it live. The ‘Top 100’ view charts places and events as they trend up or down in busy-ness (based on the number of phones inside those places) while the up/down arrows represent whether that place or event has become more or less busy in the past 30 minutes.”

Hypertrending is powered by Foursquare’s “Pilgrim” technology, which allows Foursquare to understand how phones move in and out of more than 100 million places around the world.³³⁵ The data in Hypertrending comes from Foursquare’s “first-party panel” — “a mix of data from our own apps and other apps that use our technology.”³³⁵ As all the data flowing through Hypertrending is anonymized and aggregated, Crowley claims that, “Hypertrending lets you see the movement of the panel population as a whole, without showing you anything about any of the individuals in the panel.”³³⁵

“Foursquare’s approach to analytics focuses on visits (not location trails), and aggregated and anonymized data (not individuals’ location data),” states

Crowley.³³⁵ “Hypertrending only sees phones that are stopped at a specific place (e.g. the convention center, the bar at the Driskill Hotel, Lamberts BBQ), so the map won’t show people walking, driving, or otherwise in-between places,” explains Crowley.³³⁵ Foursquare also filtered out stops at what it calls ‘sensitive’ areas, like homes or apartments, religious centers, divorce lawyers’ offices, etc.³³⁵ This means users won’t see these types of places on Hypertrending either.³³⁵

Foursquare only released Hypertrending during SXSW 2019 and hoped the demo would pique the interest of developers and entrepreneurs, as well as inspire them to build things with the tool.³³⁵ As Crowley explains, “Building city guides and data viz comes naturally to us — but we want to see what the urban planners, the game developers, the folks innovating with AR, etc. would do with a Hypertrending-esque data set.”³³⁵

Going Viral

In their paper *Two Hearts in three-quarter time: How to waltz the social media/viral marketing dance*⁵⁸, Kaplan and Haenlein put forth the six steps of what they call “waltzing the social media/viral marketing dance”⁵⁸:

- One. . . way: Viral marketing goes social media.
- Two. . . concepts: Word-of-mouth and viral marketing.
- Three. . . conditions: How to create an epidemic.
- Four. . . groups: Social media viral marketing campaigns.
- Five. . . pieces of advice: Spreading the virus.
- Six. . . degrees of separation: From epidemics to immunity.

Kaplan and Haenlein reference one of humanity’s worse pandemics to explain how potent social media virality can be⁵⁸:

“The bubonic plague, also referred to as the Black Death, is widely considered to be the deadliest pandemic in human history. Between 1348 and 1350 it killed more than 35 million people across Europe, corresponding to approximately 50,000 lives lost per day. Yet, as compared to more recent epidemics, these figures seem modest; according to the U.S. Center for Disease Control and Prevention (2010), approximately 60 million Americans contracted the H1N1 virus between April 2009 and April 2010 — more than 150,000 per day! Although only 265,000 were actually hospitalized and 12,000 perished, many of us won’t soon forget the panic surrounding this ‘swine flu.’ Now, consider an epidemic of another sort. On July 14, 2010, Procter & Gamble uploaded a 30-second video spot via the social media application YouTube, to promote its Old Spice

brand. This video, entitled The Man Your Man Could Smell Like, was viewed 23 million times in 36 hours — representing 15 million ‘infections’ per day. If H1N1 had spread with the same rapidity, 60 million infections would have been reached after less than a week, and the 35 million casualties of the Black Death would have taken no more time than a long weekend.”

Kaplan and Haenlein admit that “watching an online video is certainly not comparable to getting infected by a potentially deadly disease. Nevertheless, these numbers illustrate the incredible speed with which so-called ‘viral marketing campaigns’ can spread at a time when social media start to rule the world”⁵⁴ Kaplan and Haenlein believe that, “Viral marketing allows firms to promote their products and services with very low budgets and still reach the same levels of awareness that are usually only achievable with high-frequency TV advertising.”⁵⁸

Through clever viral marketing low budget horror flicks like *The Blair Witch Project* and *Paranormal Activity* became blockbusters.⁵⁸ Kaplan and Haenlein note that, “Brands such as Evian (Roller-Skating Babies), Burger King (Subservient Chicken), and Old Spice have all benefited from viral marketing epidemics, while JetBlue, Heinz Ketchup, and others have suffered severely at the same hands.”⁵⁸

According to Wikipedia, word-of-mouth marketing (WOMM, WOM marketing) “differs from naturally occurring word of mouth, in that it is actively influenced or encouraged by organizations (e.g. ‘seeding’ a message in a networks rewarding regular consumers to engage in WOM, employing WOM ‘agents’).”³³⁶ While it is difficult to truly control WOM, research³³⁷ has shown that there are three generic avenues to ‘manage’ WOM for the purpose of WOMM:

1. Build a strong WOM foundation (e.g. sufficient levels of satisfaction, trust and commitment).³³⁷
2. WOMM management which implies that managers only have a moderate amount of control (e.g. controversial advertising, teaser campaigns, customer membership clubs).³³⁷
3. Direct WOMM management, which has higher levels of control (e.g. paid WOM ‘agents’, “friend get friend” schemes).³³⁷

WoM has been shown to substantially influence consumer attitudes and behaviors, and to be up to seven times more effective than traditional print advertising in impacting brand switching decisions.³³⁸ Kaplan and Haenlein concede that, “Despite what one might initially think, WoM is not a purely altruistic behavior: it offers advantages to the sender, as well as the receiver.”⁵⁸ For senders, WoM is an opportunity to help others and to improve their self-confidence in doing so.³³⁹ ³⁴⁰ For receivers, it reduces decision-making time as well as risk³⁴¹, as friends tend to be perceived as unbiased sources of information.³⁴⁰

According to academic research and Jonah Berger's bestselling book *Contagious: Why Things Catch On*³⁴², there are six key factors that drive what people talk about and, ultimately, share. They are organized in an acronym called STEPPS, which stands for:

- Social Currency – the better something makes people look, the more likely they will be to share it.³⁴³
- Triggers – things that are top of mind (i.e., accessible) are more likely to be tip of tongue.³⁴⁴
- Emotion – when we care, we share. High arousal emotions increase sharing.³⁴³
- Public – the easier something is to see the more likely people are to imitate it.³⁴⁴
- Practical Value – people share useful information to help others.³⁴²
- Stories – Trojan Horse stories carry messages and ideas along for the ride.³⁴²

“Similar to traditional WoM, electronic WoM — such as book reviews exchanged on pages like Amazon.com — has been shown to influence purchase behavior³⁴⁵ and to lead to the acquisition of higher value customers,³⁴⁶” claim Kaplan and Haenlein.⁵⁸ This presents interesting managerial implications, as the inherent anonymity of online feedback mechanisms can make such platforms subject to strategic manipulations by companies which would like to increase their sales through favorable comments.^{347 348}

Electronic WoM exchanged via newsgroups and the like are easily collected and analytics for marketing research purposes.³⁴⁹ Kaplan and Haenlein believe that, “This approach, which is referred to in the literature as netnography³⁵⁰, can lead to valuable insights due to its ability to observe consumers in an unobtrusive way.”⁵⁸

According to Kaplan and Haenlein, when compared to traditional WoM, electronic WoM has two main advantages; the first is a higher diffusion speed for new pieces of information and the second is the fact that electronic WoM is substantially easier to monitor than traditional WoM.⁵⁸ “When WoM is exchanged using traditional face-to-face communication, diffusion is limited by the size of the social network each individual maintains,” claim Kaplan and Haelein.⁵⁸ Given that, on average, people have only three close friends³⁵¹, and a total social network of no more than 150³⁵², “chains of WoM communication and customer referrals tend to die out quickly.”⁵⁸ Unlike the limitations of personal communication, “WoM exchanged electronically can reach a much larger group of other customers.”⁵⁸ Because WoM is so easily monitored, calculating an ROI on marketing measures should be effortless.

Kaplan & Haenlein define viral marketing as “electronic word-of-mouth whereby some form of marketing message related to a company, brand, or product is

transmitted in an exponentially growing way, often through the use of social media applications.”⁵⁸ Viral marketing’s two defining elements; “a growth, or reproduction, rate greater than one; this implies that each receiver passes the message to more than one other person.”⁵⁸ “For example, when initially seeded to one person, a viral marketing message with a reproduction rate of two would be transferred to 2, 4, 8, 16, 32, 64 (et cetera) new people in the following periods.”⁵⁸ If the reproduction rate exceeds one, the resulting growth pattern goes exponential.⁵⁸ This pattern can be observed in “business (e.g., compound interest), physics (e.g., nuclear chain reactions), biology (e.g., bacterial growth), and epidemiology (e.g., spread of a virus).”⁵⁸

Kaplan and Haenlein state that, “The second characteristic usually associated with viral marketing is use of social media applications.”⁵⁸ Social media can be defined as “a group of Internet based applications that build on the ideological and technological foundations of Web 2.0, and that allow the creation and exchange of User Generated Content.”⁵⁴ As Kaplan & Haenlein note, Web 2.0 “is an umbrella term describing different types of applications such as collaborative projects (e.g., Wikipedia), blogs/micro-blogs (e.g., Twitter), content communities (e.g., YouTube), social networking sites (e.g., Facebook), virtual game worlds (e.g., World of Warcraft), and virtual social worlds (e.g., Second Life).”⁵⁴ “Social media applications are particularly suited for viral marketing, as the community element embedded in them makes it convenient to transmit the marketing message to a large group of people,” argue Kaplan & Haenlein.⁵⁴ Some researchers therefore use the terms ‘viral marketing’ and ‘social media marketing’ interchangeably.³⁵³

Viral marketing is a powerful but quite recent phenomenon. The literature review includes a variety of different terminologies such as word-of-mouth³⁵⁴, buzz marketing³⁵⁵, stealth marketing³⁵⁶, and word-of-mouth marketing³⁵³. The term ‘viral marketing’ was borne of an article written by Harvard Business School’s Jeffrey Rayport.³⁵⁷ Published in the business magazine *Fast Company*, “The Virus of Marketing” “makes reference to the exponential growth pattern inherent in viral marketing by comparing diffusion of the marketing message with the spread of a virus.”⁵⁸ “Successful viral marketing should lead to a growth pattern similar to major epidemics such as the Black Death in the 14th century, Spanish Flu in the 20th century, and Swine Flu in the 21st Century,” say Kaplan & Haenlein.⁵⁸ Unlike infectious viruses that cause disease, the more resistant and durable a viral marketing virus is, the better!⁵⁸

For a marketing message to go viral, Kaplan & Haenlein believe three basic criteria must be met: the message has to be memorable, the right people need to get the right message under the right circumstances, and the environment for the acceptance of the message has to be right.⁵⁸

“The first critical element in creating a viral marketing epidemic entails finding the right people to spread the message,” claim Kaplan & Haenlein.⁵⁸ Consistent

with classical laws of concentration and the Pareto Principle, “20% of messengers can be expected to carry 80% of the load; it is, therefore, especially crucial to select wisely the initial hosts for the epidemic.”⁵⁸ “Three groups of messengers are required to ensure the transformation of an ordinary message into a viral phenomenon: market mavens, social hubs, and salespeople.”⁵⁸

For Feick and Price, “Market mavens are defined as individuals who have access to a large amount of marketplace information, and proactively engage in discussions with other consumers to diffuse and spread this information.”³⁵⁸ As individuals in tune with the cultural zeitgeist, “market mavens are typically among the first to receive the message and transmit it to their immediate social network.”⁵⁸

“Once a market maven hands over the message to a social hub, a viral epidemic has begun,” claim Kaplan & Haenlein.⁵⁸ Social hubs are defined as people with an exceptionally large number of social connections.³⁵⁹ “They often know hundreds of different people and have the ability to serve as connectors or bridges between different subcultures. The exceptional social network of social hubs can facilitate immediate transmission of the message to hundreds, if not thousands, of other consumers.”⁵⁸

For Kaplan and Haenlein, sometimes a “direct link between a market maven and a social hub is just not enough.”⁵⁸ “While market mavens may know the message earlier than others, they might not be particularly convincing in transmitting the information.”⁵⁸ “In this case, salespeople could be needed to receive the message from the market maven, amplify it by making it more relevant and persuasive, and then transmit it to the social hub for further distribution.”⁵⁸

Regarding the message, “Even the most perfect combination of market mavens, social hubs, and salespeople is of limited value when the news itself is not adapted to become viral. Only messages that are both memorable and sufficiently interesting to be passed on to others have the potential to spur a viral marketing phenomenon.”⁵⁸

“Making a message more memorable and interesting, or simply more infectious, is often not a matter of major changes but minor adjustments,” suggest Kaplan and Haenlein.⁵⁸ “One option is to rely on true stories about real people (‘My brother has a friend, John Doe...’), which are often more persuasive than corporate advertising, recommend Kaplan and Haenlein.⁵⁸

Kamins, Folkes, & Perner recommend “using rumors, especially positive ones that reflect well on the person telling them, as they have a particularly high chance of being transmitted to others.”³⁶⁰ Dobele et al. recommend “obvious safe bets like practical short lists (e.g., ‘The ten best ways to lose weight’), humorous or even hilarious messages, and sex.”³⁶¹ Dobele et al. believe messages with viral potential must trigger an emotional response in the receiver.³⁶¹ “Effective messages often contain an element of surprise, combined

with other emotions that can be either positive (e.g., joy) or negative (e.g., disgust, fear),” argue Kaplan and Haenlein.⁵⁸

So many pieces of the virality puzzle must come together at just the right time, through just the right channels, with just the right influencers that it’s almost impossible to predict virality. For this reason, marketers who try to make their content go viral should accept the fact that the process is highly unpredictable; everything that can be done to ensure a marketing campaign should be done, but virality is not easy to replicate so failure shouldn’t be viewed in as harsh a light as normal advertising campaign failures.

Besides getting the right message to the right people, two other environmental conditions — uniqueness and plain old good luck — make the difference between viral marketing success or failure.⁵⁸ “Messengers will only pass on the message when they think it’s not already something everyone knows about,” say Kaplan and Haenlein.⁵⁸ Companies often fail getting virality because they spread the initial message too broadly.⁵⁸ “Instead of concentrating on having as many seeds as possible, firms should instead focus on having an infectious message (leading to a high reproduction rate) and seeding it to many disconnected subcultures,” recommend Kaplan and Haenlein.⁵⁸

Some plain old good luck is also “needed to glue everything together, as it’s often just not the right time and/or place to launch a viral marketing campaign,” say Kaplan and Haenlein.⁵⁸ “This ambiguity makes viral marketing hard to understand for companies: actions which worked well in the past, or for one’s competitor, may simply be ineffective in a specific case.”⁵⁸

Kaplan and Haenlein offer up the example of a May 2009 Starbucks viral marketing campaign — “The coffee vendor encouraged its customers to take pictures of themselves in front of the company’s new billboards, and post the shots to the micro-blogging application, Twitter.”⁵⁸

At around the same time, “film producer and political activist Robert Greenwald saw this as a perfect opportunity for promoting his latest documentary about unfair labor practices at the coffee chain.”⁵⁸ he also asked people to take pictures of themselves, “but while holding signs criticizing the company’s practices.”⁵⁸ “Many responded to Greenwald’s calling, and soon about half the photos distributed on Twitter were very different from those initially intended by Starbucks,” explain Kaplan and Haenlein.⁵⁸

It’s unclear why things like this happen, it can be a vast mix of sociological, political, behavioral and/or a hundred other reasons. Sometimes, as Kaplan and Haenlein, plainly state, it’s just not your day!⁵⁸

Viral marketing campaigns emerge from an interaction between a firm and its customer base.⁵⁸ The initiator could be either the company or a group of its consumers.⁵⁸ Like any other marketing action, viral marketing campaigns can

obviously result in positive or negative reactions.⁵⁸ Kaplan and Haenlein argue that, “Combining these two dimensions results in four different types of viral marketing campaigns: nightmares, strokes-of-luck, homemade issues, and triumphs.”⁵⁸

Nightmares include the case of JetBlue Valentine’s Day 2007 promotion.⁵⁸ When a JetBlue flight from New York to Cancun was delayed on the tarmac due to a brutal ice storm, it took JetBlue nearly nine hours to defrost the plane, which resulted in a near-complete breakdown of JetBlue’s operations.⁵⁸ Thousands of flights had to be cancelled and hundreds delayed. Because of internal IT system problems, flight crews couldn’t be rescheduled.⁵⁸

Unsurprisingly, passengers were outraged, venting their anger on social media sites; blogs, micro-blogs (e.g., Twitter), vlogs and social networking sites (e.g., Facebook) filled up with torrid complaints.⁵⁸ The fury lasted several days and “JetBlue had to cancel nearly a quarter of all its flights the following weekend.”⁵⁸ “The impact of this incident was even more substantial because JetBlue had worked hard in the previous months to build a positive image and an excellent reputation,” note Kaplan and Haenlein.⁵⁸ “*Business Week* even wanted to crown the firm as one of four companies with the best customer service, and planned to promote this prominently on its cover page.”⁵⁸ Yet, due to the “‘worst operational week in JetBlue’s seven year history’”³⁶², the magazine balked at the last minute and replaced JetBlue with hotelier Nordstrom.⁵⁸

“On Monday, February 19, David Neeleman issued a public apology for the cancellations and sent a letter to the airline’s clients. Instead of trying to find excuses or to cover up the situation, he admitted that he was ‘humiliated and mortified’ by the systems failure, and expressed his deep regrets,” recounts Kaplan and Haenlein.⁵⁸ Falling on his sword and admitting guilt worked for Neeleman and JetBlue has thrived since.

Even though Kaplan and Haenlein believe that “Viral marketing is as much an art as it is a science,”⁵⁸ there are several ways of increasing the odds of going viral. There are some basic rules companies should follow when spreading a virus, including the following⁵⁸:

1. Viral marketing is only as good as the remaining marketing mix.
2. Viral marketing needs to be backed up by traditional forms of communication.
3. Excessive planning and intervention kill any viral marketing campaign.
4. Highly provocative and edgy messages are a tricky business.
5. Successful viral marketing requires a little bit of luck and gut feeling.

Despite all of viral marketing’s advantages, one has to be realistic.⁵⁸ Even the most endemic viral buzz won’t be able to sell a worthless product. “To reveal its true potential, viral marketing needs to be accompanied by changes in the rest of the marketing mix,” advise Kaplan and Haenlein. Consider Burger King’s

Subservient Chicken campaign for some inspiration.⁵⁸ “In 2004, Burger King launched a viral marketing epidemic around an interactive website (www.subservientchicken.com) where users could give commands to a human dressed in a chicken costume.”⁵⁸ The program instantly went viral, partly “because the advertising agency in charge of it also modified other major elements of the firm’s marketing mix.”⁵⁸ “According to CP+B President Jeff Hicks, the company redesigned most anything it could: from employee uniforms, to drive-through areas, to ketchup packets. Viral marketing might draw customers to stores, but they need convincing reasons to come back once the hype is over!”⁵⁸

Viral marketing buzz tends to die out quickly, and it usually doesn’t last longer than a couple of weeks at best.⁵⁸ Viral marketing is all about excitement, and nothing is as boring as yesterday’s news.⁵⁸ Kaplan and Haenlein argue that, “To maintain momentum, firms therefore need to complement viral marketing with more traditional forms of communication.”⁵⁸ A good example of this is Wilkinson’s *Fight for Kisses* advertisement.⁵⁸ “To support the launch of its newly-developed disposable razor, Quattro Titanium, the company relied on a viral marketing story about a baby fighting his father for kisses from the baby’s mother.”⁵⁸ This campaign consisted of an amusing “animated video and an interactive computer game, combined with a series of press announcements, radio spots, and sponsorship of the France — Ireland rugby match that took place during the same time period.”⁵⁸ Despite its limited US\$90,000 budget, “the campaign was a huge success and resulted in a five percentage point market share increase within the target group.”⁵⁸ “If all forces act in concert, they can indeed move mountains!” claim Kaplan and Haenlein.⁵⁸

As with all communication exercises, “viral marketing campaigns need to be carefully planned prior to their launch.”⁵⁸ Once unleashed, the virus is set free, and less control and/or intervention is preferable.⁵⁸ In particular, companies should never ask their customers to spread the virus if they are reluctant to do so.⁵⁸ A truly compelling viral marketing campaign stands on its own and develops its own dynamics.⁵⁸ A good case in point is Evian’s Roller-Skating Babies campaign, which has been crowned as the Guinness Book of Records most viewed advertising spot, with more than 45 million online views.⁵⁸ As Kaplan and Haenlein relay, “The company engaged in careful planning prior to launching the video by choosing the right topic (Evian already had an advertising campaign based on babies 10 years earlier), the right music (a remix of a 30-year-old rap song), and the right messengers. But once the virus had been unleashed, Evian limited its role to reacting to — instead of proactively influencing — the viral phenomenon.”⁵⁸ The reality is the job of the creator is to make a piece of advertising that can go viral, not helping it to go viral once it’s released. If the advert is good enough, the viewers will come.

Marketers should keep in mind that they must walk a fine line. “Good viral

marketing messages need to be both memorable and interesting.”⁵⁸ However, “firms must exercise caution and beware of using messages that are too provocative; there is often a very fine line between being provocative and being inappropriate.”⁵⁸

“Computer manufacturer Microsoft learned this the hard way during promotion of its Perfect Dark Zero game for the Xbox 360 platform,” explain Kaplan and Haenlein.⁵⁸ “In the context of a viral marketing campaign, users were invited to provide the name and email address of a person who Joanne Dark, the assassin within Perfect Dark Zero, should ‘take care’ of. This person subsequently received a message with a video, showing a body wearing a toe tag bearing the recipient’s name.”⁵⁸

Quite a provocative idea indeed, but way, way beyond the line of decency. As expected, most people who received the message reacted with either shock or disgust.⁵⁸ “Unless a company and brand want to be remembered for bad taste, they had better be careful with messages that are too edgy,” recommend Kaplan and Haenlein.⁵⁸

Executives should accept “that the transition between careful planning and viral marketing success is subject to ‘random’ noise and that failure is always a possibility, even with the best planning and best intentions.”⁵⁸ “What worked well yesterday, or is working well for the competition, does not necessarily guarantee success today,”⁵⁸ as Heinz Ketchup discovered to its consternation with one Pepto-Bismol campaign.⁵⁸

“In 2007, Procter & Gamble organized a highly successful video contest, Be the Next Pepto Star. Users were encouraged to create funny 60-second videos portraying the five symptoms aided by Pepto-Bismol (i.e., nausea, heartburn, indigestion, upset stomach, and diarrhea) and to upload them to YouTube,” say Kaplan and Haenlein.⁵⁸

Heinz Ketchup lazily tried to copy the campaign several years later, and the results were disastrous.⁵⁸ “People uploaded videos in which they used Heinz Ketchup as toothpaste or acne cream, and publicly accused the firm of looking for cheap labor to create ads,”⁵⁸ not a look any company wants.

One thing seems certain, conclude Kaplan and Haenlein, “viral marketing is still in the early stages of its life cycle. And, the tremendous potential it offers companies at very limited cost should make every executive think seriously about engaging in this new form of communication.”⁵⁸ However, careful planning and deep sincerity are two must-have ingredients to ensure a viral campaign has a chance for success.

Conclusion

Advertising has always been looked down upon, but today it is probably more important than ever. The Canadian humorist Stephen Leacock once described advertising as “the science of arresting the human intelligence long enough to get money from it.”³⁶³ The unfortunate reality is advertising is very much a necessary evil. Will Rogers, one of America’s greatest satirists, put it succinctly when he said, “One ad is worth more to a paper than forty editorials.” For hotels and IRs, which often must spend hundreds of millions of dollars to create massive and opulent properties, advertising is more than a necessary evil, it is an operational imperative.

More than ever before, AI allows marketers to reach consumers at every stage of the buying process based on their interests and demographics. In his article *How AI Will Change Marketing as We Know It*³⁶⁴, Amine Bentahar claims that, “One particular example of how AI increases the efficiency of marketing is by making it easier to put customers into distinct groups that will allow for added segmentation to highly targeted niches.” This means that, “Rather than creating one ad campaign that you hope will reach your target customers, marketers will instead be able to create more personalized, natural marketing content that will be unique for each targeted customer segment.”³⁶⁴

AI will also “allow for more truly data-driven marketing campaigns, where AI will allow data to be more properly used and integrated into each ad campaign.”³⁶⁴ The flip side of collecting as much data as a company possibly can is brands are collecting more data than they can actually use and here, too, AI can help by giving brands “the ability to seek out and identify patterns that will be beneficial for marketers in their campaigns.”³⁶⁴

From a content standpoint, AI can help brands keep track of what type of content consumers are most interested in, which is information that can then be used to curate a website for each individual user.³⁶⁴ This should help with customer conversions and should be a part of any brand customer personalization initiatives.

Overall, AI can help marketers “look at things through a broader, more big-picture lens.”³⁶⁴ Increased AI use won’t necessarily replace marketing teams, it will simply allow them to work proactively, as well as help them focus on big-picture decisions and strategies.³⁶⁴ Creatives will be allowed to be creative once again.

AI will unquestionably be changing the marketing world as we know it, but change can be good.³⁶⁴ “AI will allow marketers to create more educated, personalized campaigns to reach consumers, all while viewing their work through a big-picture focus that will allow them to be more creative. That is how the biggest gains possible will be captured through AI,” concludes Bentahar.³⁶⁴

Brands should recognize that there is a radical reorganization of platforms and delivery channels going on right now as well. All the major software, analytics, and tech vendors are looking at new ways to monetize their businesses and marketing is something they are focusing on. Besides Amazon, Microsoft, AT&T, AOL, Verizon, new players like Roku are getting into the direct advertising business. Even companies like the now publicly traded company Uber are getting into the ad business.

Is all of this advertising expense worth it? Well, Henry Ford, the inventor of the first mass produced car, felt it was not only necessary but imperative; “Stopping advertising to save money is like stopping your watch to save time,” he wrote. In the hotel business, I’d argue that it’s more imperative than most other industries because a hospitality company’s product – its rooms and services – differs little from one hotel company to another, even from one country to another.

The psychologist Stuart Henderson Britt put it in a more succinct way, “Doing business without advertising is like winking at a girl in the dark. You know what you are doing, but nobody else does.”³⁶⁵ Advertising is very much a seduction and I think we can all agree that advertising to someone who physically can’t see or respond to the advertising is a worthless endeavor.

The next chapter tackles social media in both a listening and social media marketing way. Chapter six is about IoT and operations, explaining how to add Hadoop and real-time processing to a hotelier’s IT systems. Chapter seven and eight bring everything together and details the exact way hoteliers and IRs can fully implement the solutions discussed here.

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CHAPTER FIVE: SOCIAL A.I.

Overview

The most important thing to recognize about social media is the fact that most social media content is user generated. Social networks provide all of the tools their members require to become content producers and social network members submit photos, videos, and other forms of multimedia as well as provide customer reviews, content for blogs and vlogs and links to other social networking websites that they find noteworthy.³⁶⁶ The content comes from the users themselves, not from the publishers, and this is an important distinction.³⁶⁶ The publisher supplies all of the necessary tools for the content's distribution, but it must remain at arm's length from the actual content to ensure the integrity's content.

Business.com's *Top Tools to Measure Your Social Media Success*³⁶⁷ states that there are five Ws that must be kept in mind when devising a social media strategy. These are:

1. Who within the company will be using this tool? Will one person or several people be using the tools, and will they be inside or outside the organization? Will the primary user be tech savvy or will he or she require an intuitive interface?
2. What key performance indicators (KPI) are to be measured with this tool? It is imperative to know how you are going to measure and benchmark your social media efforts as this will dictate what social media monitoring tools are the best to use. If sales revenue is a key KPI, businesses should invest in a tool that integrates with a CRM system to track impact.
3. Where on the web will the business be engaging customers, and where does it plan to monitor its social media conversations? If a business is only interested in tracking specific channels such as Facebook or Twitter, tools such as Facebook (obviously) and socialmention.com can help with the former, while Twazzup and TweetEffect can track the latter. All-encompassing tools that monitor new sites and forums are useful to monitor mentions from across the entire web.
4. When should the company be alerted of conversations and mentions within the social media sphere? Options here include general reporting dashboards or instant notifications via e-mail alerts or RSS feeds.
5. Why is the company engaging in social media? This is, perhaps, the most important question of all, and a hotel operator must decide whether it is turning to social media to manage its online brand reputation, to

engage its customers and/or potential customers, to provide real-time customer service, or simply to drive traffic to its website to influence SEO.

A company is only as strong as its weakest customer relationship and I believe that social media can help hotels reach their customers in highly efficient and, what can be extraordinarily affordable, ways. hotels should look to social media to help them in the following ways:

- Adding interactivity to a Website
- Brand and Anti-Brand management
- Brand loyalty enhancement
- Building fanbases
- Crisis management
- Developing a virtual social world presence
- Discovering a customer's psychological profile
- Discovering important brand trends
- Engaging customers and potential customers
- Harvesting customer feedback
- Influencer marketing
- Marketing to consumers
- Reputation management
- Social Shopping

Studies have shown that 80% of social media users prefer to connect with brands through Facebook and 43% of people prefer Pinterest over associating directly with retailers and/or brands.³⁶⁸ This fact alone should underscore the importance of social media in a business context.

One of the key demographic findings of the *2018 Adobe Digital Insights (ADI) State of Digital Advertising* report was that Millennials and Gen Zers differ from Generation X, Baby Boomers, and older generations in that, "social channels are where these generations see the most relevant content in their lives."⁷¹

According to Taylor Schreiner, "social advertising is clearly a key part of a paid/owned/earned media strategy, especially if your audience is under 40."⁷¹ This is a fact that businesses should keep in mind going forward as Millennials and Gen Zers are now reaching an age when they will have disposable income, as well as the desire to spend it.

Caesars is one gaming company that has been able to use social media to measure marketing data quite successfully. In his article *At Caesars, Digital Marketing Is No Crap Shoot*³⁶⁹, Al Urbanski explains that:

"While social media networks like Facebook provide metrics that measure activity within its platform, integrating that data to enable visibility across a brand's entire marketing

organization is difficult. Caesars, however, unites information from customers coming through social channels across business units, program teams, time zones, and languages. A content-building component allows Caesars' marketers to listen in and respond in real time."

No matter where the customer interaction originates, engagement is a key factor in moving those interactions from the top of the sales funnel to an eventual purchase.³⁶⁹ "It doesn't matter where customers come in or leave or reenter," says Chris Kahle, Caesars Web Analytics Manager, "if they come to your social page and click your button, or if they go into your content or email and click on that, it's all the same app and you've got them."³⁶⁹ Caesars IDs a cookie and if the prospects come back around on paid search three days later, Caesars tracks them.³⁶⁹ "We can track them on every website, even if they came in on a Las Vegas site and then jump markets to Atlantic City," adds Kahle.³⁶⁹

Caesars also tracks activity in real time, while responding to customer cues.³⁶⁹ Unsurprisingly, different types of customers are more responsive to different interactions from Caesars. Aside from dividing customers into categories such as "Frequent Independent Traveler" — or FITs and Total Rewards members, the Caesars team uses tracking data to further segment customers by property or market as well as to determine how each of their various segments respond to content.³⁶⁹

Using this data, Caesars evaluates campaigns in regard to KPIs, such as number of nights booked, and adjusts them on the fly to ramp up conversion rates.³⁶⁹ "What's really dramatic about this is that you can determine what is engaging individuals and target them with it," says Adobe's Langie.³⁶⁹ "The high-roller segment, for example. They might respond to a very different Web design than the casual visitor and Caesars tailors the page view to who is visiting. Think of the website as a canvas. You can paint a still life of a fruit for one person and something different for another. The canvas is dynamic."³⁶⁹

"The speed and the manner with which the chosen website designs and digital marketing tactics are implemented across the Caesars network may well be the most transforming development of the company's new data culture," adds Kahle.³⁶⁹ And this was no easy task as the Caesars landscape extends over 60 websites for its various properties and services as well as 40 Facebook pages.

"Prior to implementing a data-centric approach to the decision-making process, it could take as long as two weeks to furnish the field with actionable data. They now get it done in a matter of hours," adds Kahle.³⁶⁹ In 2013, Caesars' implemented Adobe's Digital Marketing Suite, which "includes real-time tracking and segmentation of digital site visitors, analysis of social media's role in purchasing, and content testing by segment or individual visitor."³⁶⁹

"The people at the individual properties who are managing the content of the

websites are not all technically sophisticated, but Adobe's system provides them with built-in capabilities," says Kahle.³⁶⁹ "Say one of our properties wants to track social. Before, they'd have to spend a lot of time manually adding tracking codes. With Adobe, tracking codes are integrated," Kahle adds.³⁶⁹

"Right now we can assign a percentage value to social media if a booking doesn't result right away," Kahle says.³⁶⁹ "But with social we're going to be experimenting with a longer funnel, maybe a two-week time frame."³⁶⁹ "Values are ascribed to social media for being the site of initial contact with a new customer, for instance, or for numbers of positive reviews by current customers."³⁶⁹

Currently, Caesars can't measure the total value of a reservation booked online and also can't determine how much an online booker spends at the tables during his or her stay.³⁶⁹ This is important information when it comes to truly understanding a patron. Caesars would also like to know if, for example, "customers left the Caesars' hotelier in Las Vegas and went to dinner at Gordon Ramsay's restaurant at the Paris Las Vegas, so they could offer them a free dinner at the restaurant to close the deal on a future booking."³⁶⁹

"Eventually we're going to set a time frame that will never expire [on the sales funnel]," Kahle says.³⁶⁹ "But for now we've built a sales allocation model that goes beyond the last click, and that's OK. Most organizations using multiple marketing channels are still stuck on that last click."³⁶⁹

Social Media Analytics

As Melville and Lawrence explain in their article *Social Media Analytics: Channeling the Power of the Blogosphere for Marketing Insight*³⁷⁰, social media analytics is "the practice of gathering data from blogs and social media websites and analyzing that data to make business decisions. The most common use of social media is to mine customer sentiment." Social media analytics evolved out of the disciplines of social network analysis, machine learning, data mining, information retrieval (IR), and Natural Language Processing (NLP).

According to Melville and Lawrence, the automotive analysis of blogs and other social media sites raise the following intriguing marketing questions³⁷⁰:

1. Given the enormous size of the blogosphere, how can we identify the subset of blogs and forums that are discussing not only a specific product, but higher-level concepts that are in some way relevant to this product?
2. Having identified this subset of relevant blogs, how do we identify the most authoritative or influential bloggers in this space?
3. How do we detect and characterize specific sentiment expressed about an entity (e.g., product) mentioned in a blog or a forum?

4. How do we tease apart novel emerging topics of discussion from the constant chatter in the blogosphere?

As Margaret Rouse explains in her article *Social Media Analytics*³⁷¹, step one of a social media analytics initiative is “to determine which business goals the data that is gathered and analyzed will benefit. Typical objectives include increasing revenues, reducing customer service costs, getting feedback on products and services and improving public opinion of a particular product or business division.” Once these business goals have been identified, “key performance indicators (KPIs) for objectively evaluating the data should be defined. For example, customer engagement might be measured by the numbers of followers for a Twitter account and number of retweets and mentions of a company’s name,” states Rouse.³⁷¹

Through social networks like Twitter and Weibo, organizations can pick up customer satisfaction in real time.¹¹⁷ “Social media is enabling companies such as Coca-Cola, Starbucks, and Ford to go beyond standard customer satisfaction data gathering to innovate by setting up and participating in communities to gain feedback from customers.”¹¹⁷ A good example is MyStarbucksIdea.com, it is a website where “Starbucks customers can relate their experiences and offer ideas about how to improve the Starbucks experience, from drinks to foods to ambiance.”¹¹⁷

When looking at what objectives companies were seeking when implementing customer analytics technologies with social media data (see Figure 21), TDWI Research found that gaining a “deeper customer understanding” topped the list at 56%¹¹⁷ “Social media listening can provide an unprecedented window into customer sentiment and the reception of an organization’s marketing, brands, and services.”¹¹⁷

Besides the broad objective of gaining deeper customer understanding, nearly one-third (31%) of companies seek to identify attribution, or paths to buying decisions, which can be done on a limited scale with services like Google Analytics as well as other Web site analysis applications.¹¹⁷ Google webmaster tools also allow hotelier to understand the organic search traffic that is linking customers to them.

30% of respondents sought to discover customer sentiment, which is important because it helps companies discover positive and negative comments in social media channels, on customer comment and review sites.¹¹⁷ “Sentiment analysis often focuses on monitoring and measuring the ‘buzz’ value, usually through volume and frequency of comments around a topic.”¹¹⁷

Simply deciding which social media sites’ data to analyze can be one of the biggest challenges facing businesses going down the analytics path. “Organizations have to research where their customers are most likely to express themselves about brands and products. They need to spot influencers who have

networks of contacts and take it upon themselves to play an advocacy role.”¹¹⁷ “About 20% of respondents are interested in differentiating influencers from followers in social media.¹¹⁷ “Link analytic tools and methods specialize in identifying relationships between users in social communities and enabling organizations to measure users’ influence.”¹¹⁷ “With some tools, data scientists and analysts can test variables to help identify social communities as ‘segments’. Then, as they implement segmentation models for other data sources, they can integrate these insights with social media network analysis to sharpen models and test new variables,” explains Stodder.¹¹⁷

Which of the following objectives does your organization seek to achieve by implementing customer analytics technologies and methods with social media data? (Please select all that apply.)

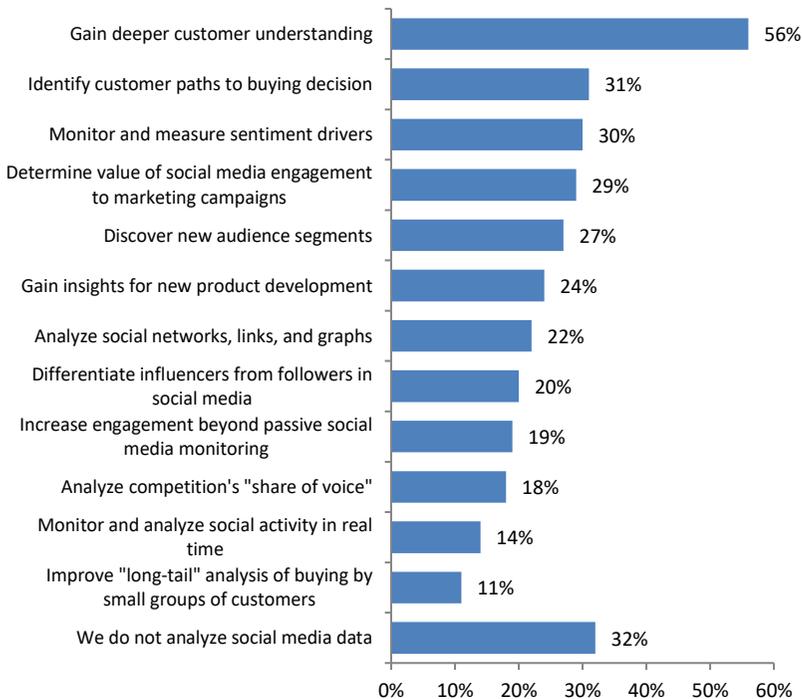


Figure 21: Customer Analytics and Social Media Objectives
 Based on 1,546 respondents from 418 respondents; a bit more than three responses per respondent, on average.
 Source: TDWI Research

Analytics are critical in helping organizations “make the right decisions about when, where, and how to participate in social media. It isn’t enough to just listen; organizations must insert themselves and become part of the conversation.”¹¹⁷

When doing so, however, companies should keep in mind advice from *The Cluetrain Manifesto*³⁷² — “Conversations among human beings sound human. They are conducted in a human voice,” as well as this: “When delivering information, opinion, perspectives, dissenting arguments or humorous asides, the human voice is typically open, natural, uncontrived.”³⁷²

One interesting strategy is for a hotel operator to start viral campaigns via Twitter, using hashtags for a topic; the campaign could be a part of a larger marketing strategy. The hotel can then “monitor social media to see what people say and analyze how the campaign is playing among influencers and across networks.”²³⁶

Klear, a social media and social data platform that focuses on influencer marketing, offers a product that can help hotels understand the effects of their influencer marketing. Klear’s campaign reports contain the following summaries³⁷³:

- How many influencers participated in the campaign?
- Number of updates the influencers posted during the campaign.
- Engagements metrics.
- Number of people who saw the content.

The report also includes a drill-down analysis for each and every influencer. For each influencer the report will show³⁷³:

- Who is the influencer?
- The influencer’s expertise.
- Fanbase across different social networks.
- Top posts during the campaign.
- Engagements for these updates.
- A direct link to the influencer’s profile on Klear.

This is a paid service, but most of the information is publicly available and this is something an IR could build up in-house, should they want a customized solution.

Influencer marketing taps directly into what Deighton and Kornfeld call the five paradigms of digital interactive marketing, i.e., social exchanges — building identities within virtual communities — and cultural exchanges — firms offering culture products that will compete in buzz markets.²³⁶ This peer-to-peer interactivity should motivate the desire to exchange and share information, which should help market any IR event.²³⁶

In their article *Social Media Monitoring: An Innovative Intelligent Approach*³⁷⁴, Emmanouil Perakakis, George Mastorakis and Ioannis Kopanakis argue that “Social media marketing today has become too complex. There are too many social media channels, devices and technologies in the marketing stacks, creating

a huge volume of data that is no longer humanly possible for marketers to manage. This makes the art of campaigning extremely time-consuming and inefficient.” The writers add that, “Artificial intelligence can play a crucial role in social media marketing by introducing new features for tasks automation.”³⁷⁴

“AI is poised to elevate the power of marketers’ data capabilities and enable powerful contextual marketing programs,” say Perakakis et al.³⁷⁴ “By understanding the customer, brands can determine relevant marketing messages, find the right social media influencers, refine their content marketing strategy and gain insightful information about their users,” add Perakakis et al.³⁷⁴ “In addition, AI will play a crucial role in social media monitoring tools, by enabling new features for smart suggestions and intelligent decisions based on the analyzed data (e.g., mentions),” notes Perakakis et al.³⁷⁴

“As intelligent social media monitoring improves, it will become easier for brands to find the right influencers,” argue Perakakis et al.³⁷⁴ Finding and hiring these influencers will become less resource-intensive, less time-consuming and more accurate.³⁷⁴ There are already social media monitoring companies that make use of influencers’ followers, posts and interactions to determine if they are suitable for a brand.³⁷⁴

Timing, as they say, is everything, especially in social media marketing. The channel can also be important. “Sometimes social media marketers have great content available but the time or the medium, at which they post could be wrong. This means that the content does not receive the engagement that it deserves,” explains Perakakis et al.³⁷⁴

If a social media post is uploaded at the wrong time, it could receive customer engagement for just a few seconds.³⁷⁴ “Choosing the right time and platform for posting content is a process that can be simplified by using an intelligent social media monitoring tool,” recommend Perakakis et al.³⁷⁴ Tools embedded with intelligent features can “analyze data about the reach of posts with their time and platform to come up with an effective content posting strategy.”³⁷⁴

Social media is a great channel for hotels to connect with their customers and potential customers.³⁷⁴ “Whether digital marketers look to grab the attention of prospects or to answer queries of their customers, social media is the way to go. However, social media, unlike other forms of media, thrives on real-time interactions,” note Perakakis et al.³⁷⁴ This means marketers can’t afford a long delay in responding to their customers.³⁷⁴ Immediacy is imperative.³⁷⁴

“Social media monitoring tools can help marketers identify opportunities for interacting with customers by providing vital insights. Intelligent features in a social monitoring tool allow for determining when and how to respond back to customers,” claim Perakakis et al.³⁷⁴ In futures years, AI will undoubtedly be even more involved in the customer service process than it currently is.³⁷⁴ hoteliers need to jump on this trend ASAP.

Today, it's easy for social media marketers to get overwhelmed by the amount of social media posts referencing their brand.³⁷⁴ Moreover, they can also get confused between which posts are referencing their brand and which aren't; not all industry keywords will be relevant to a brand's marketing message but it's almost impossible to keep up with it all, especially for international brands.³⁷⁴

AI automates the process of scanning through social media posts, ensuring key opportunities for customer engagement aren't missed.³⁷⁴ "Social media marketers can leave the sorting of the posts to an intelligent social media monitoring tool. This enables them to focus on responding back to the customers," say Perakakis et al.³⁷⁴ The reality is, "no matter how many social media marketers are assigned to the task of sorting social media posts, it is nearly impossible to carry out this task without the assistance of automation."³⁷⁴ "AI can play a key role in helping sort these posts and it is expected that intelligent features will improve such processes even further. Learning algorithms enables for making informed calculations, perform analytics and even make automated recommendations," contend Perakakis et al.³⁷⁴

Social media marketers can also mine an intelligent monitoring tool to generate customer leads.³⁷⁴ "AI-powered insights allow social media marketers to improve conversion rates and generate more sales," argue Perakakis et al.³⁷⁴

"For efficient social media monitoring, brands need to go through and learn from all user-generated content, including images," contend Perakakis et al.³⁷⁴ "Intelligent tools have to be able to recognize brand-related images and draw meaning from them," say Perakakis et al.³⁷⁴ "Through this, brands can learn in-depth insights about the customers' feedback on their products. AI enables brands to recognize possible sales opportunities and cross-promotional opportunities through visual content analytics," say Perakakis et al.³⁷⁴ With information gleaned from images, social media marketers can capture the available opportunities and release targeted marketing content for customers and even potential customers.³⁷⁴

Customers who regularly post images or blogs about a product, can be sent targeted promotions or even just messages of appreciations showing them that the company cares.³⁷⁴ This should increase customer loyalty as well as encourage them to keep posting content about the brand.³⁷⁴ It becomes a positive reinforcement loop that will help with word of mouth marketing for the company. "Moreover, analyzing the visual content that customers post can also help social media marketers developing detailed buyer personas," say Perakakis et al.³⁷⁴ These buyer personas provide priceless information and data about the groups of people that buy from the brand, information that the marketing department should covet.³⁷⁴

In a general context, AI plays a key role in monitoring social media platforms and other customer review forums.³⁷⁵ "Since social sharing continues to improve

across different platforms, as a result, brands face a serious challenge when it comes to monitoring what customers say on these platforms,” claim Perakakis et al.³⁷⁴ With the overwhelming amount of feedback and reviews that businesses can get on these platforms, it is important to have an advanced monitoring tool that captures both quantity and nuance.³⁷⁴ This ensures that no harm will come to the brand’s reputation, which is extremely important in this highly sensitive culture we’re currently living in.³⁷⁴

With AI, businesses can effectively monitor mentions on social media coming from a multitude of channels and networks.³⁷⁴ AI can help identify a customer who is complaining about a particular company product or service.³⁷⁶ AI can be used to identify positive comments from select customers.³⁷⁴ This social proof can then be shared on the company’s social channels, which will help it build its online reputation.³⁷⁴ A Python NLP script can easily analyze and classify positive and negative comments. Alerts can be set up for negative comments, which can quickly be acted upon to ensure the company’s reputation isn’t damaged by incensed or annoyed customers.³⁷⁴

Personalized customer experiences also help with online reputation management, argue Perakakis et al.³⁷⁴ To deliver one, a business needs to clearly understand its customer demands.³⁷⁴ By collecting customer data on social media and correlating that with a customer’s purchase history, companies can understand the exact customer demands.³⁷⁴

AI can be used to recognize customer preferences, which will help deliver personalized experiences. For marketers, AI helps meet the demand for highly individualized experiences.³⁷⁷ Thus, businesses can better reach and target their consumers, which should result in a better buying experience.³⁷⁴

AI can also help businesses track customer posts to identify any possible pain points.³⁷⁴ AI can also ensure customer service is effectively delivered.³⁷⁴ Today, customers almost demand instant replies from a business they frequent and any slight delays will lead to customers complaining about inefficiency, often to any and every one on their social media feed.³⁷⁴ This can risk tarnishing or flat out ruining a company’s reputation.³⁷⁴ Through the use of AI and chatbots, customer concerns can be addressed effectively.

Other uses for AI in online reputation management include offering a personalized customer experience, countering the spread of fake news and gathering customer testimonials.³⁷⁸

What Perakakis et al. propose is an innovative intelligent system that would analyze social media data and automatically draw useful conclusions for company marketers without needing any human intervention.³⁷⁴ Perakakis et al. named this system (Social Intelligence Advisor (S.I.A.)), and it is based on the following analysis steps³⁷⁴:

1. "Data gathering: This is the practice of harvesting data from web and social media. Data is often provided anonymized and it is not exactly as seen from actual human social media users."³⁷⁴
2. "AI micro-analysis of gathered data (Sentiment analysis, text analysis, image recognition, etc.): In this step, each post gathered is individually analyzed by intelligent algorithms to enrich it with semantic information. E.g., the sentiment of text, the language it was written, the gender of the author, the country that it originated, etc."³⁷⁴
3. "Social intelligent analysis: In this step, the data is treated as a set, rather than individual posts. In this way, patterns are discovered, and useful insights can be drawn automatically. This step was only previously possible in this area by human analysts."³⁷⁴
4. "Expert advice: Furthermore, the conclusions from step 3 are not only shown to the users, but customized advice sets can be generated, personalized for different cases. This advice is aimed at helping the marketers take action to improve their marketing efforts."³⁷⁴
5. "Re-evaluate: Since the goal of the system is to generally improve a brand's online marketing efforts in social media, it is important to follow-up and repeat the measurement at regular times. A comparison can be made between the new values and the old ones in order to evaluate if metrics show improvement, and advise the marketer again based on the new results."³⁷⁴

"The introduction of S.I.A. and 'intelligent' features in social media monitoring allows marketers to focus on the gist of marketing itself," say Perakakis et al.³⁷⁴ Instead of focusing on collecting and converting data into useful information, S.I.A. enables marketers to focus on drawing meaning from customers data to improve company decision making based on engagement reach, sentiment and other social metrics.³⁷⁴

Using an S.I.A., a hotel can see engagement rates, reach, as well as the negative sentiments on a particular post.³⁷⁴ It can help uncover the brand's fans and ambassadors that you may have previously gone unnoticed.³⁷⁴ It can reveal the best days for posting based on past performance.³⁷⁴ "S.I.A. can analyze the data about the reach of posts with their time and platform to come up with an effective content posting strategy."³⁷⁴ An S.I.A. can automatically find hashtags that perform better in the company's posts and its industry, so they can be utilized to increase exposure.³⁷⁴ An S.I.A. can remind the business when reposts are needed.

An S.I.A. can quickly identify content that has the potential to go viral and it can remind the business when it needs to repost content.³⁷⁴ This allows a brand to take appropriate actions before it's too late.³⁷⁴ The business might be able to detect a viral event, while it is spreading, potentially helping the virality.³⁷⁴

An S.I.A. can help a business find the most popular site where a competitors is

appearing and provide advice on how to appear there as well.³⁷⁴ Through an S.I.A., a hotelier would be able to capture every site that its competitors appear on.³⁷⁴ As such, the hotelier could identify the positive impact of such advertising efforts.³⁷⁴

“S.I.A. in influencers’ discovery lets brands target social media influencers with followers who are interested in the brand,” say Perakakis et al.³⁷⁴ The application can identify the follower’s interests, as well as discover influencers through their contextual relationships with both the brand and amongst their followers.³⁷⁴

AI can also “be applied in monitoring the performance of competitor’s online campaigns.”³⁷⁴ This helps social media marketers pinpoint how and where a competitor might be getting their customers.³⁷⁴ “Through monitoring the performance of competitors’ campaigns, social media marketers are allowed to know the expectations of their customers,” say Perakakis et al.³⁷⁴ “With an AI-enabled advertisement analytics tool, social media marketers are aware of the type of adverts run by their competitors that gain more engagements. With this knowledge, they are then able to come up with better advertisements and target the same audience,” offer Perakakis et al.³⁷⁴

“An intelligent social media monitoring tool not only focuses on what competitors are saying, but such a tool is also capable of highlighting what customers say about products,” say Perakakis et al.³⁷⁴ Should a brand competitor’s customers complain about certain elements missing from that company’s product, the brand’s social media marketers can quickly advertise one of their products that contain these missing elements, thereby capturing some market share.³⁷⁴ As if that weren’t enough, companies can also directly target any complaining clients.³⁷⁴ “In addition, through AI-enabled competitors monitoring, social media marketers will have the ability to get real-time intelligence.”³⁷⁴ Comments can be responded to immediately, which should increase customer conversion.³⁷⁴

Sentiment Analysis

In the *TDWI Customer Analytics in the Age of Social Media*¹¹⁷ Research report about the same percentage (30%) of respondents sought to monitor and measure sentiment drivers. “Sentiment analysis enables organizations to discover positive and negative comments in social media, customer comment and review sites, and similar sources. Sentiment analysis often focuses on monitoring and measuring the ‘buzz’ value, usually through volume and frequency of comments around a topic.”¹¹⁷ However, it is not just the buzz that is important, many organizations want more analytical depth so that they can understand what the buzz is all about, where it comes from, and who is benefiting the most from it.¹¹⁷

For more sophisticated sentiment analysis, text analytics tools that use word extraction, natural language processing, pattern matching, and other approaches to examine social media users' expressions are employed.¹¹⁷ "Sentiment analysis can give organizations early notice in real time of factors that may be affecting customer churn; the research shows that 14% are interested in monitoring and analyzing social activity in real time."¹¹⁷

In 2011, Toyota started testing social media monitoring and sentiment-analysis tools. After a few years of research, they discovered that by filtering for such words as "Lexus", "decide", "buy" and "BMW", they were able to quickly identify active shoppers who were choosing between theirs and their competitor's brands.³⁷⁹

Today, Toyota uses social media data analysis across many areas — sales, service, quality, marketing and product development.³⁷⁹ For example, if a customer expresses interest in a car, Toyota "can determine engagement by analyzing the frequency of dealership visits via their Foursquare check-ins, understand their dealership experiences, and even understand what features may have sparked their interest in a competitor's product."³⁷⁹

Armed with this information, Toyota stratifies its leads based on their readiness to buy, moving stronger leads to the top of the funnel and weaker ones to the bottom.³⁷⁹ By analyzing free-form text, Toyota can learn what customers think of specific vehicles.³⁷⁹ In the quality area, "Toyota can look for information like whether new-car owners are hearing a slight rattle and pass that on to their quality engineers."³⁷⁹ They are also working on using sentiment analysis to increase the accuracy of their sales predictions; an important goal, if ever there was one.³⁷⁹

Hotel operators should keep these ideas in mind when developing their own use cases. A "rattle" for the hotelier wouldn't be an engine problem, of course (except in a company bus, maybe), but rather a poor customer on property experience.

Toyota also wants to deepen its understanding of its customers' other interests, like what a Camry owners' favorite TV show might be, as well as which other brands they might like.³⁷⁹ This can help with product placement and brand ties down the line.³⁷⁹

Sentiment analysis is also key to understanding a competitors' relative strengths and weaknesses in the social sphere.¹¹⁷ The TDWI research found that "18% of respondents are examining social media data to analyze a competition's 'share of voice.'"¹¹⁷

As Joe Mullich explains in his article *Opposition Research: Sentiment Analysis as a Competitive Marketing Tool*³⁸⁰:

"When a leading bank wanted to find out how it stacked up

against competitors, it assumed customers would focus on lending terms and interest rates. To the bank's surprise, the most enthusiastic discourse on blogs and specialized financial forums related to a smartphone app a competing financial institution had just put out. The bank had dismissed apps as a generic marketing gimmick, like the old custom of giving away a toaster for opening an account. After learning how much customers valued the app, the bank quickly created its own with the same prized features as its competitor."

"You get the benefits of corporate espionage without doing corporate espionage," notes Joseph Carrabis, founder of NextStage Evolution, the company that did the analysis for the bank.³⁸⁰

Sentiment analysis can also provide early insight into a competitor's new product initiatives.³⁸⁰ "Very often companies will test market before they release a product," says Mullich.³⁸⁰ "And no matter what you get people to sign saying that they won't share information, they'll go online and talk about products they're excited about," warns Mullich.³⁸⁰ You can't change human nature, but sometimes you can make it work for you.

In addition, sentiment analysis can alert companies about new competitors who are bubbling up to the surface or even coming out of left-field.³⁸⁰ Ford would obviously consider Chevy a competitor, but it might not think of public transport as being troubling competition.³⁸⁰ However, Carrabis argues that a car company should realize that it needs to analyze online discussion boards to try to understand why people are making different transportation choices so it can change its product offerings or marketing campaigns to emphasize their customers' growing environmental concerns.³⁸⁰ "We have to think broader and wider than we used to," Carrabis advises.³⁸⁰ The lesson here is, don't just look at your closest competitors as your competition.

This is why it is so imperative for a hospitality company to understand how and why people discuss competitors online. "When car shoppers talk online they don't talk about 'quality,'" says Susan Etlinger, an analyst with the Altimeter Group.³⁸⁰ "They'll say, 'I love the leather interior' or 'the cup holder fell out.' It takes meticulous work to roll together all the indicators of quality."³⁸⁰

Etlinger suggests that "social-media listening teams work with the groups in the organization that handle keyword search terms and search-engine optimization effort, since they have a solid grasp on how people online actually talk about the industry and products."³⁸⁰

Another thing to keep in mind: "At any point in time, the way people feel about a brand can be distorted online, because things like Twitter are so volatile and affected by the news of the day," warns Etlinger.³⁸⁰ "But over time, you can get directional trends — why do people love or hate you, how do they feel about

your product compared to the competitor's products."³⁸⁰

"My belief is that the sweet spot for social media is not conversion, but nurturing," said Brian Ellefritz, vice president of global social media at SAP.¹¹⁷ "Whether it's in your community, through Twitter, or through Facebook pages, you want to build an increasing conviction that your company is the one to do business with," says Ellefritz.¹¹⁷ "It's about establishing a belief system that becomes robust with the support of fans and followers. The question is how you measure that and create value out of that investment," he adds.¹¹⁷

When it comes to setting strategies for customer and social media analytics, Stodder recommends the following¹¹⁷:

- Use social media data to support an active, not passive social media strategy. "In competitive, fast-moving markets, organizations cannot just passively listen to and analyze social media data. The analytics should plug into strategies for engaging users and customers on social networks and comment sites. Predictive analytics can help organizations anticipate the results of active strategies. Special events such as tweet-ups can build on customer data analysis and create positive exchanges and engagement."¹¹⁷
- Take a holistic view of the potential contributions of social media data analytics. "Understanding behavior in the social sphere can have a positive impact, not just on marketing and sales functions, but also on services and other processes in the organization. Marketing executives should use social media insights to improve brand awareness and reputation throughout the organization."¹¹⁷
- Give CMOs and marketing executives the ability to understand the financial impact of certain decisions.
- Apply analytics to gain a more accurate understanding of marketing attribution. "Last-touch" attribution may be easy to affix, but it is not always reliable. Powerful analytics, along with big data, can help organizations get a better understanding of what truly affects a customer's purchase decision.

In its article *Sentiment Analysis: Types, Tools, and Use Cases*³⁸¹, Altexsoft states that the goal of sentiment analysis is "to know a user or audience opinion on a target object by analyzing a vast amount of text from various sources." "It's not only important to know social opinion about your organization, but also to define who is talking about you," says Altexsoft.³⁸¹ Measuring mention tone can also help define whether industry influencers are discussing a brand and, if so, in what context. The power of sentiment analysis software is it can do all of the above in real time and across all channels, thereby making it useful for both sentiment analysis and customer service.³⁸¹

"You can analyze text on different levels of detail, and the detail level depends

on your goals,” says Altexsoft.³⁸¹ “For example, you may define an average emotional tone of a group of reviews to know what percentage of customers liked your new clothing collection,” explains Altexsoft.³⁸¹ “If you need to know what visitors like or dislike about a specific garment and why, or whether they compare it with similar items by other brands, you’ll need to analyze each review sentence with a focus on specific aspects and use or specific keywords,” add Altexsoft.³⁸¹

When a brand wants to analyze sentiment, it first needs to gather all relevant brand mentions into one document.³⁸¹ Selection criteria must be carefully considered – should mentions be time-limited, should only one language be used, should specific locations be locked in, etc., etc.³⁸¹ Data must then be prepared for analysis, read, cleansed, and any irrelevant content should be excluded from the analysis.³⁸¹ Once the data has been prepared, full analysis can begin and sentiment extracted.³⁸¹ Of course, since hundreds of thousands or even millions of mentions may need analysis, the best practice is to automate this tedious work with software and many of the tools I have mentioned throughout this book can help.³⁸¹ I have also included a list of social media monitoring tools at the end of this section.

Altexsoft mentions various customer experience software, such as InMoment and Clarabridge that “collect feedback from numerous sources, alert on mentions in real-time, analyze text, and visualize results.”³⁸¹ “Text analysis platforms (e.g. DiscoverText, IBM Watson Natural Language Understanding, Google Cloud Natural Language, or Microsoft Text Analytics API) have sentiment analysis in their feature set,” adds Altexsoft.³⁸¹

“InMoment provides five products that together make a customer experience optimization platform,” explains Altexsoft.³⁸¹ “One of them, Voice of a Customer, allows businesses to collect and analyze customer feedback in a text, video, and voice forms. The number of data sources is sufficient and includes surveys, social media, CRM, etc.,” says Altexsoft.³⁸¹

Clarabridge is a CEM platform that “pulls and analyzes text from chats, survey platforms, blogs, forums, and review sites,” notes Altexsoft.³⁸¹ “Users can also gain insights from emails, employee and agent notes, call recordings and Interactive Voice Response (IVR) surveys: The system can convert them into text.”³⁸¹ Clarabridge provides social media listening as well.³⁸¹ According to Altexsoft, “The system considers industry and source, understanding the meaning and context of every comment. Sentiment analysis results display on an 11-point scale. Users can modify sentiment scores to be more business-specific if needed.”³⁸¹

Another useful platform is DiscoverText, “a cloud-based collaborative text analytics system for researchers, entrepreneurs, and governments.”³⁸¹ “Capterra users note the solution is great for importing/retrieving, filtering, and

analyzing data from various sources, including Twitter, SurveyMonkey, emails, and spreadsheets,” says Altexsoft.³⁸¹

IBM Watson Natural Language Understanding is a set of advanced text analytics systems that supports analysis in 13 languages.³⁸¹ “Analyzing text with this service, users can extract such metadata as concepts, entities, keywords, as well as categories and relationships,” says Altexsoft.³⁸¹ “It also allows for defining industry and domain to which a text belongs, semantic roles of sentence parts, a writer’s emotions and sentiment change along the document,” says Altexsoft.³⁸¹ Tools for developers to build chatbots and other NLP solutions are provided using IBM Watson services.³⁸¹

“Microsoft Text Analytics API users can extract key phrases, entities (e.g. people, companies, or locations), sentiment, as well as define in which among 120 supported languages their text is written,” explains Altexsoft.³⁸¹ “The Sentiment Analysis API returns results using a sentiment score from 0 (negative) to 1 (positive),” explains Altexsoft.³⁸¹ The software can detect sentiment in English, Spanish, German, and French texts.³⁸¹ Developers recommend that “the analysis be done on the whole document and advise using documents consisting of one or two sentences to achieve a higher accuracy.”³⁸¹

Google Cloud Natural Language API can “extract sentiment from emails, text documents, news articles, social media, and blog posts.”³⁸¹ It can also extract “insights from audio files, scanned documents, and documents in other languages when combined with other cloud services.”³⁸¹ “The tool assigns a sentiment score and magnitude for every sentence, making it easy to see what a customer liked or disliked most, as well as distinguish sentiment sentences from non-sentiment sentences,” notes Altexsoft.³⁸¹

Competitive analysis that involves sentiment analysis can also help hotel brands understand their strengths and weaknesses and maybe find ways to stand out from the crowd.³⁸¹ In times of crisis, sentiment analysis can be instrumental in helping douse the flames.

Altexsoft believes, “There is one thing for sure you and your competitors have in common — a target audience.”³⁸¹ Brands can track and research how society evaluates competitors just as they analyze attitudes towards their business. “What do customers value most about other industry players? Is there anything competitors lack or do wrong? Which channels do clients use to engage with other companies?” — these are all important questions that sentiment analysis help answer.³⁸¹ Brands can use this knowledge to improve “communication and marketing strategies, overall service, and provide services and products customers would appreciate.”³⁸¹

Most brands grapple with the question of how to bring a desired product to the market?³⁸¹ The only approach, claims Altexsoft, is to ask people what they want.³⁸¹ Successful companies build a minimum viable product (MVP), gather

early feedback, and continuously try to improve a product, even after its release.³⁸¹ “Feedback data comes from surveys, social media, and forums, and interaction with customer support,” argues Altexsoft.³⁸¹ Sentiment analysis can be extremely handy here.³⁸¹ It helps brands learn about product advantages and drawbacks.³⁸¹ Armed with strong sentiment analysis results, “a product development team will know exactly how to deliver a product that customers would buy and enjoy.”³⁸¹

Using sentiment analysis, marketers can study consumer behavior patterns in real time, which can help to predict future brand trends.³⁸¹ “Another benefit of sentiment analysis is that it doesn’t require heavy investment and allows for gathering reliable and valid data since its user-generated,” says Altexsoft.³⁸¹ Sentiment analysis lets businesses harness an enormous amount of free data to help them understand their customers’ attitude towards their brand.³⁸¹ This analysis can take customer care to the next level.

Sentiment Analysis Tools

Table 11 lists the Social Media Tools and websites available to business users to track engagement and customer feedback.

Name	Comments
Board Reader	BoardReader allows users to search multiple message boards simultaneously, allowing users to share information in a truly global sense. Boardreader is focused on creating the largest repository of searchable information for our users. Users can find answers to their questions from others who share similar interests. Our goal is to allow our users to search the “human to human” discussions that exist on the Internet.
Buffer	Buffer makes your life easier with a smarter way to schedule the great content you find. Fill up your Buffer at one time in the day and Buffer automagically posts them for you through the day. Simply keep that Buffer topped up to have a consistent social media presence all day round, all week long. Get deeper analytics than if you just post to social networks directly.
Buzzsumo	<p>Analyze what content performs best for any topic or competitor. Find the key influencers to promote your content:</p> <ul style="list-style-type: none"> • Discover the most shared content across all social networks and run detailed analysis reports. • Find influencers in any topic area, review the content they share and amplify. • Be the first to see content mentioning your keyword; or when an author or competitor publishes new content. • Track your competitor’s content performance and do detailed comparisons.

THE A.I. HOTELIER

Name	Comments
Commun.it	Can help you organize, increase, and manage your followers, and can do so across multiple accounts and profiles. At a glance you can see different aspects of your community management, like the latest tweets from your stream and which new followers might appreciate a welcome message.
Crowdfire	Crowdfire is a powerful phone app and online website that helps you grow your Twitter and Instagram account reach. This tool has a variety of functions designed to understand your social analytics as well as manage your social publishing.
Cyfe	Cyfe is an all-in-one dashboard software that helps you monitor and analyze data scattered across all your online services like Google Analytics, Salesforce, AdSense, MailChimp, Facebook, WordPress and more from one single location in real-time.
Fanpage Karma	Shows a variety of valuable information related to your Facebook page, such as growth, engagement, service and response time, and of course Karma (a weighted engagement value). FanKarma also provides insight into Twitter and YouTube; the latter could be particularly valuable if you're creating a video marketing strategy.
Followerwonk	Followerwonk is a cool social media analytics tool that lets you explore and grow your social graph. Dig deeper into Twitter analytics: followers, their locations, when do they tweet. Find and connect with influencers in your niche. Use visualizations to compare your social graph to competitors.
Google Alerts	Google Alerts are email updates of the latest relevant Google results (blogs, news, etc.) based on your searches. Enter the topic you wish to monitor, then click preview to see the type of results you'll receive. Some handy uses of Google Alerts include: monitoring a developing news story and keeping current on a competitor or industry.
Google Trends	Trends allows you to compare search terms and websites. With Google Trends you can get insights into the traffic and geographic visitation patterns of websites or keywords. You can compare data for up to five websites and view related sites and top searches for each one.
Hootsuite	Monitor and post to multiple social networks, including Facebook and Twitter. Create custom reports from over 30 individual report modules to share with clients and colleagues. Track brand sentiment, follower growth, plus incorporate Facebook Insights and Google analytics. Draft and schedule messages to send at a time your audience is most likely to be online. HootSuite has the dashboard for your iPhone, iPad, BlackBerry and Android.
HowSocialable	Monitor and post to multiple social networks, including Facebook and Twitter. Create custom reports from over 30 individual report modules to share with clients and colleagues. Track brand sentiment, follower growth, plus incorporate Facebook Insights

Name	Comments
	and Google analytics. Draft and schedule messages to send at a time your audience is most likely to be online. HootSuite has the dashboard for your iPhone, iPad, BlackBerry and Android.
Iconosquare	Key metrics about your Instagram account. Number of likes received, your most liked photos ever, your average number of likes and comments per photo, your follower growth charts and more advanced analytics. Track lead conversations, send private message as on Twitter, and improve communication with your followers.
Klear	Social media monitoring, analytics and reporting. Influencer marketing, find and create relationships with the top influencers in your sector and build your community. Competitive analysis tracks your social media landscape, see what's working for them and develop your strategy.
Klout	Klout's mission is to help every individual understand and leverage their influence. Klout measures influence in Twitter to find the people the world listens to. It analyzes content to identify the top influencers.
Kred	Kred is a social-media scoring system that seeks to measure a person's online influence. Kred, which was created by the San Francisco-based social analytics firm PeopleBrowsr, attempts to also measure a person or company's engagement, or as they call it, outreach. PeopleBrowsr hopes that that combination can offer a more informed metric for non-celebrities like entrepreneurs and those whom they follow and look to for advice.
LikeAlyzer	This Facebook analysis tool comes up with stats and insights into your page and begins every report with a list of recommendations. Keep track of where your Facebook page stands compared to other pages by following the comparison to average page rank, industry-specific page rank, and rank of similar brands.
Mention	Mention prides itself on "going beyond Google Alerts" to track absolutely anywhere your name or your company might be mentioned online. When you subscribe to Mention's daily email you get all these wayward hits right in your inbox, and the Web dashboard even flags certain mentions as high priority.
Mentionmap	Explore your Twitter network. Discover which people interact the most and what they're talking about. It's also a great way to find relevant people to follow. The visualization runs right in your browser and displays data from Twitter. Mentionmap loads user's tweets and finds the people and hashtags they talked about the most. In this data visualization, mentions become connections and discussions between multiple users emerge as clusters.
Must Be Present	Built by the team at Sprout Social, Must Be Present searches your Twitter account to find how quickly you respond to mentions. Their engagement reports place you in a percentile based on other

THE A.I. HOTELIER

Name	Comments
	accounts so you can see how you stack up to the speed of others.
NeedTagger	A super-powered Twitter search tool, NeedTagger runs language filters and keyword searches to determine which Twitter users might need your products or services. The tool shows you real-time search results and sends a daily email digest of new finds.
NutshellMail	Collects your activity on Facebook, LinkedIn, and Twitter (and even places like Yelp and Foursquare) to provide an email overview of your accounts. You set how often and when you want to receive the recap emails. Put it to use: If you have a weekly metrics plan you can have NutshellMail send a message once a week with an overview of your accounts. You can then extract the data and insights straight into your weekly report.
Omgili	Omgili helps you find interesting and current discussions, news stories and blog posts. Direct access to live data from hundreds of thousands of forums, news and blogs. Very easy to use, no signup for web interface.
Pinterest Analytics	Find out how many people are pinning from your website, seeing your pins, and clicking your content. Pick a time-frame to see how your numbers trend over time. Get better at creating Pins and boards with metrics from your Pinterest profile. Learn how people use the Pin It button on your site to add Pins. See how people interact with your Pins from whatever device they use. Get a glance at your all-time highest-performing Pins.
Pluggio	Pluggio is a web-based social media tool to help marketers easily grow and manage their social media profiles (Facebook and Twitter). It includes a suite of tools to organize and keep track of multiple accounts, get more followers, and automate the finding and publishing of excellent targeted content.
Postific	The full set of social media tools. Post content to over 10 social networks with one single click of a button. Get real time click-through statistics with your domain name. Measure and analyze the best results from your social posts. Monitor the social media conversations that are important for your business.
Quintly	Quintly is the professional social media monitoring and analytics solution to track and compare the performance of your social media marketing activities. Whether you are using Facebook, Twitter or both, Quintly monitors and visualizes your social media marketing success. Benchmark your numbers against your competitors or best practice examples.
Sentiment	Sentiment was born in 2007 and now boasts a team of bright enthusiastic people dedicated to provide the best social customer service and engagement platform for business.
SocialMention	SocialMention tracks areas such as sentiment, passion, reach, and strength to not just tell you what's being said about your search

Name	Comments
	but how those reactions feel. While you track your brand or yourself, you can also see how your sentiment changes over time.
Social Rank	Identifies your top 10 followers in three specific areas: Best Followers, Most Engaged, and Most Valuable. Your most engaged followers are those who interact with you most often (replies, retweets, and favorites); your most valuable followers are the influential accounts; and your best followers are a combination of the two. Social Rank will run the numbers for free and show you the results today, then follow-up each month with an email report.
Social Oomph	Schedule tweets, track keywords, extended Twitter profiles, save and reuse drafts, view @mentions and retweets, purge your DM inbox, personal status feed — your own tweet engine, unlimited accounts.
This tracking tool	Keeps track of your hashtag campaign or keyword on Twitter, Instagram, or Facebook with a full dashboard of analytics, demographics, and influencers.
Tip Top	TipTop Search is a Twitterbased search engine that helps you discover the best and most current advice, opinions, answers for any search, and also real people to directly engage and share experiences with. A search on any topic reveals people’s emotions and experiences about it, as well as other concepts that they are discussing in connection with the original search.
Topsy	A powerful search engine for Twitter content. Want to know how a certain term is being used on Twitter? You can search links, tweets, photos, videos, and influencers.
Twazzup	Offers real-time monitoring and analytics for Twitter on any name, keyword, or hashtag you choose. The Twazzup results page delivers interesting insights like the top influencers for your keyword and which top links are associated with your search.
Tweepi	Has a number of useful Twitter features, many of which fall into a couple categories: managing your followers and supercharging who you're following. For management, you can unfollow in batches those who don't follow you back, and you can bulk follow another account's complete list of followers or who they're following.
Tweetcaster	A Twitter management tool for iOS and Android devices and provides the basics of what you'd expect from a Twitter dashboard plus a few fun extras: enhanced search and lists, hiding unwanted tweets, and photo effects for your images.
Tweetdeck	Lets you track, organize, and engage with your followers through a customizable dashboard where you can see at a glance the activity from different lists, followers, hashtags, and more.

Name	Comments
TweetReach	Shows you the reach and exposure of the tweets you send, collecting data on who retweets you and the influence of each. Identify which of your tweets has spread the furthest (and why) and then try to repeat the formula with future tweets.
TwitterCounter	Twitter Counter is the number one site to track your Twitter stats. Twitter Counter provides statistics of Twitter usage and tracks over 14 million users. Twitter Counter also offers a variety of widgets and buttons that people can add to their blogs, websites or social network profiles to show recent Twitter visitors and number of followers.
Twtrland	Provides a snapshot of your Twitter profile and can even track Facebook and Instagram as well. Two of Twtrland's most helpful tools are a live count of how many followers are currently online and advanced search functionality that includes keywords, locations, and companies. Local companies can perform a location search to see which area accounts are most popular and potentially worth following.
SumAll	SumAll is a powerful social media analytics tool that allows our customers to view all of their data in one simple, easy-to-use visualization. Social media, e-commerce, advertising, e-mail, and traffic data all come together to provide a complete view of your activity.
ViralWoot	Pin Alert feature lets you track what are people pinning from your website, who is pinning the most and what images from your website are trending on Pinterest. Thousands of social media marketers and agencies use Viralwoot for their clients. You can manage & grow multiple Pinterest accounts with a single Viralwoot account.
WhosTalkin	WhosTalkin is a social media monitoring tool that lets you search for conversations surrounding the topics that you care about most. Whether it be your favorite sports team, food, celebrity, or brand name; Whostalkin will help you find the conversations that are important to you. WhosTalkin search and sorting algorithms combine data taken from over 60 of the most popular social media sites.

Table 11: Social Media Tools

Source: Dreamgrow.com³⁸²

Social Media Monitoring

It is high time to revise Wanamaker’s oft-made quote that he didn’t know which half of his marketing spend was useful (as it is probably the most over-quoted

quote in the history of marketing) because now we not only have the ability to figure out which advertisement works for which customer, but we can also extrapolate how that advertising will work on customers similar to the ones we might want to target.

Today, digital advertising should employ a multi-screen strategy that follows its audience throughout his or her digital day. As previously mentioned, successful mobile advertising requires three things — reach, purity and analytics. Analytics “involves matching users’ interests — implicit and explicit, context, preferences, network and handset conditions — to ads and promotions in real time.”⁴⁶

A hotel operator can utilize analytics to enhance its marketing, campaign management, increase sales, conduct market research, ferret out fraud and for risk/management, contact center operations, supply chain management, as well as for a whole host of other things.

In their *Measuring Social Media Performance and Business Impact (Part 1)*³⁸³, Hamill and Stevenson put forth their ‘6Is’ of social media monitoring framework that include:

1. Involvement — the number and quality of customers involved in your various online networks
2. Interaction — the actions taken by online network members — read, post, comment, review, recommend, etc.)
3. Intimacy — the brand sentiments expressed, level of brand ‘affection’ or ‘aversion’
4. Influence — advocacy, viral forwards, referrals, recommendations, retweets, etc.
5. Insights — the level of customer/actionable insight delivered from monitoring online conversations
6. Impact — business impact of your social media activities benchmarked against core business goals and objectives.

In 1999, *The Cluetrain Manifesto*³⁷² warned, “Reviews are the new advertising.” Today, this is truer than ever before. There are a multitude of platforms that allow users to rate or comment on a restaurant, a retail establishment, a hotel, a hotelier property, or even a local handyman or plumber.

Used properly, reviews can be the new advertising currency for a hotelier’s marketing department. Companies such as Dell, Cisco, Salesforce.com, the American Red Cross, and Gatorade are creating Social Media command centers that monitor the social conversations about their companies. These social media centers enable company employees to monitor conversations from the social web on channels such as Twitter, Facebook, and YouTube, amongst others, in an attempt to keep track of the health of a company’s social brand.

In his article *Taking Back The Social-Media Command Center*³⁸⁴, Scott Gulbransen

argues that, “To do the command-center model right, a setup has to envision a real-time workflow empowered to take action on all of the relevant content being analyzed, whether it be insights derived from real-time monitoring, opportunities to respond, or great discovered content to feature that elevates you and your fans.” Gulbransen recommends breaking down a command center into the following critical functions³⁸⁴:

1. Identify trends and insights — track not only the key themes, but also how they evolve over time.
2. Review the content — monitor a wide variety of terms that are meaningful to the brand and assign employees to sort through the responses, deciding which one warrants a response, and what might interest the community at large.
3. Curate the best stuff — leverage the great content that is being said about the company as well as champion those great content providers.
4. Listen and Respond — this is a two-way conversation, listen and respond quickly and accordingly.

Unlike casual conversations, comments, updates, likes, and dislikes uploaded to social networks are collected and, therefore, analyzable, and measurable. This results in “a data tsunami: the actions and content generated by participants in social media create ‘Big Data’ sources that are full of potential for tracking and understanding behavior, trends, and sentiments.”¹¹⁷ Remember, this can be highly quantifiable data. hotel operators should be studying attribution analysis for its social media campaigns on platforms like Facebook, YouTube, Twitter, Weibo, etc., etc.

Getting people to actually state their feelings and opinions about a product is paramount and it can help with attribution analysis, which can reveal such things as what kinds of campaigns most influence customer behavior.¹¹⁷ In digital advertising, attribution is traditionally done at a user-specific level, where a consistent user identifier can be established across all analyzed events. In traditional media, attribution is generally done at the macro, user-group level, as there is no consistent user identifier available.

In its *Social Media Analytics: Making Customer Insights Actionable*³⁸⁵, IBM believes that the “mistake many organizations make is to treat social media as distinct and separate from other customer data and divorced from revenue generating imperatives.” IBM recommends companies venturing into the social media space do the following³⁸⁵:

- Integrate company-wide information from different data sources to drive the business through deeper consumer insight.
- Define the real value of the company’s brand — its equity, reputation and loyalty — at any moment in time, in any place in the world; and

- Understand emerging consumer trends, both globally and locally and apply predictive models to determine actions with the highest probability of increasing relevance and maximizing marketing campaign ROI.

IBM recommends businesses ask the following questions when devising a social media plan³⁸⁵:

- Assess — also referred to as “listening,” at this stage a company should monitor social media to uncover sentiment about its products, services, marketing campaigns, employees and partners. The questions that need to be asked at this stage include:
 - What are your company objectives? Are you looking to:
 - Attract customers?
 - Increase the value of existing customer relationships?
 - Retain customers?
 - How do customers interact with you today?
 - What are they interested in?
 - Where and when do they use social media?
 - Are there significant influencers who speak to your brand or products?
- Measure — proactive analytics can uncover hidden patterns that can reveal “unknown unknowns” in the data. Questions that businesses need to ask at this stage include:
 - Who are you targeting with your social media initiatives and why?
 - What will you be measuring:
 - Share of voice
 - Activation
 - Brand sentiment
 - Influencers
 - Sales over the life of the customer relationship?
- Integrate — social media can give businesses both a broad view of their operations as well as a detailed and intimate view of their individual customers. Questions to ask at this stage include:
 - What is your vision for social media and its integration into the company’s operational marketing systems?
 - Do you have a profile of your customer advocates? Can you predict sentiment on products, services, campaigns?
 - How do you measure the effects of social media on brand equity and reputation, pipeline, and sales orders and margins?
 - How will you integrate social analytics into other customer analytics?

Regardless of the sophistication and scope of any social media initiative, the end

goal, IBM argues, should be in alignment with corporate imperatives and goals as well as produce a measurable ROI.³⁸⁵

Social Media Marketing

In their article *An Exploratory Study of Gambling Operators' Use of Social Media and the Latent Messages Conveyed*³⁸⁶, Gainsbury et al. argue that social media has become a powerful marketing channel because it “enables gambling operators to promote products and brands with fewer constraints than in traditional forms of media.”³⁸⁶ The study attempts to quantify features of social media presence among several popular Australia gambling operators, a majority of which did have some social media presence; Facebook was the most popular social media platform used.³⁸⁶

In the Gainsbury et al. study, “Information posted on Facebook and Twitter was inspected to examine content promoted or discussed via the respective social media channels. Many operators posted the same or similar content across various social media platforms or linked between these. This was particularly the case for Facebook and Twitter linking to YouTube videos.”³⁸⁶

According to Gainsbury et al., the types of content posted on social media sites included the following³⁸⁶:

- Information about the venue/operator, including information on gambling facilities as well as other non-gambling services available, contact details, and hours of operation.
- Promoting gambling products, offers, and specific events to encourage users to place bets. “Posts involved text and graphics that illustrate the types of gambling products available, how to use these, potential returns, and types of customers who use the products.”³⁸⁶ Land-based venues often posted information about in-venue events, such as bingo tournaments and upcoming jackpots.”³⁸⁶
- Posts about competitions and promotions.
- Promoting gambling wins.
- Promoting features to assist with betting, including betting and payment options.
- Betting tips
- Sports and racing news
- Promoting in-venue events, which include drawing users’ attention to special or regular weekly events, encouraging interaction with users.
- Promoting food and beverages.
- Encouraging customer engagement by encouraging users to follow, like, and share their own posted content.
- Links to sports teams.

- Promoting community engagement.

Many gambling operators also posted content unrelated to gambling, but this was “designed to be engaging, humorous, and encourage likes and sharing among user networks.”³⁸⁶ For example, “cartoons and images were often used to make jokes about the frenetic and mundane chaos as well as the drudgery of family life, with betting presented as a superior alternative option (e.g., a Facebook post by IASbet.com featuring a photo of a man surrounded by children thinking about being at the race with the caption ‘Where would you rather be’, May 16, 2013).”³⁸⁶

In its *Q2 2019 Paid Search and Paid Social Benchmark Report*³⁸⁷, Adstage provides benchmark data as well as trend analysis for multiple social media channels, offering a good overview of the current social media marketing environment.

“Facebook may soon be making changes to the News Feed itself according to tests it’s been running,” says Adstage.³⁸⁷ Facebook has admitted that there’s no more room for ads in News Feed, and as users get more comfortable with Swipeable Stories, it may be where Facebook puts its focus next.³⁸⁷

In an effort to strengthen privacy, Facebook is letting users clear their entire histories, but marketers fear it could mess with targeting options.³⁸⁷ “The option would give people the ability to see and delete the data that third-party sites and apps share about them. For example, Custom Audiences relies in part on data about visits people make to an advertiser’s website or app,” says Adstage.³⁸⁷

When one hears “influencers”, one automatically thinks of Instagram, a fact that the social media platform is well aware of and now wants to utilize.³⁸⁷ That’s why Instagram now make influencer posts shoppable.³⁸⁷ According to Adstage, “Influencers can now use the app to tag and sell products directly. Previously, only Instagram pages owned by brands could link out to specific products using ‘shoppable’ posts.”³⁸⁷ Advertisers can now work in concert with influencers to sell products on their behalf.³⁸⁷ “Creators and brands will receive ‘shared insights’ from Instagram.”³⁸⁷

Instagram also allows advertisers to boost Branded Content Partnerships as ads.³⁸⁷ As Instagram explained in their announcement: “We’re introducing the ability for advertisers to promote creators’ organic branded content posts as feed ads. 68% of people say they come to Instagram to interact with creators. With branded content ads, businesses have an opportunity to tell their brand stories through creators’ voices, reach new audiences and measure impact.”³⁸⁷ “Previously, branded content partnership posts would only reach the followers of the influencer. Branded content ads let advertisers promote the posts just like they would any other ad,” contends Adstage.³⁸⁷

In an effort to boost privacy, “Google is bringing users more transparency around

how they're being tracked across the web with cookies, which could negatively affect advertisers."³⁸⁷ Some analysts fear Google might now give its own tracking preferential treatment.³⁸⁷ With these new changes, "Chrome will let users clear all tracking cookies, while not affecting single domain cookies – those are the cookies that store info like logins and settings."³⁸⁷ "Users will also be able to see exactly which sites are setting the tracking cookies."³⁸⁷

Google is also "prohibiting another type of online tracking called fingerprinting, or device recognition."³⁸⁷ But similarly, this will only aid Google's bottom line.³⁸⁷ Without fingerprinting, the amount of data third parties can collect on internet users is limited.³⁸⁷

On the product side, Google's announced a new mobile search ad format that queues up giant gallery ads.³⁸⁷ According to Adstage, advertisers can feature up to eight images in the ads, to "make it easier for you to communicate what your brand has to offer," said Prabhakar Raghavan, SVP of Google Ads and Commerce.³⁸⁷ "Google is also rolling out a mobile search redesign featuring a black 'Ad' label, which replaces the green outlined label and a new look for favicons on organic listings."³⁸⁷ "New advanced location targeting is meant to reach commuters, whether they're at home, at work, or on the road," said Adstage.³⁸⁷ "Marketers will see the targeting option label has changed from 'People in your targeted locations' option to 'People in or regularly in your targeted locations.' Now businesses can reach people not just when they're physically in the targeted locations at search time, but if they regularly pass through the targeted location."³⁸⁷

Finally, one of Google's most used products – maps – is courting advertisers.³⁸⁷ Over the past 14 years ago, maps has been relatively free of ads, but now the app will regularly highlight sponsored locations and show additional paid listings when people search for nearby businesses.³⁸⁷ Also, for the last two years, "Google has also tested 'promoted pins,' which show an advertiser's brand regardless of whether or not the user searched for that business."³⁸⁷

"If there's any platform that believes in the power of account-based marketing, it's LinkedIn," explains Adstage.³⁸⁷ The company has "teamed up with Adobe and Microsoft to accelerate account-based marketing for their joint customers."³⁸⁷ "LinkedIn says that by extending account-based marketing capabilities to Adobe Experience Cloud users, they're creating a seamless way for them to identify and target the right audiences on LinkedIn with meaningful content."³⁸⁷ This is great news for B2B marketers as "Adobe and Microsoft are also working together to align key data sources to populate account-based profiles from Adobe Experience Cloud, including Marketo Engage and Microsoft Dynamics 365 for Sales."³⁸⁷ This makes it "much easier for B2B marketers to easily identify, understand, and engage B2B customer buying teams."³⁸⁷

"In an effort to demonstrate a broader focus on ad inventory, data, and targeting

capabilities, Bing Ads rebranded itself to Microsoft Advertising,” explains Adstage.³⁸⁷ In the announcement post, Microsoft said, “It’s a simple shift because our clients and partners already know us as Microsoft, and many are already tapping into our new advertising products that go above and beyond search, such as the Microsoft Audience Network.”³⁸⁷

“Microsoft Advertising also debuted Sponsored Products, which allow manufacturers to promote their products in shopping campaigns with their hotelier partners.”³⁸⁷ According to Adstage, “this gives manufacturers access to new reporting and optimization capabilities, and retailers get additional product marketing support with a fair cost split.”³⁸⁷ Also, “Microsoft’s new Chromium-based Edge browser, an overhauled app now available for Windows, MacOS, Android and iOS that’s based on Google’s open-source browser technology will block intrusive ads.”³⁸⁷ This is another clear sign that browsers are now competing to make the online experience better – and more private – for consumers, even if it deters businesses.³⁸⁷ “Product managers say Edge will also go a step further with a privacy control that consumers could use to block advertisers and publishers from tracking them across the web. The feature offers three levels of tracking constraints: unrestricted, balanced and strict,” concludes Adstage.³⁸⁷

In its *Q3 2019 Paid Search and Paid Social Benchmark Report*³⁸⁸, Adstage reports that “Facebook continued on its quest to make users feel more comfortable on the platform by making it easier for them to understand why an ad was being shown.” “Now when someone clicks on ‘Why am I seeing this ad?’ they’ll see detailed information like interests or categories they’ve shown an affinity for that may have been the reasons they were targeted for the ad,” explains Adstage.³⁸⁸ Facebook will also be “more upfront about where it received information about a user’s interests.”³⁸⁸ “That means anyone can find out which advertiser uploaded a list with their information and used it to run an ad in the past 7 days,” says Adstage.³⁸⁸

“Facebook is finding more ways to pack advertising opportunities into its pages,” notes Adstage.³⁸⁸ “In Q3, Facebook started letting more advertisers place ads in Facebook’s search results.”³⁸⁸ “‘Facebook search’ now pops up for some advertisers when they’re creating a Newsfeed campaign. That means businesses have to place ads in Facebook search results and in the Newsfeed.”³⁸⁸ “When a business places an ad in Facebook search, it shows up for search terms related to the business’s offerings,”³⁸⁸ which means a Facebook business page should be highly detailed and updated constantly.³⁸⁸

In Q3, Facebook also rolled out automated lead generation capabilities in Messenger.³⁸⁸ “After tapping on a click-to-Messenger ad, users go through an automated series of questions that can be answered with pre-filled or free form responses,” explains Adstage.³⁸⁸ “To continue the process, businesses can integrate Messenger with their CRM provider to capture leads info. Pages can

also manually continue the conversation through Pages Inbox, Pages Manager App, or a third-party live chat provider,” notes Adstage.³⁸⁸

Google recently updated “its Keyword Planner tool so that it now shows the most relevant keyword ideas based on the seed keyword.”³⁸⁸ “The update is designed to help campaign managers prioritize which keywords to add to their Google Ads account,” says Adstage.³⁸⁸ Also, “Google Ads will now only suggest recommended keywords if they’re estimated to drive additional traffic beyond existing keywords.”³⁸⁸ In addition, Google Ads’ keyword recommendations can now include broad match modifiers.³⁸⁸ “Google Ads also expanded close variants to include words that have the same meaning as the original keyword.”³⁸⁸ “Now, close variants can match for queries that don’t contain the keywords at all, as long as they share the same meaning.”³⁸⁸

On the analytics side, “Google is making it easier to measure users’ interactions across platforms with unified app and website analytics.”³⁸⁸ “Reports for this new property use a single set of consistent metrics and dimensions, making it possible to see integrated reporting across app and web like never before. Now you can answer questions like: Which marketing channel is responsible for acquiring the most new users across your different platforms?” says Google.³⁸⁸

According to Adstage, Google officially launched Gallery Ads in beta in the 3rd quarter of 2019.³⁸⁸ “Gallery ads are a swipeable, image-based ad unit that appear at the top of search results. Much like Carousels on Facebook, they’re designed to give businesses more real estate to showcase their brand visually with the ability to include up to 8 images,” says Adstage.³⁸⁸

“There’s a new ad unit available to advertisers on YouTube — masthead ads,” notes Adstage.³⁸⁸ “Previously, the only way to buy YouTube masthead ads was to do a full day takeover. That meant everyone who visits YouTube on a particular day would see the ad. You can still do that, but the cost is enormous, and there are no targeting options. Now advertisers can buy the YouTube Masthead on a cost-per-thousand impression (CPM) basis and use advanced audience solutions to customize who sees it,” says Adstage.³⁸⁸

YouTube’s new “Video Reach campaigns let advertisers upload multiple videos for a single campaign.”³⁸⁸ “The capabilities include three different asset types — six-second bumper ads, skippable in-stream ads, and non-skippable in-stream ads. The units are available on a CPM-basis and currently run on YouTube’s desktop and mobile platforms,” says Adstage.³⁸⁸

In Q3, “LinkedIn gave marketers a handful of exciting new advertising goals and insights capabilities.”³⁸⁸ “The first of these was three new ways for marketers to achieve their advertising goals. In Campaign Manager, marketers can now optimize their LinkedIn marketing campaigns for the following objectives:

- Brand awareness

- Website conversions
- Job applicants³⁸⁸

With this change, LinkedIn is optimizing its click pricing to align with the selected objective of helping marketers best utilize their budgets.³⁸⁸ “For example, if your objective is website clicks, you’ll only be charged for clicks that go to a landing page or your website,” explains Adstage.³⁸⁸

“In Q3, Twitter introduced a 6-second video bid unit where advertisers will be charged only if their ad is viewed for 6 seconds, with pixels at 50% in view,” says Adstage.³⁸⁸ Twitter also revealed that, “according to their data, a tweet can attract 10x the engagement as a tweet without a video.”³⁸⁸ Even videos of non-professional quality could be just as engaging as something that’s more polished.³⁸⁸

Microsoft Advertising is giving marketers the ability to see where their ads are showing up in search results seems like a given.³⁸⁸ Also, new metrics include³⁸⁸:

- Top impression share.
- Top impression share lost to rank.
- Top impression share lost to budget.
- Absolute top impression share.
- Absolute top impression share lost to rank.
- Absolute top impression share lost to budget.

“A top impression is anything in the top section of search results. An absolute top impression means the ad was the first thing shown in search results,” explains Adstage.³⁸⁸

Microsoft is giving users the ability to test it with a feature called “Experiments”.³⁸⁸ “As the company explained in the announcement, ‘Sometimes, it’s not immediately clear whether a new bidding strategy, setting, or feature is the best move for you... With experiments rolling out globally, you can now test out those campaign changes with full confidence.’”³⁸⁸ “This gives advertisers the ability to test changes without launching them across the whole campaign for a pretty effective A/B test,” notes Adstage.³⁸⁸

Microsoft is also giving “marketers more real estate in Dynamic Search Ads with longer titles and descriptions. This makes their ads more comparable to what Google’s ads provide after their recent headline, description, and character expansions.”³⁸⁸ The update gives marketers³⁸⁸:

- An additional description field.
- Up to 90 characters each for the two descriptions.
- Longer dynamically generated ad titles.

In another bid to keep pace with Google, Microsoft opened up Responsive search ads – ads that automatically adjust themselves according to the search query –

to all advertisers,” says Adstage.³⁸⁸ Previously it was only for select accounts.³⁸⁸ Finally, Microsoft built in a new audience targeting option.³⁸⁸ “The new method combines customer data with technology to hit people with ads when they’re most ready to buy by finding prospects who are similar to those who already buy from you. Microsoft says the new option should give marketers a boost in the performance of shopping campaigns with better conversion rates and lower CPA,” notes Adstage.³⁸⁸

Conclusion

Social media listening can provide a hotel with an ongoing real-time window into customer sentiment, as well as give the business verifiable information about the company’s marketing campaigns, brands, and services.

The beauty of this system is that it can be a real win-win when it comes to a company’s marketing plan as customers who are happy with a business’s products and/or services will often comment and blog about the products and/or services they like, while those who aren’t happy with it can be reached out to and, hopefully, converted into satisfied customers. Often, the simple act of responding to a customer’s comments can turn the tide of negativity and, as long as the remedies are constructive, turn a hostile customer into a happy one, and, possibly, one who might even tout the company’s excellent customer service at a later date.

Mullich offers the following tips on how to get the low-down on rivals³⁸⁰:

1. Understand that day-to-day online chatter can be misleading, but, over time, A hotel can find directional trends important to its business and industry.
2. The deepest insights often come not from general sources, like Facebook and Twitter, but from blogs and forums that are specific to an industry.
3. Think broadly about the nature of one’s “competitors” — sentiment analysis can help a business prepare for unexpected entries that might be preparing to take a piece of its business. Keyword search teams can help.
4. The information you can gain online about competitors is limited, and often must be combined with your own internal data to bring actionable insights.

There are, of course, limits to what competitive sentiment analysis can provide. “The challenges you might address, using your company’s own customer, product, and transactional data, are far more extensive than those you can tackle via available competitor data,” says Seth Grimes, an analyst who runs the annual Social Analysis Symposium.³⁸⁰ “For instance, you’re not going to have access to

your competitors' contact-center notes and warranty claims, or to your competitors' customer profiles and transaction records. But with your own company's, you can create some very rich analyses," he adds.³⁸⁰

For the above reasons, competitive analysis is usually just one piece of the vast data mosaic.³⁸⁰ For example, one company that noticed a drop in sales of its flagship product analyzed online chatter and found customers were talking enthusiastically about a new product a competitor had just released.³⁸⁰ "When the company analyzed its contact-center data, it found that returns correlated to discontent about an attribute its own product lacked, but the new competing product offered."³⁸⁰ The company was quickly able to identify the problem and by using a combination of competitive sentiment analysis, discovery from its own internal data, it was able to tweak its own product to make it much more competitive.³⁸⁰

As Grimes says, "Sentiment analysis can help you understand how the market perceives you and your competitors' products and services, but keep in mind that sentiment is only an indicator, useful in measuring and projecting market impact, not a substitute for strong human judgment."³⁸⁰

There is a dark side to all this tracking as the case of IFA and Shopsense showed. Health Insurer IFA Insurance teamed up with Shopsense, a grocery chain in Midwest America, and bought their loyalty card customer data.³⁸⁹ The insurance company discovered some intriguing patterns in the loyalty card data, such as the correlation between condom sales and HIV-related claims, for example.³⁸⁹ It also discovered such things as households that buy cashews and bananas quarterly are the least likely to develop symptoms of Alzheimer's.³⁸⁹ Although this information did prove to be highly profitable for IFA, I believe it is a clear violation of customer trust and privacy.

As Katherine Lemon explains in her article, *How Can These Companies Leverage the Customer Data Responsibly*³⁹⁰, "Customer analytics are effective precisely because firms do *not* violate customer trust. People believe that retail and other organizations will use their data wisely to enhance their experiences, not to harm them. Angry customers will certainly speak with their wallets if that trust is violated."³⁹⁰

Another concern for consumers is what Lemon calls "battered customer syndrome."³⁹⁰ She explains that, "Market analytics allow companies to identify their best and worst customers and, consequently, to pay special attention to those deemed to be the most valuable."³⁹⁰

"Looked at another way, analytics enable firms to understand how poorly they can treat individuals or groups of customers before those people stop doing business with them. Unless you are in the top echelon of customers — those with the highest lifetime value, say — you may pay higher prices, get fewer special offers, or receive less service than other consumers," Lemon adds.³⁹⁰

“Despite the fact that alienating 75% to 90% of customers may not be the best idea in the long run, many retailers have adopted this ‘top tier’ approach to managing customer relationships. And many customers seem to be willing to live with it — perhaps with the unrealistic hope that they maybe reach the upper echelon and reap the ensuing benefits.”³⁹⁰

“Little research has been done on the negative consequences of using marketing approaches that discriminate against customer segments. Inevitably, however, customers will become savvier about analytics. They may become less tolerant and take their business (and information) elsewhere,” warns Lemon.³⁹⁰

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CHAPTER SIX: THE SMART HOTEL

“Smart homes and other connected products won't just be aimed at home life. They'll also have a major impact on business. And just like any company that blissfully ignored the Internet at the turn of the century, the ones that dismiss the Internet of Things risk getting left behind.”

~Jared Newman
Fast Company

Overview

Not only is AI old, but it is also a difficult technology to implement. One of the first things companies that want to implement AI need to do is to get its data house in order. In its *Conquer the AI Dilemma by Unifying Data Science and Engineering*³⁹¹, Databricks says that only “1 in 3 AI projects are successful and it takes more than 6 months to go from concept to production, with a significant portion of them never making it to production — creating an AI dilemma for organizations.”

Databricks believes that data-related challenges are hindering 96% of organizations from achieving AI.³⁹¹ Nearly all of the respondents (96%) cited multiple data-related challenges when moving projects to production.³⁹¹ “According to the survey, 90% of the respondents believe that unified analytics — the approach of unifying data processing with ML frameworks and facilitating data science and engineering collaboration across the ML lifecycle, will conquer the AI dilemma.”³⁹¹

Databricks argues that, Unified Analytics make AI much more achievable for organizations.³⁹¹ “Unified Analytics makes it easier for data engineers to build data pipelines across siloed systems and prepare labeled datasets for model building while enabling data scientists to explore and visualize data and build models collaboratively.”³⁹¹ A unified analytics platform can “unify data science and engineering across the ML lifecycle from data preparation to experimentation and deployment of ML applications — enabling companies to accelerate innovation with AI,” concludes Databricks.³⁹¹

The rest of this chapter will focus on how to build the backbone of an IT system that will incorporate a structure that can help a hotelier utilize AI throughout its operation. General sections on data governance, IoT, deep learning frameworks, amongst others, will lay out the most common questions that a marketer should

ask about an EDW, cloud systems, storage, CPUs, and an AI, ML and deep learning world. The rest of this chapter will detail specific business areas that can be improved with these technologies.

The term “Smart” has become synonymous with a vision of technology integrating with multiple information and communication platforms, including Internet of Things (IoT) solutions to enhance quality, performance and interactivity of services, as well as to reduce costs and resource consumption and to improve contact between different parties, including between a citizen and his or her government.

In my estimation, *The A.I. Hotelier* has answers to the following questions:

- How can a hotel save on its resource use?
- How can a hotel improve the management of patron movements?
- How can a hotel best utilize its transportation fleet?
- How can a hotel reduce its labor needs?
- How can a hotel cut down on waste?
- How can a hotel ensure its security?

These are all important questions that need to be asked by today’s hotel executives. IoT can help hotels become more predictive. Sensors have become so small and so cheap they can be put almost anywhere. IoT sensors can be used for smart parking, smart lighting, as well as part of a mini smart grid. They can also be used for silo stock calculation — measuring the emptiness level and weight of goods, as well as waste management, tracking movements within the hotel, and perimeter access control.

For a hotel’s logistics department, IoT aids quality of shipment conditions, item location, storage incompatibility detection, and fleet tracking. IoT sensors can even be installed to ensure a building’s structural health, as well as part of a swimming pool remote management system.

As Figure 22 shows, analytics can be used to boost service quality, reduce operating costs, as well as increase ROI. As the IBM Thought Leadership White Paper *Descriptive, predictive, prescriptive: Transforming asset and facilities management with analytics*³⁹² states, “As facilities and assets become more IT-like — instrumented, intelligent and interconnected — the convergence of physical and digital infrastructures makes their management increasingly complex. And in a physical world outfitted with millions of networked sensors, vast amounts of facilities- and asset-generated data make extracting meaning increasingly difficult.”³⁹²

When it comes to capital planning, real estate lease management, operations, facilities maintenance and energy consumption, IRs must tame the three Vs of big data — volume, variety, and velocity — and analytics are the best way to do that.

UNDERSTANDING ANALYTICS

Definitions, sample applications and opportunities, and underlying techniques

	Descriptive	Predictive	Perscriptive
	What HAS happened?	What COULD happen?	What SHOULD happen?
What the user needs to DO	<ul style="list-style-type: none"> Increase asset reliability Reduce labor and inventory costs 	<ul style="list-style-type: none"> Predict infrastructure failures Forecast facilities space demands 	<ul style="list-style-type: none"> Increase asset utilization Optimize resource schedules
What the user needs to KNOW	<ul style="list-style-type: none"> The number and types of asset failures Why maintenance costs are high The value of the materials inventory 	<ul style="list-style-type: none"> How to anticipate failures for specific asset types When to consolidate underutilized facilities How to determine costs to improve service levels 	<ul style="list-style-type: none"> How to increase asset production Where to optimally route service technicians Which strategic facilities plan provides the highest long-term utilization
How analytics gets ANSWERS	<ul style="list-style-type: none"> Standard reporting - What happened? Query/drill down - Where exactly is the problem? Ad hoc reporting - How many, how often, where? 	<ul style="list-style-type: none"> Predictive modeling - What will happen next? Forecasting - What if these trends continue? Simulation - what could happen? Alerts - what actions are needed? 	<ul style="list-style-type: none"> Optimization - What is the best possible outcome? Random variable optimization - What is the best outcome given the variability in specified areas?
What makes this analysis POSSIBLE	<ul style="list-style-type: none"> Alerts, reports, dashboards, business intelligence 	<ul style="list-style-type: none"> Predictive models, forecasts, statistical analysis, scoring 	<ul style="list-style-type: none"> Business rules, organization models, comparisons, optimization

Figure 22: Understanding analytics, definitions, applications

Source: IBM³⁹²

Utilizing the right analytics in the right place can yield impressive ROI results. As IBM states³⁹²:

“From basic to advanced capabilities, analytics can yield dramatic results. One study found that an organization that uses basic automation to expand its reporting capabilities can improve its return on investment (ROI) by 188 percent. But adding additional capabilities such as data management, metadata to ensure uniform data interpretation, and the ability to gather and analyze data from outside the organization, can boost ROI to as high as 1,209 percent.”

IBM’s specific examples include:

- “Effective facilities and asset management uses data analytics to proactively manage facilities and maintain equipment, optimize utilization, prevent breakdowns, lower occupancy and operational costs, and extend asset life.”³⁹²
- “Utilizing analytics to monitor energy-intensive equipment across the facilities portfolio, identify operating anomalies in real time, and generate corrective work orders can dramatically reduce energy consumption.”³⁹²
- “To help mitigate risks of failure in facilities and assets, analytics can detect even minor anomalies and failure patterns. Identifying issues early helps organizations deploy limited maintenance resources more

cost-effectively, maximize equipment uptime and improve customer service levels.”³⁹²

Data Governance

Today, Talend believes that, “Data governance is not only about control and data protection; it is also about enablement and crowdsourcing insights. Data governance is a requirement in today’s fast-moving and highly competitive enterprise environment.”³⁹³ Ultimately, “Now that organizations have the opportunity to capture massive amounts of diverse internal and external data, they need the discipline to maximize that data’s value, manage its risks, and reduce the cost of its management,” claims Talend.³⁹³

Data governance is not optional in today’s highly complex and fast-moving IT environment.³⁹³ An effective data governance strategy provides so many crucial benefits to an organization, including³⁹³:

- A common understanding of data: “Data governance offers a consistent view of, and common terminology for, data, while individual business units retain appropriate flexibility.”³⁹³
- Improved data quality of data.
- A data map.
- A 360-degree view of each customer and other business entities.
- Consistent compliance with government regulations.
- Improved data management because a human dimension is brought into a highly automated, data-driven world.
- Easy accessibility.

To find the right data governance approach for your organization, Talend recommends brands look for “open source, scalable tools that are easy to integrate with the organization’s existing environment.”³⁹³ Additionally, a cloud-based platform lets brands “quickly plug into robust capabilities that are cost-efficient and easy to use.”³⁹³ “Cloud-based solutions also avoid the overhead required for on-premises servers,” notes Talend.³⁹³ When comparing and selecting data governance tools, brands need to focus on choosing ones that will help them realize the business benefits laid out in their data governance strategy.³⁹³ Any chosen tool should help in the following ways³⁹³:

- Capture and understand data through discovery, profiling, benchmarking and capabilities.³⁹³ For example, the right tools can automatically detect a piece of personal data, like a national ID or social security number, in a new data set and then trigger an alert.
- Improve the quality of a brand’s data with validation, data cleansing, and data enrichment.

- Manage a brand's data with metadata-driven ETL and data integration applications so data pipelines can be tracked and traced with end-to-end, forward-looking and backward-looking data lineage.
- Control a brand's data with tools that actively review and monitor it.³⁹³
- Empower the people who know the data best, so they can contribute to the data stewardship tasks with self-service tools.³⁹³

Modern data governance is about both minimizing data risks and maximizing data usage.³⁹³ There is a need for a more agile, bottom-up approach, which "starts with the raw data, links it to its business context so that it becomes meaningful, takes control of its data quality and security, and thoroughly organizes it for massive consumption."³⁹³ In addition, due to headline-grabbing data scandals and data leaks, governments are enacting a proliferation of new regulations and laws that put higher stakes on data protection.³⁹³

Talend believes that, "New data platforms empower this new discipline, which leverages smart technologies like pattern recognition, data cataloging, data lineage, and machine learning to organize data at scale and turn data governance into a team sport by enabling organization-wide collaboration on data ownership, curation, remediation, and reuse."³⁹³

With data storage prices plummeting, data is becoming less commoditized.³⁹³ Large data repositories such as data lakes are creating vast reservoirs of known and unknown datasets.³⁹³ Although it might take seconds to ingest data into a modern EDW or data lake, it could take weeks for this data to be made available to a business user.³⁹³ At the same time, business users might not even be aware that the data they need is even available for use.³⁹³ Humans are inventive creatures and they often employ data work-arounds, which can create additional governance headaches.³⁹³ When business users add their own rules atop newly created data sources, multiple versions of "the truth" result. This can lead to data governance nightmares.³⁹³

The challenge "is to overcome these obstacles by bringing clarity, transparency, and accessibility to your data assets."³⁹³ Wherever this data resides, proper data screening must be established so businesses have a holistic view of the data sources and data streams coming into and out of their organization.³⁹³

In the past, data experts might have manually processed the data using traditional data profiling tools.³⁹³ However, this approach no longer works.³⁹³ "The digital era's data sprawl requires a more automatic and systematic approach," says Talend.³⁹³

Modern data cataloging tools can help schedule the data discovery processes that crawls an EDW or a data lake and intelligently inspect the underlying data, so that it can be understood, documented, and actioned, if necessary.³⁹³ Today's data catalogs "can automatically draw the links between datasets and connect them to a business glossary."³⁹³ Talend argues that, "this allows an organization

to automate the data inventory and leverage smart semantics for auto-profiling, relationships discovery and classification thanks to an integrated semantic flow.”³⁹³ The benefits are twofold; data owners and providers get an overview of their data and can take actions; data consumers get visibility into the data before consuming it.³⁹³

Data profiling is the process of discovering in-depth and granular details about a dataset. It helps in accurately assessing a company’s multiple data sources based on the six dimensions of data quality — accuracy, completeness, consistency, timeliness, uniqueness, and validity.³⁹³ It will help a brand identify if and how its data is inaccurate, inconsistent, and, possibly, incomplete.³⁹³

Often, the people who know the data best are not the data experts.³⁹³ Sales admins, sales representatives, customer service reps, and field marketing managers know the data quality issues probably better than their company’s central IT team.³⁹³ Not only do they know the data best, but they are also the ones who most keenly feel the pain of data quality issues because it directly impacts upon their day-to-day job.³⁹³

Of course, these people can’t become data quality experts so they must be provided with smart tools that can hide the technical complexity of data profiling. Many vendors provide data preparation tools that have “powerful yet simple built-in profiling capabilities to explore data sets and assess their quality with the help of indicators, trends, and patterns.”³⁹³ “While automatic data profiling through both a data catalog and self-service profiling addresses the case for bottom-up data governance, a top-down approach might require a deeper look into the data,” says Talend.³⁹³

With products like Talend Data Quality, users “would start by connecting to data sources to analyze their structure (catalogs, schemas, and tables), and store the description of their metadata in its metadata repository.”³⁹³ Users would then “define available data quality analyses including database, content analysis, column analysis, table analysis, redundancy analysis, and correlation analysis,” says Talend.³⁹³ “These analyses will carry out data profiling processes that will define the content, structure, and quality of highly complex data structures,” adds Talend.³⁹³

A “trust index” can be created out of all this data discovery and it can be calculated, reported, and tracked on a regular and automated basis.³⁹³ Trigger alerts can be set when index moves beyond a certain comfortable threshold.³⁹³

According to Talend, “Data quality is the process of conditioning data to meet the specific needs of business users.”³⁹³ However, data quality is not a standalone operation or problem.³⁹³ “To make it successful and deliver trusted data, you need to operate data quality operations upfront and natively from the data sources, along with the data lifecycle to ensure that any data operator or user or app could consume trusted data at the end,” argues Talend.³⁹³

“Successful data governance frameworks require setting accountabilities and then delegating that authority appropriately,” argues Talend³⁹³ For example, Talend says, “a data protection officer in a central organization might want to delegate tasks to data stewards or business users in the operations: a sales engineer might be best positioned to ensure that contact data for his or her accounts are accurate and kept up-to-date. A campaign manager is the one that should ensure that a consent mechanism has been put in place and captured within its marketing database.”³⁹³ To support this kind of delegation, organizations need to provide workflow based, self-served apps to different departments, recommends Talend.³⁹³ This provides additional autonomy without putting the data at risk.³⁹³

“The cloud drastically extends the boundaries of data. Lines of business use their own applications, and products, people, and assets create their own data pipelines through the web and the Internet of Things. Data can also be exchanged seamlessly between business partners and data providers,” says Talend.³⁹³

“Data preparation is not just a separate discipline to make lines of business more autonomous with data; it’s a core element for data quality and integration,” contends Talend.³⁹³ Not only does it unlock people’s data productivity, but it also captures the actions taken on that data, which can help make the data more trustworthy.³⁹³ In addition to improving personal productivity, the true value of these collaborative and self-service applications is to drive collaboration between business and IT, however that’s not always an easy thing to do.³⁹³

Once the incoming data assets are identified, documented and trusted, it is time to organize them for massive consumption by an extended network of data users within an organization.³⁹³ “This starts by establishing a single point of trust; that is to say, collecting all the data sets together in a single control point that will be the cornerstone of your data governance framework,” explains Talend.³⁹³ Datasets then need to be identified; roles and responsibilities have to be assigned directly into a single point of control.³⁹³

“It is one of the advantages of data cataloging: regrouping all the trusted data in one place and giving access to members so that everybody can immediately use it, protect it, curate it and allow a wide range of people and apps to take advantage of it,” notes Talend.³⁹³ “The benefit of centralizing trusted data into a shareable environment is that it will save time and resources of your organization once operationalized,” they add.³⁹³

“Within a data catalog, a business glossary is used to define collections of terms and to link them to categories and sub-categories. Building a business glossary can be as simple as dragging in an existing well-documented data model, importing the terms and definitions from other sources (e.g., CSV, Microsoft Excel),” says Talend.³⁹³ Once published, the glossary can be accessed company-

wide anyone who has proper authorizations.³⁹³

Talend believes that, “As you are about to deliver access to your catalog to others, your dataset will become a living artifact, as you will enable authorized people to edit, validate, or enrich the data directly into data sets.”³⁹³ “Doing it automatically through a data catalog will allow you to save lots of time and resources,” they contend.³⁹³

Talend claims that data lineage functionality gives users the ability to track and trace their data flows from source to final destination.³⁹³ Data lineage can dramatically accelerate the speed to resolution of problematic data by helping users spot the specific problem at the right place and ensure that the data is always accurate.³⁹³ Moreover, if new datasets come into an EDW and/or a data lake, data lineage rapidly helps identify these new sources.³⁹³ Errors can quickly be uncovered and accountability understood. A data chain is both forward and backward-looking, upstream or downstream impact is easily seen and acted upon.

Once the data categories have been defined, a more accurate picture of the data environment sources can be created.³⁹³ “It will also enable you to define better data owners: who is responsible for this particular data domain? Who is responsible for viewing, accessing, editing and curating the data sets?” explains Talend.³⁹³

At this step, using a RACI Model — a model derived from the four key responsibilities most typically used: Responsible, Accountable, Consulted, and Informed — will help users save time defining and assigning roles and responsibilities between stakeholders.⁹⁶

“The next step is to define data owners who are ultimately accountable for one or more data categories and subcategories,” says Talend.³⁹³ “These data owners will be responsible for day-to-day operations regarding the data or appoint data stewards those operational data-centric tasks. They will identify critical datasets and critical data elements (CDEs) as well as establish standards for data collection, data use, and data masking.”³⁹³ “A data catalog may also catalog owners and stewards for data categories and sub-categories and assign their related roles and workflows,” adds Talend.³⁹³

For example, a data cataloger “may catalog the data owners for ‘customer’ as well as ‘customer identity’, ‘customer billing’, ‘customer contact’ and ‘customer ship-to information’.”³⁹³

The RACI Model is a good example of a responsibility assignment matrix that is both easy to understand and use.⁹⁶ “It’s particularly useful if your data governance will involve different departments and divisions in your organization,” says Talend.³⁹³

According to Wikipedia, data curation “is the organization and integration of

data collected from various sources. It includes annotation, publication, and presentation of data to make sure it's valid over time."³⁹⁴ This will be enabled once you put in place an explicit RACI Model that clearly describes who can define, edit, validate, and enrich data in the systems.³⁹³

"A data governance project is not just intended to let trusted data be accessible to all," claims Talend.³⁹³ "It's also about promoting data custodians' accountability to the rest of the organization so that they can enrich and curate trusted data and produce valuable, accurate insights out of the data pipelines," they add.³⁹³ "In many cases, data owners realize that they should not manage everything in their data domain, and thus need act as orchestrators rather than doers," notes Talend.³⁹³

"The data governance team may also delegate responsibilities for data protection," adds Talend.³⁹³ Data masking is a prime example for delegation.³⁹³ "In a data lake, for example, IT specialists might not be the ones responsible for data masking and might even not have the authorization privileges to process the data before it has been masked," claims Talend.³⁹³ Data protection tasks can be delegated to people who might not be technical experts with deep expertise in the data masking discipline.³⁹³

"This is why it is important to empower a large audience to mask the data on their own so that once they identify specific scenarios where sensitive data may be exposed, they can proactively act on it automatically with a user-friendly tool," says Talend.³⁹³ For example, Talend offers the case of a campaign manager who prepares an event with a business partner that doesn't have explicit consent to see the personal data of a customer because of a lack of third party privacy consent.³⁹³ Thankfully, the campaign manager can utilize data prep tools that can mask the data directly on the data so that the data can be easily shared without violating data privacy rules.³⁹³

Once the data is accessible in a single point of access and reconciled properly, "it is time to extract all its value by delivering at scale to a wide audience of authorized humans and machines," says Talend.³⁹³ Technologies like automation, data integration and machine learning can help enormously.³⁹³

"Advanced analytics and machine learning help democratize data governance and data management because they make things much simpler," argues Talend.³⁹³ "They improve developers' productivity and empower non-data experts to work with data as well by suggesting next best actions, guiding users through their data journey," say Talend.³⁹³

"Machine learning also allows the capture of knowledge from business users and data professionals," says Talend.³⁹³ One typical use case is data error resolution and matching.³⁹³ Self-service tools can be used to deduplicate records on a data sample and then machine learning can be applied to a whole data set in a fully automated process, which turns low value and time-consuming tasks into an

automated process that can be scaled up to handle millions of records.³⁹³

Data masking allows a company to selectively share production quality data across their organization for development, analysis and more, without ever disclosing any Personally Identifiable Information (PII) to people not authorized to see it.³⁹³

Failing to establish strict data privacy controls can leave a company exposed to financial risk, negative reputation, and stiff data privacy regulatory penalties.³⁹³ To deal with this growing threat, businesses need to find ways to automatically spot sensitive datasets.³⁹³ Data cataloging technologies can help with this.³⁹³

“A data catalog is the typical starting point for automating the personal data identification process,” says Talend.³⁹³ Once data elements have been defined with a PII, data sets that relate to them can automatically be spotted and masked, if necessary.³⁹³ If personal data is not necessary for testing or analytics, why risk exposing it?³⁹³

In the past, disciplines like data masking were sparingly used, but with the explosion of data privacy scandals and the proliferation of regulations, a much more aggressive approach to data masking is needed.³⁹³ Only then can businesses share production-quality data across their organizations for analysis and business intelligence, without exposing personally identifiable information.³⁹³

“Many data governance approaches fail because they cannot be applied in a systematic way,” claims Talend.³⁹³ Modern data governance controls “need to be embedded into the data chain, so that it can be operationalized and cannot be bypassed.”³⁹³ It needs to become part of the process.

Data governance can help data engineers orchestrate and automate all of a company’s data pipelines, whether they are physical EDWs or cloud-based ones, or even data that surfaces through a company app.³⁹³ “It will act as an orchestrator to operationalize and automate any jobs or flows so that you keep on structuring and cleaning your data along the data lifecycle, all the while putting stewards at work for validation, users for curations or business users for data preparation,” says Talend.³⁹³

A data catalog makes “data more meaningful for data consumers, because of its ability to profile, sample and categorize the data, document the data relationships, and crowdsource comments, tags, likes and annotations.”³⁹³ “All this metadata is then easy to consume through full text or faceted search, or through visualization of data flows,” explains Talend.³⁹³ Data catalogs make it “possible to locate, use, and access trusted data faster by searching and verifying data’s validity before sharing with peers.”³⁹³

Capacity and Demand Management

In their *Capacity management for hospitality and tourism: A review of current approaches*⁶², Pullman and Rodgers acknowledge that many leisure enterprises, such as casinos and massive integrated resorts, require substantial capital investment and expenditure. Pullman and Rodgers contend that, “While capacity management has generally fallen within the domain of operations management, and demand management within the domain of marketing, intersecting methodologies such as yield and revenue management, the partitioning of visitors (by length of stay), and/or the adjustment of visitor participation levels rely on expertise from both of these functional areas to work effectively.”⁶²

Although capacity management has been referred to as “demand management”³⁹⁵ by Crandall and Markland and “managing capacity and demand” by Fitzsimmons and Fitzsimmons, capacity and demand management are, in fact, distinct concepts. Taylor believes that demand management attempts to influence when and how many visitors attend or use a service³⁹⁶, whereas Klassen and Rohleder contend that capacity management ensures that sufficient capacity exists to meet this demand.³⁹⁷

Pullman and Rodgers argue that, capacity strategy is a key operational function for all leisure-related enterprises.^{398 399 59} “The extent to which capacity satisfies demand has an impact on visitor experience, employee satisfaction, profitability, and long-term sustainability of both the resources and the enterprise itself,” they contend.⁶²

In the leisure industry, excess capacity not only underutilizes the workforce and other physical resources, but can also lead to increased waste and demand stimulating and profit reducing price reductions.³⁹⁹ “Inadequate capacity, on the other hand, can impair the visitor experience through degradation of facilities, overuse of natural resources, crowding, and increased waiting time, warn Pullman and Rodgers.⁶² It can also open the door for competitors to enter the market as well as overtax the workforce, leading to employee burnout and increased turnover.⁶² “Fortunately, firms can borrow a number of ideas from other industries to facilitate better matching of supply to demand in their particular enterprise,” advise Pullman and Rodgers.⁶²

Capacity “can be separated into two distinct perspectives, the strategic or long-term perspective and the tactical or short-term perspective.”⁶² Strategic capacity decisions are made during the planning stages for a project as managers consider macro-level responses to existing and potential future demand.^{400 401 399} For Pullman and Rodgers, “Such decisions may include the number of hotel rooms an area can or should support; the land space, energy, and water required for a project; the available labour and skills; the anticipated overall size of the enterprise in terms of parking, seating, and production requirements (in food

services); and/or the carrying capacity issues for natural resources.”⁶²

Later in the planning process, the capacity focus shifts to the set of short-term actions taken to fulfill the planned strategies, often called the “tactics.”⁴⁰¹ “Examples of these decisions include the determination of the number of employees needed to meet peak demand during a summer lunch period and the best mix of table configurations to accommodate dinner demand given different party sizes,” say Pullman and Rodgers.⁶² As per Figure 23, “Long versus short term decisions are distinctly different, and the methodologies for addressing these problems often involve alternate approaches.”⁶²

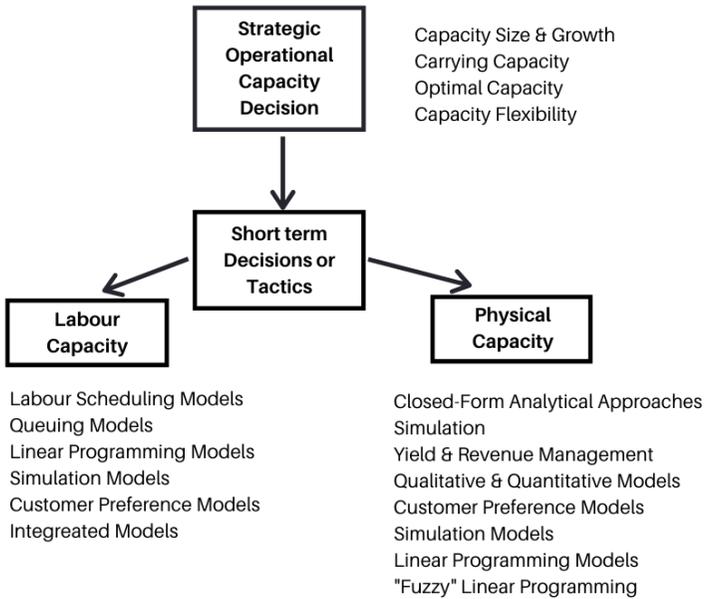


Figure 23: Capacity decisions

Source: Pullman and Rogers, *Capacity management for hospitality and tourism: A review of current approaches*⁶²

According to Porter, “In the strategic capacity planning phase, enterprises make decisions to ensure achievement of their desired objectives based on an assessment of their current situation or position, capabilities, shortcomings, and overall competitive position; the alternatives and risks involved; and the timing.”⁴⁰⁰

For Pullman and Rodgers, “Strategic capacity decisions include capacity size and expansion, carrying capacity or optimal use of the resource, and capacity flexibility. Capacity size refers to the maximum physical size of a facility or the optimal size of a workforce.”⁶² Carrying capacity is the desired or optimal level

of utilization of a given resource; beyond that capacity, both Lawson and Baud-Bovy⁴⁰² as well as Mathieson and Wall⁴⁰³ argue that negative impacts exceed levels specified by evaluative standards, such as those for physical deterioration or minimum quality of recreational experience. "Capacity flexibility represents the ability to respond to fluctuating demand using additional labour or adjustments to physical space."⁶² For Schroeder, "These strategies address the amount and timing of capacity changes and types of facilities needed for the long run."⁴⁰¹ "For physical facilities, capacity strategy is part of the total operations strategy; it is not merely a series of incremental capital-budgeting decisions," argue Pullman and Rodgers.⁶² "Both physical and labour capacity strategies include proactive planning for future growth, reactive response to existing demand, or a mix of these two strategies," claim Davis and Heineke.³⁹⁹

"Short-term capacity management comprises the set of actions taken to fulfill the firm's strategy — specifically, the methods of implementation or the requirements for the strategic plan to take effect," say Pullman and Rodgers⁶²; for example, diners or visitors served per hour, rooms cleaned per shift, or skiers per day.⁶² "Managers and planners are concerned with meeting demand in real time by means of such things as labour scheduling, flexible seating or partitioning, or opening up more seating capacity at lower price points as an event or departure date approaches," explains Pullman and Rodgers.⁶²

Other decisions can address such things as "the design of the service process, including the service interaction time (the average amount of time an employee spends with a visitor); the level of visitor participation or self-service; the capacity cushion (extra space or labour added as a contingency); and queue reservations or partitioning."⁶² Disney's Fast-Pass program or Universal's VIP pass for special fast lines are examples of reservations systems put in place to ease traffic and customer headaches.⁶² "The appropriate focus for these capacity decisions depends on the overall size and type of leisure enterprise," argue Pullman and Rodgers.⁶²

It is useful to view leisure-related enterprises in terms of the service process matrix, which was originally developed by Schmenner⁴⁰⁴ for the field of operations management. As per Table 12, this framework classifies enterprises "according to their degree of labour intensity versus degree of interaction/customization."⁶² "Labour intensity is defined as the ratio of labour cost incurred to the value of the facilities and equipment."⁶² In general, "highly labour-intensive businesses require relatively little capital expenditure for facilities and equipment, while businesses with low labour intensity have low levels of labour cost relative to costs for facilities and equipment."⁶² "The degree of interaction and customization reflects the level of service customization for the visitor and the level of visitor interaction with the service process. When both of these levels are high, visitors actively participate in the service process and the business works to satisfy the visitors' particular preferences," say Pullman

and Rodgers.⁶²

Degree of labour intensity	Degree of interaction and customization	
	Low	High
Low	<i>Service Factory</i> Airlines Standard hotels Resorts Cruise ships Recreation Theme parks	<i>Service Shop</i> Luxury hotel Luxury restaurants Luxury cruise ships Spas
High	<i>Mass Service</i> Retailing Cafeterias Fast food	<i>Professional Services</i> Tour guides Instructors Concierges

Table 12: Application of the service process matrix⁴⁰⁴ to the field of hospitality and tourism

Source: Pullman and Rodgers, *Capacity management for hospitality and tourism: A review of current approaches*⁶²

“For enterprises with low ratios of labour to capital intensity — that is, Service Factory and Service Shop processes — physical capacity decisions are paramount. Here, capacity cannot be augmented easily, so it is essential to utilize each capacity unit effectively (each airline seat, hotel room, restaurant or gaming table seat, amusement park ride seat, etc.),” contend Pullman and Rodgers.⁶²

“Strategic physical capacity decisions encompass the long-term planning of construction or renovation of buildings, planes, or cruise ships, or the purchasing of new equipment, rides, vehicles, etc. Short-term capacity management, in contrast, includes approaches that enable firms to react to short-term fluctuations in demand,” argue Pullman and Rodgers.⁶² “The latter is typically achieved through scheduling, yield or revenue management, and the addition or withdrawal of support services. Mass Service and Professional Service processes, on the other hand, have high degrees of labour intensity,” explain Pullman and Rodgers.⁶² “Strategic capacity management for these enterprises focuses more on the management of labour capacity, including the hiring and selection of employees with the appropriate skill mix,” note Pullman and Rodgers.⁶² “Short-term capacity management focuses on the implementation of scheduling and other incremental capacity methods that allow the enterprise to react to short-term fluctuations in demand with greater flexibility,” conclude Pullman and Rodgers.⁶²

“Capacity measures serve as the foundation of all analytical approaches for all

capacity decisions,” explain Pullman and Rodgers.⁶² “For example, a capacity measure could provide the planning objective (e.g., an 80% employee utilization goal). Or the measures could show the relationship of capacity to the overall performance of a system (e.g., at 80% and 90% maximum capacity, a park experienced 89% and 75% customer satisfaction ratings, respectively),” add Pullman and Rodgers.⁶² But as pointed out by Wall, capacities are difficult to measure because of definitional problems.⁴⁰⁵ “The appropriate design and outcome measures depend on whose perspective is emphasized,” note Pullman and Rodgers.⁶² Table 13 provides some examples of operational indicators that are particularly relevant to managers and visitors.

Visitors' perspective	Managers' perspective
Availability	Revenue or profits
Right time	Number of visitors
Right price	
Right type	
Crowding and space Too many people/too little space Too few people/too much space	Utilization
Intimacy/privacy	Percentage of cost of depletion or wear
Interaction/sociability	Excess capacity or waste
Perceived service time	Labour costs
Perceived wait time	Variable and fixed physical resources
	Actual service time
	Actual wait time

Table 13: Examples of capacity measures relevant to visitors' versus managers' perspective

Source: Pullman and Rogers, *Capacity management for hospitality and tourism: A review of current approaches*⁶²

“In most for-profit environments, management is concerned with maximizing revenue through the number of paying visitors using the enterprise or revenues generated per visitor and the firm’s capacity utilization of resources,” explain Pullman and Rodgers.⁶² “Visitor objectives (including less crowding and shorter perceived waiting times) and their other specific measures of relevance differ from those of the enterprise management,” add Pullman and Rodgers.⁶²

For Wall, “In hospitality and tourism, both biophysical (the quality of the environment) and behavioural components are recognized.”⁴⁰⁵ An increase in physical capacity utilization can lead to queuing and a general reduction in the perceived quality of service warn Davis and Heineke.³⁹⁹ This can have profoundly negative effects on customer satisfaction, obviously.

In the mainstream literature, the critical levels that are needed to support certain facilities are often referred to as capacity thresholds.⁴⁰⁶ Muller provides the example of the high occupancy of an airplane or a quick-service restaurant, which can lead to untidiness because the service crew simply doesn't have time to maintain cleanliness; from the customer's perspective this can be a big negative.⁴⁰⁷ A nearly empty cruise liner, on the other hand, does not provide the expected social ambience and affects the employees' interactions with customers argues Kandampully.⁴⁰⁸

"Clearly, managers must monitor visitors' perceptions and preferences and try to best meet both management's and their customers' expectations," advise Pullman and Rodgers.⁶² For example, Kilby and Fox explain in *Casino Operations Management*, "an Australian casino improved the level of patrons' comfort by decreasing the playing spots offered on each gaming table, which subsequently increased the blackjack hold."⁴⁰⁹ However, as Muller illustrates, a reduction in the number of customers can be compensated for by higher revenues only if the demand is price inelastic, which is not always the case.⁴⁰⁷

"Different capacity indicators linking the ability of an enterprise to control the environment with the overall customer experience can be used. For example, in a restaurant setting, capacity-related indicators include average customer waiting time and average duration of each service," explain Pullman and Rodgers.⁶² These indicators have been shown to have "a causal relationship with the number of incidents/complaints, the general ratings of the service, and the food quality."⁴¹⁰

"For a recreational site, capacity indicators can include the following: the satisfaction of the visiting public, the intention to return, the percentage of people feeling overcrowded, and the number of complaints," say Simón et al.⁴¹¹ Several researchers have shown that the links between capacity decisions and other performance measures such as profit, quality (overall visitor satisfaction), and market share are complex and nonlinear, including work by Easton and Pullman⁴¹² and Sill.⁴¹³

As previously mentioned, "strategic capacity planning of physical resources is of primary concern for Service Factory and Service Shop processes (hotels, resorts, cruise ships, recreational sites and theme parks)."⁶² In practice, this planning is part of the detailed design that includes capacity estimation, an integral part of a feasibility study⁴¹⁴ and the main indicator of the price of a capital asset.⁴¹⁵ Strategic physical capacity decisions include size, configuration, layout, and built-in flexibility. These decisions made during the planning stage have long-term implications for the overall resource productivity of a property.⁴¹⁶

The capacity-related criteria for the "goodness" of a design includes the grossing factor⁶¹, which is calculated as the proportion of income generating areas relative to the total floor space. According to Pullman and Rodgers, "The grossing

factor is reduced by the need to provide technical areas (business centres, sport and recreational areas, etc.) and functional features (architectural elements such as atriums, balconies, and grand staircases), as well as by the need to meet legislative and environmental requirements such as land zoning and usage restrictions, building codes, fire and maritime safety requirements, and disability access regulations.”⁶²

“Codes for food-service premises, for example, stipulate the allocation of adequate space for each food production area and regulate the physical layout of the facility to ensure the ease of cleaning/sanitation (minimum gaps between equipment units and walls, minimum number of hand-washing sinks and maximum walking distance to reach them, etc.), explain Pullman and Rodgers.⁶² These requirements for land-based^{417 418} and cruise-ship⁴¹⁹ kitchens lead to an increase in the size of the production areas, which are non-revenue-generating.⁶² “By means of the grossing factor, various areas of a facility can be assessed for the contribution margin of the different service products they support,” explain Pullman and Rodgers.⁶² For example, Kimes and McGuire show that in the Raffles City Convention Centre in Singapore, the contribution margin is 30–35% for food services, 85–95% for room rentals, and 50–95% for audio-visual equipment.⁴²⁰

“In addition to size, the actual physical capacity depends on the configuration and layout of a facility, since the combination of these affects the flow of products and customers,” notes Pullman and Rodgers.⁶² For example, in restaurant planning, table types and locations (banquettes, booths, or anchored or unanchored tables) affect the customer experience and, hence, the average spending per minute.^{421 422} Table 14 provides other examples of other design solutions for different industries and sectors.

The capacity-related criteria for the “goodness” of a design include the grossing factor⁶¹, “which is calculated as the proportion of income generating areas relative to the total floor space.”⁶² “The grossing factor is reduced by the need to provide technical areas (business centres, sport and recreational areas, etc.) and functional features (architectural elements such as atriums, balconies, and grand staircases), as well as by the need to meet legislative and environmental requirements such as land zoning and usage restrictions, building codes, fire and maritime safety requirements, and disability access regulations,” note Pullman and Rodgers.⁶²

INDUSTRY	LAYOUT SOLUTION	OUTCOMES
Airlines, theme parks, ski resorts	Hub and spoke system	The hub is a central facility offering restaurants, shopping arcades, entertainment, conference rooms, and other amenities, while the spokes are chosen destination areas. ⁴²³
	Point to point	The space is designed for people to move from one destination area to the next without moving through a central location. ⁴²⁴
	Virtual queue	Customers sign up for virtual queue, go to other destination areas and return at appointed time. ⁴²⁵
Hotels	Increased bathroom size	The decrease in the net bedroom size coupled with an addition of a walk-in shower and dressing area resulted in a 13% improvement of the design efficiency ratio. ⁶¹
Restaurants	Process flow principle	A steady, controlled process flow reduced complexity and confusion in a kitchen. ⁴²⁶ Better distribution of serving capacity between cold and hot sections in restaurant buffets resulted in faster table turns, shorter lines, better food temperature control, and decreased construction costs. ⁴¹³
	Table type and location	Customers in booths spent more on average than those in banquettes; those in poor table locations spent more. ⁴²¹
	Reduce table spacing	Creating a busy feel (small dining spaces) increased customer satisfaction.
Cruise ships	Horizontal class sandwich	Positioning of the upper category of cabins at the lower desk to minimize rolling, which is amplified at the upper deck as well as at the bow and the aft. ⁴²⁷
	“Cocooned isolation”	Vertical class barrier with the provision of a view, a private balcony, and no need to change floors to reach the nearest pool. ⁴²⁷

Table 14: Examples of layout applications for physical resources⁶²

Source: Pullman and Rogers, *Capacity management for hospitality and tourism: A review of current approaches*⁶²

Food production is the only manufacturing function in the hospitality sector⁴²⁸, “but it faces more unpredictable demand patterns than most goods production.”⁶² This production is manageable, however; Creed recommends short shelf-life systems (cook-hot-hold and cook-chill), which offer a relatively

small time buffer between food preparation and consumption and are suitable for settings with predictable demand, such as banqueting or in-flight catering.⁴²⁹

“Extended shelf-life systems (cooked-in-a-bag and cook-freeze), on the other hand, which allows for a longer time buffer, are suitable for unpredictable demand patterns such as those of railway food services or restaurants that are open to the public,” note Pullman and Rodgers.⁶² “The practical implication of this for tourism-oriented food services is that the capacity of their physical resources can be better utilized through the production of packaged meals for new markets (local cafes and restaurants as well as the retail sector) during a slow season or periods of tourism downturn,” argue Pullman and Rodgers.⁶²

Sector	Units	Method
Hotels	Beds, rooms, percentage of occupancy	Cost-volume-profit ⁴³⁰
		Regressions analysis ⁴³¹
		Economic order quantity ⁴³²
Restaurants	Available seats per hour	Number of seats x hours of service/service-cycle time ⁴⁰⁷
	Degree of table “combinability”	TABLEMIX computer program ⁴³³
	Production equipment units	Empirical formulae ⁴³⁴
Gaming	Average blackjack hands/hour	Minimum break-even bets ⁴⁰⁹
Theme parks and resorts	Rides	Break-even analysis ⁴²³
	Ski lifts	Simulation modeling ⁴³⁵
Convention and exhibition centers	Square meters of exhibition area, tables, flatware, chairs	Benchmarking against the consumption patterns (number of customers per event, space, time requirements, etc.) and future trends in demand ⁴³⁶
Cruise ships	Berths	Dynamic game theory ⁴³⁷

Table 15: Examples of strategic physical capacity estimation techniques

Source: Pullman and Rodgers, *Capacity management for hospitality and tourism: A review of current approaches*⁶²

“The relationships between demand, capacity, managerial objectives, and the visitor experience are complex and difficult to evaluate without appropriate analytical techniques,” assert Pullman and Rodgers.⁶² Table 15 lists several different methods used in strategic capacity estimation for industries such as

hotels, restaurants, gaming, theme parks, convention and exhibition centers and cruise ships.⁶² The range of strategic estimation approaches run “from the planning of overall tourism or hotel carrying capacity in a city (for long range tourism or special events such as the Olympics) to such micro-level decisions as the sizing of hotel water heaters,” note Pullman and Rodgers.⁶²

Generally, the major capacity indicators – the number of berths on a cruise ship, rooms in a hotel, seats in a restaurant, etc.) are determined during the initial stages of major infrastructure projects. These indicators are then used later in the estimation of other capacity elements,” contend Pullman and Rodgers.⁶² “Closed-form/cost-oriented methods are typically used in the accommodation sector, which is capital intensive, since the capital costs, such as construction costs, furnishings, property taxes, and insurance, vary with capacity” add Pullman and Rodgers.⁶² An example of a closed-form solution is a typical break-even formula such as the cost-volume-profit method⁴³⁸ put forth by Liu and Var:

$$P = Q(S - V) - F$$

where P = total profit; Q = volume of sales (e.g., visitor-days); S = sale price per unit volume; V = variable cost per unit volume; F = total fixed cost.

“Here, if a target profit is set, the volume of sales (Q) can be derived from this equation, which together with the expected occupancy level would indicate the capacity needed to meet the given profit objective. With this approach, the capacity depends on the targeted sales price,” claim Pullman and Rodgers.⁶² “Another closed-form approach, proposed by Carey⁴³¹ uses regression models to determine overall hotel carrying capacity for specific locations. Here the dependent variable — optimal room occupancy — is a function of the independent variables, price and overall market capacity,” note Pullman and Rodgers.⁶²

“A feasibility assessment of a new project also includes the determination of variable or semi-variable costs affected by furniture/equipment needs and layouts,” say Pullman and Rodgers.⁶² They add that, “These can be classified as ‘capacity elements’ and are usually estimated using empirical formulae with results expressed in a variety of units (square meters for different functional areas; number of parking places/rides/boats, etc.; customers per lift cycle for a ski resort; standing spots for hotelier games; and others).”⁶² “These approaches are usually simpler than the methods used in determining the major capacity indicators and reflect the factors shaping the capacity on the micro-level, which are usually not directly linked to profits,” explain Pullman and Rodgers.⁶² For example, Muller provides a very simple empirical formula to estimate capacity for a restaurant based on estimates of hours of service, number of seats, cover count, and planned service-cycle time⁴⁰⁷:

$$\text{maximum seating capacity} = \frac{\text{seats} \times \text{hours of service}}{\text{service} - \text{cycle time}}$$

Pullman and Rodgers argue that, “The closer a capacity element is to the customer interface in a physical sense, the more customer-related variables are used in capacity estimation — the number of customers served per hour for a dining-room or the percentage of people travelling by car for parking, for example.”⁶² “To estimate the number of rides in a theme park, Wanhill⁴²³ provides a closed-form solution integrating the catchment’s population and penetration rate, demand fluctuations between weekdays and weekend, average ‘consumption’ of entertainment units per customer, and average ride throughput,” claim Pullman and Rodgers.⁶²

“Typically closed-form solutions must assume that variables such as pricing or demand are constant or that certain conditions must be ignored to create problem tractability. As an alternative, probabilistic models allow for more complexity and realism. These approaches range from modifications of closed-form approaches to large simulation models,” claim Pullman and Rodgers.⁶² In his *Analysis of Las Vegas strip casino hotel capacity: an inventory model for optimization*⁴³², Gu gives an example of a modified closed-form solution, that “treated the supply of room nights of Las Vegas Strip hotelier hotels as inventory units and integrated a probabilistic model based on the economic order quantity (EOQ) equation to reflect the perishable nature of hotel services.” “This approach allowed for the prediction of the cycles of over- and undercapacity,” state Pullman and Rodgers.⁶²

“In previous research, simulation modelling has been applied to capacity problems such as restaurants, cruise ships and ski resorts,” note Pullman and Rodgers.⁶² For example, Wall⁴⁰⁵ uses simulation modelling to account for multiple inputs and the cyclic nature of capacity in tourism. For restaurant capacity, the TABLEMIX model developed by Thompson

“provides the optimal percentage of combinable tables in a restaurant by integrating the number and duration of peak dining periods, the probabilities of different numbers of party arrivals for the dining period, the probabilities of different size parties, the maximum number of waiting parties, the distribution of dining periods (normal or lognormal), and the choice of table arrangement rule (e.g., assign an available table to the largest party or to the party waiting the longest).”⁴³³

“Using probabilistic models of market share and computer simulation to more accurately integrate the relationship between capacity and demand,” Pullman and Thompson developed a method for determining the profit-maximizing capacity strategy for different hospitality environments.⁴³⁵ “This method requires customer utility models (reflecting real customer’s preferences for multiple capacity-related aspects of a service such as queue duration) with the potential costs and revenues from the implementation of different capacity

management strategies,” explain Pullman and Rodgers.⁶² The writers continue, saying that, “Using discrete-event simulation models of a resort’s subsequent flow performance under different capacity scenarios, the profit maximizing strategy simultaneously addresses both management and customer preferences as shown below:

$$\text{profit} = \sum_{t \in T} (N_t \pi_{jt} (P_t - V_j) - F_j)$$

where t = time period (set T periods); N_t = number of potential visitors in period t ; P_{jt} = price of service j during time period t ; V = variable cost per visitor for service j ; F = fixed cost of service j ; π_{jt} = potential market share or probability that a customer group will select service j from the set of J services in period t .⁶²

The above market share is derived from actual customer preference models based on choice experiments by Verma et al.⁴³⁹ In this case, the probability that an aggregate group chooses service j out of a set of J competitive service establishments is as follows⁶²:

$$\pi_j = \frac{e^{U_j}}{\sum_{j=1}^J e^{U_j}}$$

where U_j = aggregate customers’ overall systematic utility for service design j .

Pullman and Rodgers see the advantages of these mixed-model approaches are as follows:

“first, complex enterprises can be modelled with a great deal of realism, including variable costs, dynamic customer arrivals and flow patterns, multiple combinations of strategies, and heterogeneous customer mixes. Alternate forecasts of visitor behaviour and customer flows can be tested. Second, utility models are typically based on actual customer preferences for different attributes of an enterprise (for example, crowding level, average queue time, price, retail and amenities level, mix of activities, or skill level). Third, by integrating the customer and enterprise perspectives, diverse criteria can be optimized, including profit, revenue, and customer satisfaction. This approach allows for the testing of various capacity management strategies, enabling management to evaluate their estimated costs prior to the capital investment.”

For enterprises, strategic labour capacity decisions cover a long-term planning horizon, usually of 6-18 months.⁴⁰¹ “As with physical capacity decisions, firms’ functional capacity strategies should reflect their competitive priorities,” argue Pullman and Rodgers.⁶²

From an operations management perspective, there are three typical strategies for labour capacity planning: level, chase, or mixed.⁴⁴⁰ Pullman and Rodgers provide the following example: “hotels with a high service/competitive priority might want to retain the majority of their staff throughout the year (a level strategy), regardless of demand, to keep both the service level and the morale high. A cost-focused hotel, on the other hand, might only staff as needed (a chase strategy) to minimize labour costs.”⁶²

Sasser argues that, a *level strategy* is more appropriate when demand is quantifiable before its time of use, or the firm has strict requirements about service availability, and/or the employees are scheduled according to pre-existing criteria such as strict union contracts.⁴⁴⁰

“Typically, Service Factory processes with low interaction, customization, and labour intensity use this strategy. Demand is scheduled to fit into an existing plan, such as airline flight or tourist bus schedules. The visitor or guest reserves a space in advance and the labour capacity is fixed for the flight or bus trip regardless of the number of people on that trip,” explain Pullman and Rodgers.⁶² “This approach is best suited to an environment in which labour requirements are predetermined based on physical capacity, such as under safety regulations (e.g., the number of flight attendants on a plane is fixed regardless of the number of passengers),” state Pullman and Rodgers.⁶²

A *chase strategy* tries to meet demand as it occurs.⁴⁴⁰ Pullman and Rodgers contend that, “For this type of strategy, the labour requirements change to match the demand forecast throughout the planning horizon. This approach is best suited to an environment in which visitors cannot be prescheduled and there is a high degree of labour interaction and customization (Professional Services), or to other environments with unpredictable visitor arrivals such as hotel front desks, shops, parks, and non-reservation restaurants.”⁶²

Mixed strategies use some combination of level and chase approaches.⁴⁴⁰ “Because of the seasonality of many tourism enterprises, it makes sense to use level strategies for certain staff areas (e.g., cruise ship operators and maintenance or other departments that must function regardless of the number of visitors) and chase strategies for others (maid service, ski instructors, front desk personnel, wait-staff, bell-staff, etc.),” recommend Pullman and Rodgers.⁶²

“Often a leisure enterprise will change its labour capacity strategy as the company grows,” claim Pullman and Rodgers.⁶² “For example, Port Aventura, a Spanish theme park, used a chase strategy for their first season to match employees to demand. During that season, the workforce reached 2800 on the busiest days but went down to 200 employees during the winter season.”⁶² Later, Huete and Segarra report, “the company signed a collective agreement with their unions that offered permanent or permanent-seasonal contracts to 50% of the long-term workforce, thus requiring a mixed strategy.”⁴⁴¹

“Labour capacity estimation for various strategies depends on the industry and often on the planned physical capacity,”⁶² even with integrated resorts that are now some of the biggest buildings in the world. “Here, industry standards play a significant role, dictating how many employees of each type are required for a plane, restaurant or hotel of a certain size,” argue Pullman and Rodgers.⁶²

Sill provides examples of this approach for hospitality: An enterprise first estimates a key demand input (e.g., number of expected guests, menu-mix history, or potential bar sales), multiplies that by a given standard (staffing standard, recipe, table-setting used) and gets a capacity output (staffing for the dining-room, kitchen, dishwashing, food production, or bar).⁴⁴² “To cite another example, in the hotel industry, union contracts might dictate how many rooms a housekeeper may clean in a shift (perhaps 12–14 standard rooms), and the required number of housekeepers can then be directly calculated from the expected room occupancy,” explain Pullman and Rodgers.⁶²

“For capacity estimation that involves a partial or full chase strategy, a typical approach to labour staffing for long-term planning employs aggregate planning techniques that calculate the economic trade-off between full- and part-time employees, overtime, and hiring and lay-off costs to determine the labour requirements,” argue Pullman and Rodgers.⁶²

In their paper *Introduction to Operations and Supply Chain Management*⁴⁴³, Bozarth and Handfield believe, “These problems are solved optimally using linear programming in which the objective is to minimize cost or maximize profit subject to constraints such as the meeting of demand, limits on materials and equipment time, and labour requirements for standard and overtime wages.” In a typical inventory-less model formulation, Vollman et al.⁴⁴⁴ argue that the linear objective function for cost minimization is the following:

$$\min \sum_{t=1}^M (C_H H_t + C_F F_t + C_R X_t + C_o O_t + C_U U_t)$$

subject to the following constraints⁴⁴⁴:

- that regular-time hours must not exceed the allowable maximum to be worked per employee per month;
- workforce level change between months $H_t F_t$; and $X_t O_t D_t$

where C_H , C_F , C_R , C_o , and C_U = the cost of hiring an employee, the cost of firing an employee, the cost per labour-hour of regular time, the cost per labour-hour of overtime, and the cost per labour-hour of idle regular time, respectively; H_t , F_t , X_t , O_t , and U_t = the number of employees hired, employees fired, regular-time hours, overtime hours, and idle regular-time hours in month t , respectively; D_t = the number of hours of service to be sold in month t ; and M = the number of months in the planning horizon.⁴⁴⁴

Vollman et al. also believe that, "Similar linear programming models can be set up to model more complex environments, such as different product or customer classes, different employee classes (part-time and full-time), and many other service situations."⁴⁴⁴

Pullman and Rodgers argue that, "During the actual operation of an enterprise, the ability to meet demand depends on both the flexibility of the physical resources and the willingness of the price/market segment to pay for an available capacity unit."⁶²

- Physical capacity
 - Physical flexibility
 - Rent capacity
 - Share capacity
 - Hire sub-contractors
 - Change resource allocations
 - Change hours of operation
 - Provide off-site access
 - Use automation
 - Price/segment flexibility
 - Partition visitors (status and length of transaction)
 - Yield management
 - Revenue management
- Human capacity
 - Labour flexibility
 - Schedule employees
 - Allow overtime
 - Allow idle time
 - Cross-train employees
 - Change work speed and process
 - Hire permanent employees
 - Lay-off employees
 - Use temporary employees
 - Use part-time employees
 - Visitor flexibility
 - Allow waiting
 - Allow balking
 - Turn away visitors
 - Provide rewards or incentives
 - Provide diversions or complementary services
 - Camouflage the queue
 - Pay for VIP queues
 - Change level of visitor participation
 - Schedule visitors/take reservations
 - Inform/educate about alternative options

Table 16: Short-term capacity management approaches

Source: Pullman and Rodgers, *Capacity management for hospitality and tourism: A review of current approaches*⁶²

Table 16 provides a comprehensive list of the different physical resource approaches, most of which are self-explanatory.^{397 410} “The majority of price/segment flexibility approaches use capacity partitioning or yield/revenue management techniques,” say Pullman and Rodgers.⁶² “Traditionally, yield management has been used by airlines (price and class), lodging enterprises (price and stay duration), restaurants (price, style, and duration of service/meal), and more recently, by gaming venues (gaming spots per table and minimum bets) and the golf-course industry (no-show fees, rental fees, playing times),” state Pullman and Rodgers.⁶² The most basic methodology is the linear modelling approach, which attempts “to maximize revenues from different customer classes subject to the capacity constraints of the enterprise as illustrated below:

$$\max \sum_{i=1}^n r_i x_i \text{ subject to } \sum_{i=1}^n x_i \leq c \text{ and } x_i \leq d_i$$

where i = rate class or segment, x_i = number of items sold in rate class i , d_i = demand for rate class i , r_i = revenue from selling items in rate class i , and c = capacity of the service.”⁶²

The work of Lindenmeier and Tscheulin⁴⁴⁵ and Sanchez and Satir⁴⁴⁶ have shown that yield management methodologies have evolved to include probabilistic demand variables, economic approaches, network approaches, customer satisfaction implications, etc. “In addition, yield management has been applied to almost all leisure and hospitality sectors, claim Pullman and Rodgers.⁶² Table 17 provides examples of the various short-term capacity estimation techniques used in different sectors.⁶²

“The capacity requirements of different customer groups cannot only affect the revenue but the overall utilization of a facility,” say Pullman and Rodgers.⁶² They provide the example of a ski resort that attempted to increase utilization; “a ski resort with a large percentage of terrain for expert or advanced skiers increased its promotions for the ‘family skier’ segment (skiers with beginner-level and intermediate skills).”⁶² Although the change reduced the service quality in terms of queuing, a resulting increase in spending on lessons and amenities was observed.⁴³⁵

In a golf course setting, experienced golfers usually play faster than novices.⁶² Kimes found that offering separate playing times for beginners relieved the experienced players’ frustration and improved overall flow.⁴⁴⁷ Simón et al. discovered that, for outdoor recreation enterprises, the attraction of environmentally aware tourists in order to minimize ecological damage and increase tourism carrying capacity had a similar effect on the operations.⁴¹¹

“Tactical human capacity approaches involve labour and/or customer flexibility. From the labour perspective (Table 17), most of the flexibility comes from hiring an appropriate number of employees, scheduling employees to meet demand as it occurs, and adequately training employees to do their respective jobs or cross-

training them to do multiple jobs,” say Pullman and Rodgers.⁶² “The majority of these labour-related tactical capacity management approaches derive from the operations area and are based on queuing theory,” note Pullman and Rodgers.⁶² According to Sundarapandian, queueing theory is the mathematical study of waiting lines, or queues.⁴⁴⁸

Sector	Tactics	References
Hotel/resort	Packages: budget, moderate, and deluxe	Kandampully ⁴⁴⁹
	Categories: couples, singles, and families	
	Subcategories for children: kids, petit, and mini baby/nursery	
Restaurant	Off-peak discounts	Muller ⁴⁰⁷
	Increase production rate by application of more efficient equipment and simpler	
	Reduce randomness via well-designed reservation system	Kimes et al. ⁴⁵⁰
	Increase sophistication through application of queuing theories, modelling and simulations, linear programming, and forecasting	
	In low-demand periods: assign multiple duties to the host, increase menu variety, offer regular or reduced prices, increase promotion, have servers bring condiments	
Ski resort	Capacity upgrades: improved lifts	Pullman and Thompson ⁴³⁵
	Capacity expansion: additional terrain	
	Queuing information	
	Inter-daily demand smoothing: surcharge during weekends	
	Class variation: mix of beginners and intermediate	
Golf course	Reduce the uncertainty of arrival by means of forecasting, overbooking, requiring guaranteed reservations, reconfirming reservations by phone, instituting a no-show fee and/or a fixed fee for reservations	Kimes ⁴⁴⁷

Sector	Tactics	References
	Reduce the uncertainty of duration by selling rounds of predictable length, flexible course design with a global positioning system to direct flow, requiring own golf carts or reducing the cart rental fee during busy times, using course marshals and caddies, posting golfers' playing times	
	Reduce the tee-time interval	
Small Inn/B&B	Coping: close part of year, maintain the premises, 'reduce staff' seek other income, borrow money	Getz and Nilsson ⁴⁵¹
	Combating: stay open all year, develop other tourist segments, cater to residents, augment the product's appeal, add value, develop export products	
	Capitulating: shrink, sell, or terminate the business	

Table 17: Capacity estimation in different hospitality and tourism sectors⁶²

Source: Pullman and Rogers, *Capacity management for hospitality and tourism: A review of current approaches*⁶²

In *Labour scheduling, part 1: forecasting demand*⁴⁵², Thompson explains that, matching visitor demand to labour capacity involves a four-step process:

1. forecasting demand;
2. translating the demand forecasts into requirements for employees;
3. developing a workforce schedule that, ideally, only has employees working when necessary to deliver the service; and
4. controlling the delivery of the service in real time.

“From the customer perspective, flexibility tactics involve the management of waiting lines or ‘capacity buffers,’” says Pullman and Rodgers.⁶² The process, Pullman and Rodgers contend, “can be designed to allow visitors to merely wait; to let them leave rather than keeping them ‘captive’ in roped areas; to provide diversions to improve the line experience; to hide the queue; to offer higher prices in exchange for a shorter queue; or to allow virtual queuing (e.g., electronic queuing, such as Disney’s Fast Pass system).”⁶²

Using queuing theory and the appropriate model, analysts can determine the appropriate number of workers based on line configuration, desired length of lines, customer wait duration, and average service times, says Kleinrock.⁴⁵³ “Alternatively, visitors can increase their own level of participation in the process, allowing the enterprise to increase the available labour capacity,” offer

Pullman and Rodgers.⁶² They provide the example of a self-guided audio-tour system for museums, parks, convention centers, arenas, and other tourism sites to reduce the number of guides required.⁶²

A wide range of labour capacity techniques are available that address these problems. Thompson^{452 454 455 456} offers a comprehensive tutorial on the development of optimal workforce schedules for multiple employee classifications (part-time, breaks, and reliefs). Thompson's main goal is to minimize employee cost, while meeting customer service-time goals.⁶²

Klassen and Rohleder ran multiple simulated scenarios that combined a number of labour and visitor flexibility options simultaneously to determine the best combinations of approaches.³⁹⁷ They found that enterprises with limited flexibility in terms of maximum schedulable staff should make use of customer participation, employee cross-training, and price segmentation and should inform or educate customers about other alternatives.³⁹⁷

Finally, the real-time adjustment of labour schedules⁴⁵⁶ "refers to methods in which managers observe actual visitor demand and correct any capacity problems as they occur. Here the goal is to improve service and cost performance in real time."⁶² For example, Pullman and Rodgers recommend, "if a restaurant's customer flow is slower than expected, employees can go on break or leave early; if it is busier than expected, employees can defer breaks until a later point in their schedule."⁶²

Real-time schedule adjustments include changing employees' station assignments, cancelling or changing their breaks, starting their shifts early/late or asking them to leave early/late, calling in more workers, or cancelling shifts.⁴⁵⁷ Thompson indicates that schedules developed with preset employee breaks outperformed those with real-time break adjustment in terms of overall cost.⁴⁵⁶ However, Hur et al. found that the active adjustment of work schedules is beneficial as long as the direction of demand change is accurately identified.⁴⁵⁷

Table 18 (across two pages) contains a detailed analysis of the advantages and disadvantages of various physical and labour capacity estimation approaches.⁶² As per Pullman and Rodgers, "Main criteria include the simplicity of use, the modelling skills and amount of data needed, and the adaptability of the approach to different environments and over- and undercapacity cycles."⁶²

As previously shown, "service capacity utilization has a significant influence on visitors' perceptions of quality: both over- and underutilization can be undesirable."⁶² "Models that include both quality and productivity measures may enable enterprises to determine optimal physical as well as social carrying capacity for a variety of environments," conclude Pullman and Rodgers.⁶²

Type	Description	Time frame	Purpose	Limitations	Advantages
Physical capacity: statistical models	Method uses historic data with regression and/or probabilistic models to predict requirements.	Performed during the planning phase of the project.	To estimate hotel carrying capacity or room occupancy.	Requires historic data for the specific location. Difficult to extrapolate to new locations.	Allows for cycles of over- and under-capacity.
Physical capacity: closed-form/cost focus	Method weighs cost, volume and profit to determine breakeven capacity.	Performed during the planning phase of project.	To estimate the number of capacity units (berths on ships, seats in plane or restaurant, hotel rooms, etc.) based on desired profit and costs.	Requires predictions of prices and costs. Does not account for competitive environment and economic fluctuations.	Relatively simple approach with closed-form solution.
Physical capacity: mixed statistical and customer preference models	Method weighs customer preferences, competitive market, and simulation of enterprise scenarios.	Performed during the planning phase of project.	To estimate appropriate capacity based on customer preferences for different attributes of the proposed enterprise in a competitive market.	Requires market research on customer preferences and existing or proposed competitors along with modelling of enterprise function.	Allows for most realistic view of multiple performance measures under any number of future scenarios.
Physical capacity: simulation models	Method models the proposed facility under various conditions.	Performed during the planning phase of the project.	To simulate the customer flow and queuing under different levels of capacity flexibility, layout, and capacity choices.	Requires sophisticated modelling skills, projected demand data, software, and complete understanding of operating environment and rules.	Allows for high degree of realism and multiple scenario evaluations. Can test design changes of existing enterprises without disrupting flow.

Type	Description	Time frame	Purpose	Limitations	Advantages
Physical capacity: yield management	Estimate uses historical and current demand to determine optimal capacity use.	Performed as needed, depending on the demand changes for the enterprise.	To estimate the right unit of capacity to sell to the right customer at the right price and for the right duration.	Requires historical data, programming ability or specialized software.	Determines optimal price, customer class size, and capacity
Labour capacity: deterministic	Method links labour requirement to physical capacity units or regulations.	Performed after physical capacity is determined.	To estimate the number of employees based on heuristic or industry regulations.	May not allow for flexibility or adaptation to actual needs.	Relatively simple to implement.
Labour capacity: linear programming	Method finds minimal labour requirements based on fluctuating demand and supply conditions.	Performed as needed (daily, weekly, monthly) depending on the industry.	To estimate the number of employees needed, given projected demand, employee service rate, contract schedule requirements, and constraints on service level.	Requires programming ability or specialized software. Can be difficult to account for different employee skills or productivity levels.	Determines optimal cost and profit schedules.
Labour or physical capacity: customer flexibility tactic	Methods allow customer to choose service method.	Performed during enterprise operations.	To free up capacity by allowing customer to self-serve or choose virtual lines.	Requires an additional channel for self-service or a virtual queue system	Allows customers to choose their experience and reduces capacity costs.

Table 18: Capacity estimation approaches and their application

Source: Pullman and Rogers, *Capacity management for hospitality and tourism: A review of current approaches*⁶²

Cost of Outages

According to Ponemon Institute's *Cost of Data Center Outages January 2016 Data Center Performance Benchmark Series*⁴⁵⁸ study, "the average cost of a data center outage has steadily increased from \$505,502 in 2010 to \$740,357 today (or a 38 percent net change)." The institute's benchmark analysis focused "on representative samples of organizations in different industry sectors that experienced at least one complete or partial unplanned data center outage during the past 12 months."⁴⁵⁸ The Institute claims that, "Utilizing activity-based costing methods, this year's analysis is derived from 63 data centers located in the United States. Following are the functional leaders within each organization who participated in the benchmarking process⁴⁵⁸:

- Facility manager
- Chief information officer
- Data center management
- Chief information security officer
- IT operations management
- IT compliance & audit
- Operations & engineering

Utilizing activity-based costing, Ponemon captured information about both direct and indirect costs, including but not limited to the following areas⁴⁵⁸:

- Damage to mission-critical data.
- Impact of downtime on organizational productivity.
- Damages to equipment and other assets.
- Cost to detect and remediate systems and core business processes.
- Legal and regulatory impact, including litigation defense cost.
- Lost confidence and trust among key stakeholders.
- Diminishment of marketplace brand and reputation.

Key findings of Ponemon's benchmark research study included⁴⁵⁸:

- The average cost of a data center outage rose from \$690,204 in 2013 to \$740,357, a 7% increase. The cost of downtime increased 38% since the first study in 2010.
- Downtime costs for the most data center-dependent businesses are rising faster than average.
- Maximum downtime costs increased 32% since 2013 and 81% since 2010. Maximum downtime costs for 2016 are \$2,409,991.
- UPS system failure continues to be the number one cause of unplanned data center outages, accounting for one-quarter of all such events.
- Cybercrime represents the fastest growing cause of data center outages, rising from 2% of outages in 2010 to 18% 2013 to 22% in the latest study.

Utilizing activity-based costing, Ponemon's study "addresses eight core process-related activities that drive a range of expenditures associated with a company's response to a data center outage."⁴⁵⁸ The activities and cost centers used in our analysis are defined as follows⁴⁵⁸:

1. Detection cost: "Activities associated with the initial discovery and subsequent investigation of the partial or complete outage incident."⁴⁵⁸
2. Containment cost: "Activities and associated costs that enable a company to reasonably prevent an outage from spreading, worsening or causing greater disruption."⁴⁵⁸
3. Recovery cost: "Activities and associated costs that relate to bringing the organization's networks and core systems back to a state of readiness."⁴⁵⁸
4. Ex-post response cost: "All after-the-fact incidental costs associated with business disruption and recovery."⁴⁵⁸
5. Equipment cost: "The cost of new equipment purchases and repairs, including refurbishment."⁴⁵⁸
6. IT productivity loss: "The lost time and related expenses associated with IT personnel downtime."⁴⁵⁸
7. User productivity loss: "The lost time and related expenses associated with end-user downtime."⁴⁵⁸
8. Third-party cost: "The cost of contractors, consultants, auditors and other specialists engaged to help resolve unplanned outages."⁴⁵⁸

"In addition to the above process-related activities, most companies experience opportunity costs associated with the data center outage," claims the Ponemon report.⁴⁵⁸ This can result in lost revenue, business disruption and average contribution.⁴⁵⁸ Accordingly, Ponemon's cost framework includes the following categories⁴⁵⁸:

- Lost revenues: The total revenue loss from customers and potential customers because of their inability to access core systems during the outage period.
- Business disruption (consequences): The total economic loss of the outage, including reputational damages, customer churn and lost business opportunities.

Figure 24 presents the activity-based costing framework used in the Ponemon research, which consists of 10 discernible categories.⁴⁵⁸ As shown below, the four internal activities or cost centers include detection, containment, recovery and ex-post response.⁴⁵⁸ "Each activity generates direct, indirect and opportunity costs, respectively," notes Ponemon.⁴⁵⁸ "The consequence of the unplanned data center outage includes equipment repair or replacement, IT productivity loss, end-user productivity loss, third parties (such as consultants), lost revenues and the overall disruption to core business processes. Taken together, we then infer the cost of an unplanned data center outage," argues

Ponemon.⁴⁵⁸

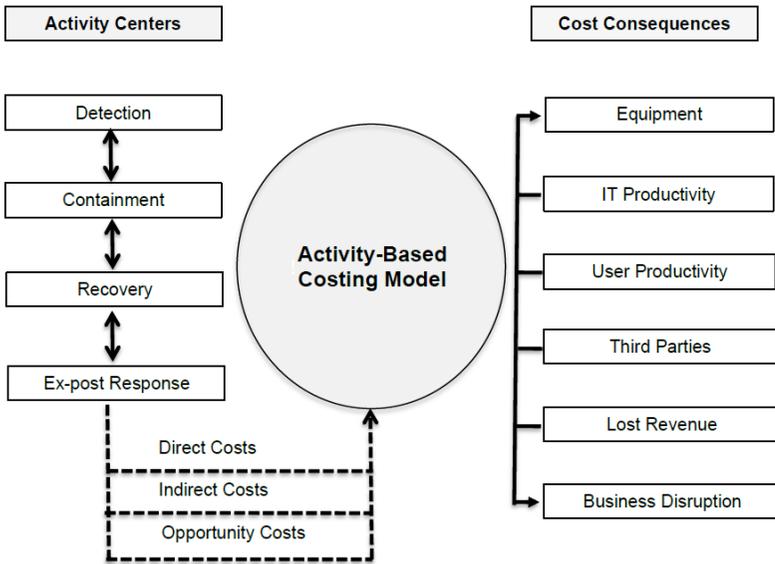


Figure 24: Activity-Based Cost Account Framework
Source: Ponemon Institute

Ponemon’s “benchmark instrument was designed to collect descriptive information from IT practitioners and managers of data center facilities about the costs incurred either directly or indirectly as a result of unplanned outages.”⁴⁵⁸ The survey design relied “upon a shadow costing method used in applied economic research. This method does not require subjects to provide actual accounting results, but instead relies on broad estimates based on the experience of individuals within participating organizations.”⁴⁵⁸

“The benchmark framework in Figure 24 presents the two separate cost streams used to measure the total cost of an unplanned outage for each participating organization,” claims Ponemon.⁴⁵⁸ “These two cost streams pertain to internal activities and the external consequences experienced by organizations during or after experiencing an incident,” says Ponemon.⁴⁵⁸ Its benchmark methodology “contains questions designed to elicit the actual experiences and consequences of each incident.”⁴⁵⁸ Ponemon believes that, “This cost study is unique in addressing the core systems and business process-related activities that drive a range of expenditures associated with a company’s incident management response.”⁴⁵⁸

For Ponemon, the process worked as such⁴⁵⁸:

“Within each category, cost estimation is a two-stage process.

First, the survey requires individuals to provide direct cost estimates for each cost category by checking a range variable. A range variable is used rather than a point estimate to preserve confidentiality (in order to ensure a higher response rate). Second, the survey requires participants to provide a second estimate for both indirect cost and opportunity cost, separately. These estimates are calculated based on the relative magnitude of these costs in comparison to a direct cost within a given category. Finally, we conduct a follow-up interview to obtain additional facts, including estimated revenue losses as a result of the outage.”

In total, the benchmark instrument contained “descriptive costs for each one of the five cost activity centers.”⁴⁵⁸ Within each cost activity center, respondents were asked to estimate the cost in three different ranges — direct cost, indirect cost and opportunity cost.⁴⁵⁸ These are defined as follows⁴⁵⁸:

- Direct cost – the direct expense outlay to accomplish a given activity.
- Indirect cost – the amount of time, effort and other organizational resources spent, but not as a direct cash outlay.
- Opportunity cost – the cost resulting from lost business opportunities as a consequence of reputation diminishment after the outage.

Table 19 summarizes the frequency of companies and separate data centers participating in the benchmark study.⁴⁵⁸ A total of 16 industries are represented in the sample.⁴⁵⁸ Six data center organizations were rejected from the final sample for incomplete responses to the survey, which resulted in a final sample of 63 separate data centers.⁴⁵⁸

Industries	Companies	Data centers	Rejected	Final sample
Co-location	4	11	1	10
Communications	1	2	0	2
Consumer products	2	2	0	2
eCommerce	7	7	1	6
Education	2	3	0	3
Financial services	6	11	2	9
Healthcare	5	5	0	5
Hospitality	1	1	0	1
Industrial	4	6	0	6
Media	1	2	0	2
Public sector	4	5	1	4

Research	1	1	0	1
Retail	5	5	0	5
Services	5	7	1	6
Transportation	1	1	0	1
Total	49	69	6	63

Table 19: Tally of cost studies by recruited company & data center

Source: Ponemon Institute

Table 20 summarizes the participating “data center size according to total square footage and the duration of both partial and complete unplanned outages.”⁴⁵⁸ According to Ponemon, “The average size of the data center in this study is 14,090 square feet and the average outage duration is 95 minutes.”⁴⁵⁸

Key stats	Data center square footage	Duration in minutes
Average	14,090	95
Maximum	55,000	415
Minimum	1,505	13

Table 20: Key statistics on data center size and duration of the outage

Source: Ponemon Institute

Figure 25 reports key statistics on the cost of unplanned outages as reported in 2010, 2013 and 2016.⁴⁵⁸ The cost range, median and mean all consistently show substantial increases in cost over time.⁴⁵⁸

As the Ponemon report shows, “the maximum cost has more than doubled over six years from just over \$1 million to \$2.4 million (a 34 percent increase since the last study). Both mean and median costs increased since 2010 with net changes of 38 and 24 percent respectively. Even though the minimum data center outage cost decreased between 2013 and 2016, this statistic increased significantly over six years, with a net change of 58 percent.”⁴⁵⁸

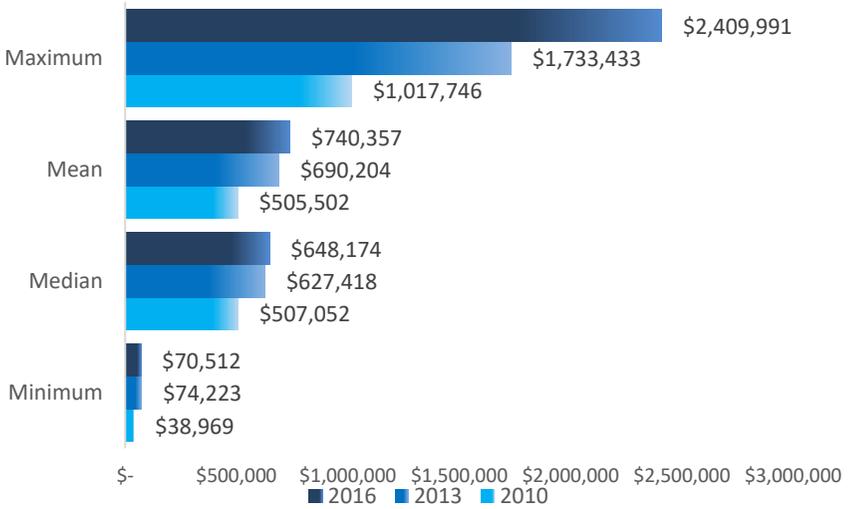


Figure 25: Key statistic on data center outages

Comparison of 2010, 2013, and 2016 results

Source: Ponemon Institute

Figure 26 reports the cost structure on a percentage basis for all cost activities for FY 2010, 2013 and 2016.⁴⁵⁸ As the Ponemon reports shows, “the cost mix has remained stable over the past five years. Indirect cost represents about half and opportunity loss represents 12 percent of total cost of outages.”⁴⁵⁸

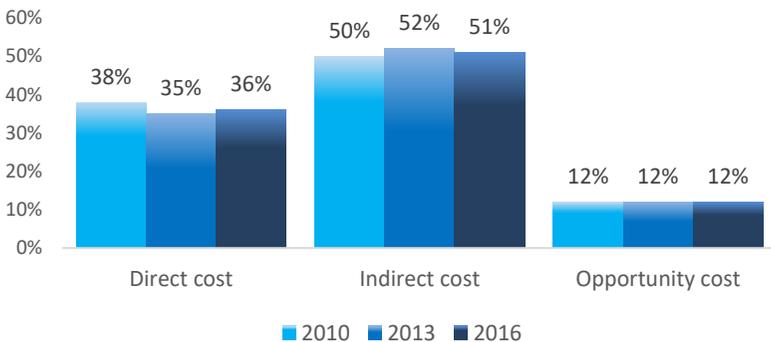


Figure 26: Percentage cost structure of unplanned data center outages

Comparison of 2010, 2013 and 2016 results

Source: Ponemon Institute

Table 21 summarizes the cost of unplanned outages for all 63 data centers. It

should be noted, however, that cost statistics are derived from the analysis of only one unplanned outage incident.⁴⁵⁸

Cost categories	Total	Mean	Median	Minimum	Maximum
Third parties	\$625,401	\$9,927	\$6,970	\$1,551	\$27,600
Equipment	\$597,114	\$9,478	\$8,865	\$1,249	\$67,783
Ex-post activities	\$530,964	\$8,428	\$11,566		\$36,575
Recovery	\$1,334,151	\$21,177	\$17,570	\$1,900	\$58,171
Detection	\$1,682,856	\$26,712	\$22,813	\$877	\$69,100
IT productivity	\$3,898,440	\$61,880	\$56,789	\$6,994	\$125,600
End-user productivity	\$8,706,159	\$138,193	\$124,551	\$15,600	\$456,912
Lost revenue	\$13,141,737	\$208,599	\$197,500	\$26,591	\$755,810
Business disruption	\$16,125,669	\$255,963	\$201,550	\$15,750	\$812,440
Total cost	\$46,642,491	\$740,357	\$648,174	\$70,512	\$2,409,991

Table 21: Cost summary for unplanned outages

Source: Ponemon Institute

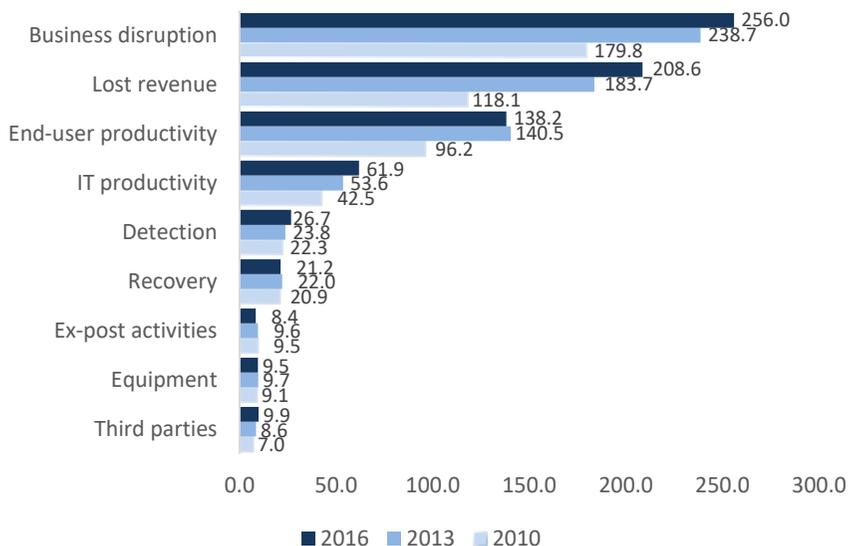


Figure 27: Comparison of activity cost categories

Comparison of 2010, 2013 and 2016 results, \$1,000 omitted

Source: Ponemon Institute

Figure 27 shows that the Ponemon study reveals a relatively consistent pattern across nine cost categories over five years (three studies).⁴⁵⁸ “The cost associated with business disruption, which includes reputation damages and customer churn, represents the most expensive cost category. Least expensive involves the engagement of third parties such as consultants to aid in the resolution of the incident.”⁴⁵⁸

Figure 28 analyzes the sample of 63 data centers by the primary root cause of unplanned outage.⁴⁵⁸ The “other” category refers to incidents where the root cause could not be determined.⁴⁵⁸ As the chart shows, 25 percent of companies cite UPS system failure as the primary root cause of the incident.⁴⁵⁸ Twenty-two percent cite accidental or human error and cyberattack as the primary root causes of the outage.⁴⁵⁸ For human error, this is the same percentage as was found in 2013, indicating that there has been no progress in reducing what should be an avoidable cause of downtime.⁴⁵⁸ The 22 percent figure for cybercrime represents a 20 percent increase from 2013 and a 167 percent increase from 2010.⁴⁵⁸ IT equipment failure represents only four percent of all outages studied in this research.⁴⁵⁸

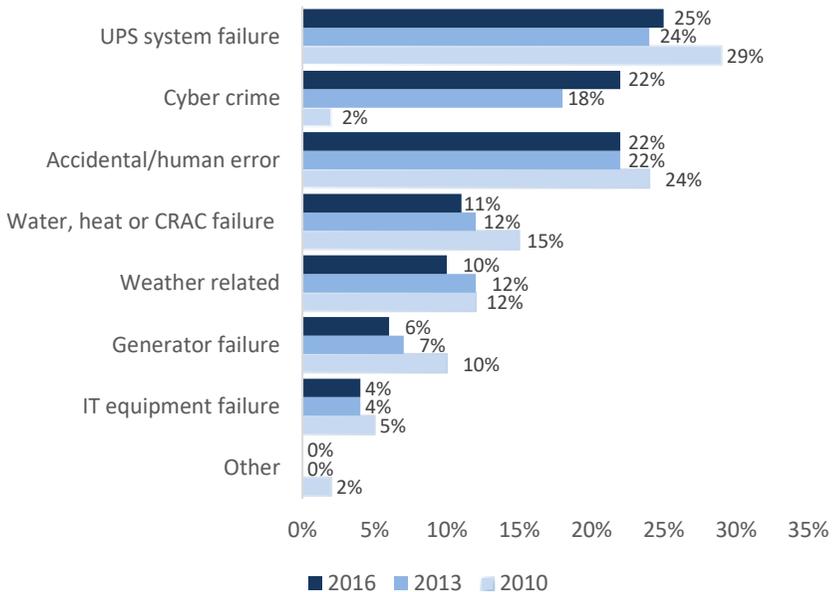


Figure 28: Root causes of unplanned outages

Comparison of 2010, 2013 and 2016 results

Source: Ponemon Institute

Figure 29 compares costs for partial unplanned outages and complete

unplanned outages.⁴⁵⁸ All three studies show complete outages are more than twice as expensive as partial outages.⁴⁵⁸

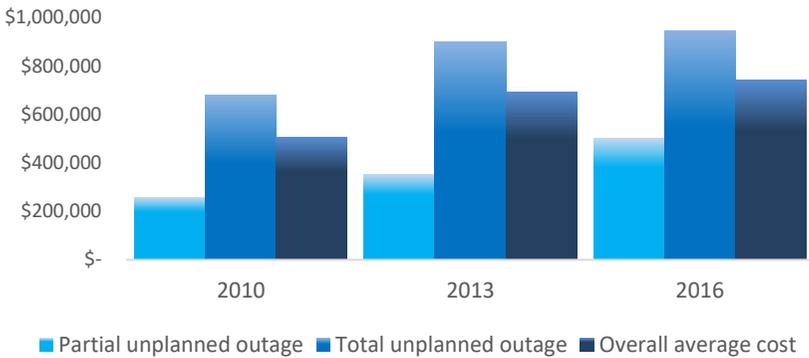


Figure 29: Cost for partial and total shutdown

Comparison of 2010, 2013 and 2016 results

Source: Ponemon Institute

Figure 30 provides the total cost of unplanned outages for the 15 industry segments included in the benchmark sample.⁴⁵⁸

Total cost of unplanned outages

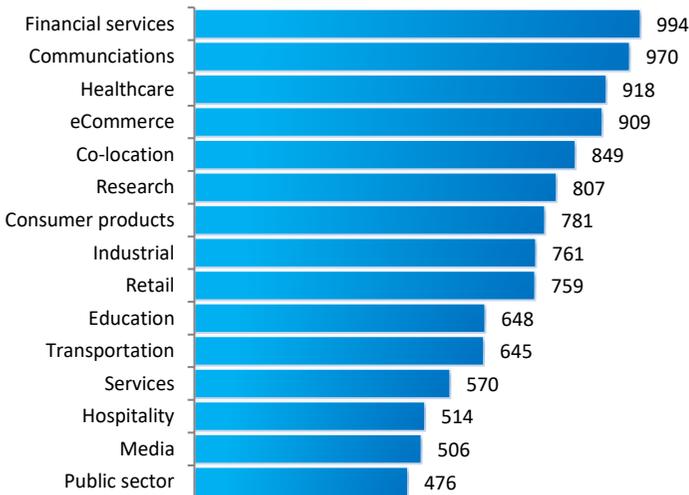


Figure 30: Distribution of total cost for 15 industry segments

\$1,000 omitted

Source: Ponemon Institute

Analysis by industry is limited because of a small sample size; however, it is interesting to see wide variation across segments ranging from a high of \$994,000 (financial services) to a low of \$476,000 (public sector).⁴⁵⁸

Figure 31 compares the average duration (minutes) of the event for partial and complete outages.⁴⁵⁸ In the 2016 study, complete unplanned outages, on average, last 66 minutes longer than partial outages.⁴⁵⁸ “It is also interesting to note a U-shape relationship in duration over six years — wherein unplanned outages on average decreased 15 minutes between 2010 and 2013 and increased 11 minutes between 2013 and 2016.”⁴⁵⁸ One possible explanation for the increase in duration time is the rise of cyberattacks, which are difficult to detect and contain.⁴⁵⁸

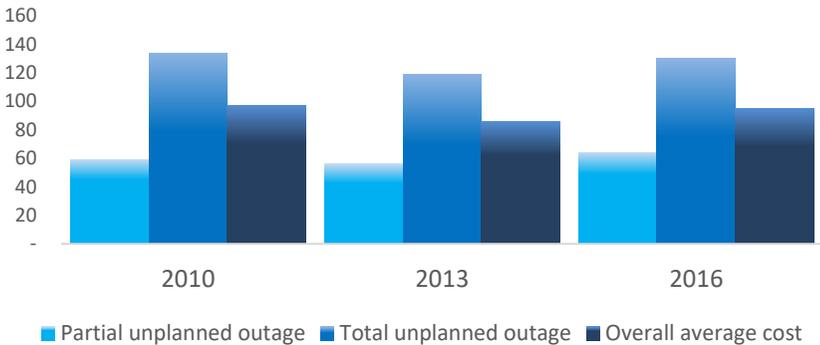


Figure 31: Duration for partial and total shutdown (measured in minutes)

Comparison of 2010, 2013 and 2016 results

Source: Ponemon Institute

Figure 32 reports the minimum, median, mean and maximum cost per minute of unplanned outages computed from 63 data centers.⁴⁵⁸

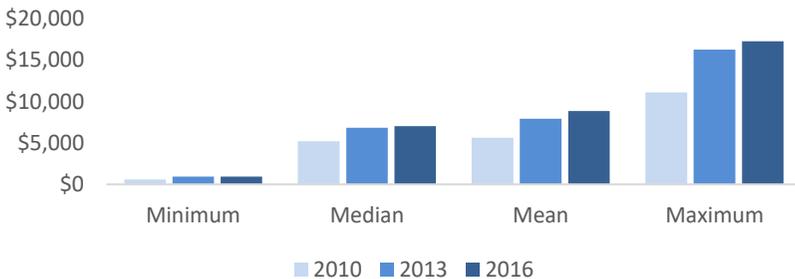


Figure 32: Total cost per minute of an unplanned outage

Comparison of 2010, 2013 and 2016

Source: Ponemon Institute

Figure 32 shows that the most expensive cost of an unplanned outage is over \$17,000 per minute. On average, the cost of an unplanned outage per minute is nearly \$9,000 per incident.⁴⁵⁸

Figure 33 reports the average cost of outage by primary root cause of the incident.⁴⁵⁸ As shown below, IT equipment failures result in the highest outage cost, followed by cybercrime.⁴⁵⁸ The least expensive root cause appears to be related to weather followed by accidental/ human errors.⁴⁵⁸

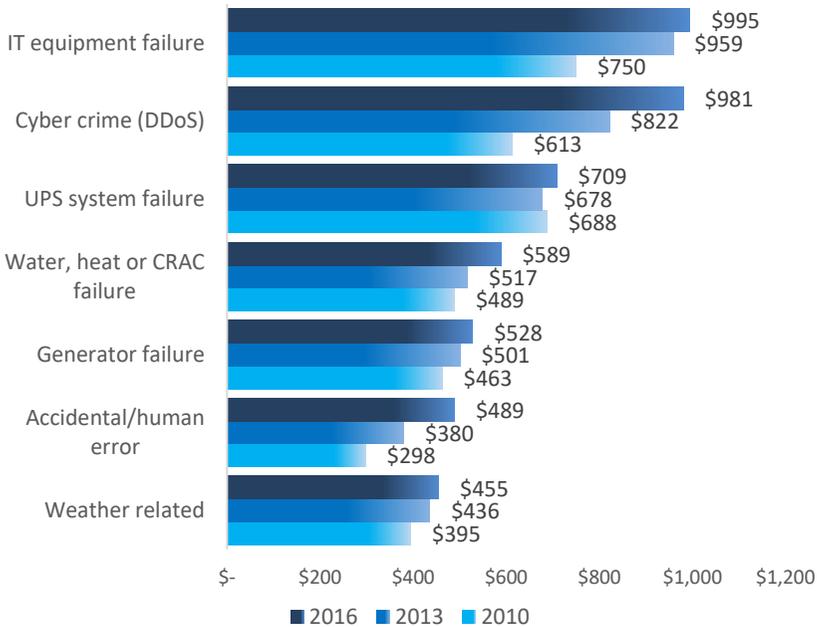


Figure 33: Total cost by primary root causes of unplanned outages

Comparison of 2010, 2013 and 2016 results, \$1,000 omitted

Source: Ponemon Institute

Unused Capacity

As Zoltán Sebestyén and Viktor Juhász claim in their paper *The Impact Of The Cost Of Unused Capacity On Production Planning Of Flexible Manufacturing Systems*⁴⁵⁹, “capacity is one of the most important measures of resources used in production. Its definition and analysis are therefore one of the key areas of production management.” Sebestyén and Juhász believe that, “The use of conventional parameters often leads to wrong decisions.”⁴⁵⁹

For Sebestyén and Juhász, “There are three aspects of the problem of conventional capacity measures: the absence of economic content, quantity

based approach, and the unduly high emphasis laid on technical processes.”⁴⁵⁹ Sebestyén and Juhász believe that, “If capacity measures could side step the problems discussed above, i.e. if they could include the value of resources, and could refer to the costs of unused capacity, then better decisions could be made in a number of cases.”⁴⁵⁹ “Changes in the nature of production, and the enhanced significance of auxiliary processes made calculations necessary for production and service systems where processes are difficult to quantify,” argue Sebestyén and Juhász.⁴⁵⁹ “The appearance of activity-based costing (ABC) solved precisely these problems, because the main goal of the method is to analyse and differentiate the overhead costs associated with capacity maintenance and operation and support processes.”⁴⁵⁹ “When using ABC for the determination of cost data, the results are also appropriate for performing capacity usage calculations,” claim Sebestyén and Juhász.⁴⁵⁹

“The ABC calculation attempts to approximate an ideal situation where the overhead is incorporated in the product only to the extent it actually exploits its resources,” say Sebestyén and Juhász.⁴⁵⁹ “In the past, due to the small ratio of overheads, it was sufficient to use a single cost driver for overhead allocation. The presently observed growth of the ratio of overheads makes it important to allocate them accurately to different products. Different products use resources to a different extent, therefore, several cost drivers are used,” the writers contend.⁴⁵⁹ The ideal case say Sebestyén and Juhász “would be to use a separate cost driver for every cost, but this is impossible to realize. Costs must be collected in cost centers, and a characteristic cost driver must be assigned to each cost group in the center.”⁴⁵⁹

“To perform a capacity calculation, we have to know the ratio of the costs of the machine, equipment, plant or division depending on, and independent of the output,” claim Sebestyén and Juhász.⁴⁵⁹ Their work builds upon the work of Cooper and Kaplan in their *Activity-Based System: Measuring the Cost of Resource Usage*.⁴⁶⁰ “These costs are closely related to the resource where they appear. The operated resources can be divided into groups on the basis whether they are provided according to their usage needs or in advance, without the prior knowledge of these needs.”^{459 460} “There is no capacity problem associated with *resources provided on the basis of direct needs*, because these are provided on the basis of known or estimated needs,” claim Sebestyén and Juhász.⁴⁵⁹ “*Resources provided in advance* are those that are made available independent of direct needs. Even though needs are forecasted by different methods to some degree, still there is the constraint of availability prior to the time when the need actually appears,” add Sebestyén and Juhász.⁴⁵⁹

For Sebestyén and Juhász, “There are three typical groups of resources provided in advance. One of them is *investment*. The company invests in machines, equipment, or buildings that present costs to be paid in advance and that are expected to operate for quite a number of years.”⁴⁵⁹ “Another cost type is the

contract costs. In this case, the company signs a contract for the future use of a service. The third and last typical example is that of *workforce*. This includes those employees who are paid a fixed wage.”⁴⁵⁹

“The *cost of unused capacity* can be calculated when the fix cost of the resource, the actual resource usage and the effective capacity are known,” contend Sebestyén and Juhász.⁴⁵⁹ The determination of the group of resources allocated in advance, the collection of their fixed costs, and the measurement of the actual capacity usage require the development of the management information system.⁴⁶¹ For Cooper and Kaplan, “The analysis of the cost of unused capacity is based on the following simple formula⁴⁶⁰:

$$\text{Activity Availability} = \text{Activity Usage} + \text{Unused Capacity.}$$

“The cost of capacity is the entire cost paid beforehand to obtain the resource under consideration,” explain Sebestyén and Juhász.⁴⁵⁹ This consists of the costs of capacity rightfully used in the operation – also called exploited – and the cost of unnecessarily allocated, that is, unused capacity, as shown in Figure 34.^{460 461 462}

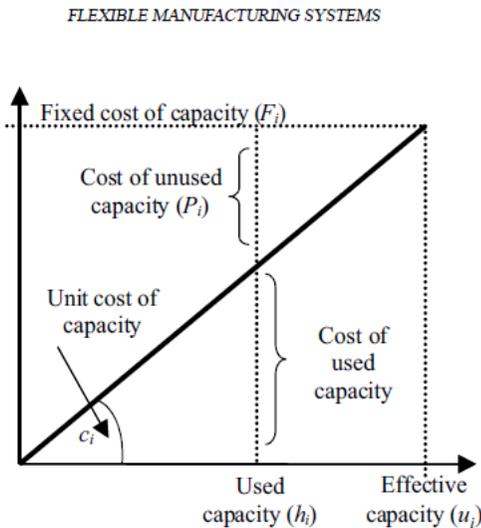


Figure 34: Interpretation of the cost of unused capacity

Source: Zoltán Sebestyén and Viktor Juhász, *The Impact Of The Cost Of Unused Capacity On Production Planning Of Flexible Manufacturing Systems*

“The separation into two parts of capacity costs can be appropriately done by linear approximation,” claim Sebestyén and Juhász.⁴⁵⁹ “There also exist theoretical models for the description of capacity utilization costs in terms of a

non-linear function, but they are seldom used in practice,” they add.⁴⁵⁹ The unit fix cost of the resource in question is derived by “Dividing the costs of availability of the resource during a given period by the quantity of the resource available during the same period.”⁴⁵⁹ This is just the slope of the linear function shown in Figure 34.⁴⁵⁹ “Knowing the quantity of the used resource and the unit cost it is easy to calculate the *cost of unused capacity*,” argue Cooper and Kaplan.⁴⁶⁰ “If u_i is the capacity, h_i is the actual production, and F_i is the total fix cost of the resource, then the unused capacity is given, according to the formula below”⁴⁶⁰:

$$P_i = F_i \left(1 - \frac{h_i}{u_i} \right).$$

Streaming Analytics

As *The Cluetrain Manifesto*³⁷² points out, “Real-time marketing is the execution of a thoughtful and strategic plan specifically designed to engage customers on their terms via digital social technologies.” Adding to that description, Wikipedia notes that real-time marketing is⁴⁶³:

“Marketing performed ‘on-the-fly’ to determine an appropriate or optimal approach to a particular customer at a particular time and place. It is a form of market research inbound marketing that seeks the most appropriate offer for a given customer sales opportunity, reversing the traditional outbound marketing (or interruption marketing) which aims to acquire appropriate customers for a given ‘pre-defined’ offer.”

Real-time marketing can be inexpensive compared to the cost of traditional paid media. “Expensive research, focus groups, and awareness campaigns can be replaced with online surveys, blog comments, and tweets by anyone or any business,” add Macy and Thompson in their book *The Power of Real-Time Social Media Marketing*.⁴⁶⁴ Just to be clear, the expense of real-time marketing might be low compared to running through traditional media channels, but setting up an IT operation that can hit a level of personalization that will wow a customer is anything but cheap, or simple.

In his article *How Real-time Marketing Technology Can Transform Your Business*²³, Dan Woods’ amusing comparison of the differing environments that marketers face today as compared to what their 1980s counterpart faced is highly instructive as today’s marketing executives don’t have time for a market research study in his sort of figurative first-person-shooter game. “The data arrives too late and isn’t connected to the modern weapons of marketing. The world is now bursting with data from social media, web traffic, mobile devices, and tripwires of all kinds,” Woods warns.²³

Today, most large companies have massive amounts of data pertaining to consumer behavior coming at them constantly, from all angles. The challenge is to make sense of the data in time to matter, to understand how consumer attitudes and behaviors are changing and how they are being changed by marketing and advertising efforts; to grab the treasure and avoid the pitfalls of unleashing a Pandora's box full of marketing furies.

The challenge in understanding the modern consumer is making sense of all of the customer data, coming in from these vast unstructured sources.²³ Some of this information explains the broad fluctuations in mass opinion, while other evidence clarifies what consumers might be doing on a company website.²³ Others still explain what consumers have done en masse or as individuals.²³ Still other data can be collected after a customer trip in the form of surveys, whether they are mobile, physical, or verbal surveys.

In his article *When do you need an Event Stream Processing platform?*⁴⁶⁵, Roy Schulte states that:

"An event is anything that happens. An event object (or 'event,' event message, or event tuple) is an object that represents, encodes, or records an event, generally for the purpose of computer processing. Event objects usually include data about the type of activity, when the activity happened (e.g., a time and date stamp), and sometimes the location of the activity, its cause, and other information. An event stream is a sequence of event objects, typically in order by time of arrival."

Large hotel companies typically have three kinds of event streams:

- Copies of business transactions, such as customer orders, bank deposits or withdrawals, customer address changes, call data records, advance shipping notices, or invoices.⁴⁶⁵ These are generated mostly internally, and reflect the operational activities of the company.⁴⁶⁵
- "The second are information reports, such as tweets, news feed articles, market data, weather reports, and social media updates, including Facebook and LinkedIn posts."⁴⁶⁵ According to Schulte, "most of these sources are external to the company, but may contain information that is relevant to a decision within the company."⁴⁶⁵
- "The third, and fastest growing, kind of event stream contains sensor data coming from physical assets."⁴⁶⁵ Generally known as IoT data, this includes "GPS-based location data from vehicles or smart phones, temperature or accelerometer data from sensors, RFID tag readings, heart beats from patient monitors, and signals from supervisory control and data access (SCADA) systems on machines."⁴⁶⁵

The reason for performing analytics on one or more event streams is to obtain

information value from the data.⁴⁶⁵ As Schulte explains, “A stream analytics application converts the raw input data (*base events*), into a form, *derived events*, that is better suited for making decisions. The derived events are *complex events*, which means that they are events that are abstracted from one or more other events.⁴⁶⁵

Stream analytics are executed in one of two ways, push-based, continuous intelligence systems, which recalculate as new data arrives without being asked to or pull-based systems that run when a person enters a request, or a timer sends a signal to produce a batch report. Event Stream Processing (ESP) platforms are mostly relevant in highly demanding, push-based systems, but they are occasionally used for pull-based analytics on historical data.⁴⁶⁵

When people think of ESP, they usually think of push-based continuous intelligence systems, which ingests ongoing flows of event data and provide situation awareness, while also supporting near-real-time, sense-and-respond business processes.⁴⁶⁵ “Continuous intelligence systems typically refresh dashboards every second or minute, send alerts, or implement hands-free decision automation scenarios,” Schulte explains. “They may be used to monitor a data source, such as Twitter, or a business operation, such as a customer contact center, supply chain, water utility, telecommunication network, truck fleet, or payment process,” adds Schulte.⁴⁶⁵

Schulte explains that⁴⁶⁵:

“ESP platforms are software subsystems that process data in motion, as each event arrives. The query is pre-loaded, so the data comes to the query rather than the query coming to the data. ESP platforms retain a relatively small working set of stream data in memory for the duration of a limited time window, typically seconds to hours — just long enough to detect patterns or compute queries. The platforms are more flexible than hardwired applications because the query can be adjusted to handle different kinds of input data, different time windows (e.g., one minute or one hour instead of ten minutes) and different search terms.”

According to Schulte, continuous intelligence applications are best implemented on ESP platforms if⁴⁶⁵:

- A high volume of data (thousands or millions of events per second).
- Frequently recalculated results (every millisecond or every few seconds).
- Multiple simultaneous queries are applied to the same input event stream.

Schulte gives the example of Twitter’s ESP platforms, Storm and Heron as

powerful streaming platforms.⁴⁶⁵ These DWs are “used to monitor Twitter, which averages about 6,000 tweets per second. A simple query might report the number of tweets that included the word ‘inflation’ in the past ten minutes. However, at any one time, there may be thousands of simultaneous queries in effect against Twitter, each looking for different key words or different time windows.”⁴⁶⁵

“In high volume scenarios, ESP platform applications can scale out vertically (multiple engines working in parallel on the same step in a processing flow) and/or horizontally (split the work up in a sequence or pipeline where work is handed from one engine to the next while working on the same multistep event processing query (i.e., an event processing network),” notes Schulte.⁴⁶⁵

Schulte notes that, “On-demand analytics are pull-based applications that support ad hoc data exploration, visualization and analysis of data.”⁴⁶⁵ On-demand analytics can be used with historical event data to build analytical models.⁴⁶⁵ In this context, “historical means stored event streams that are hours, weeks or years old.”⁴⁶⁵ Schulte explains that the “analytical models can be used for either of two purposes:

- “To design rules and algorithms to be used in real-time continuous intelligence applications (see above), or
- “To make one-time, strategic, tactical and long-term operational decisions.”⁴⁶⁵

The most common tool for on-demand analytics with historical data is a data discovery product like Alteryx, Qlik, Tableau, SAS, Tibco, etc., etc., however, “companies occasionally use ESP platforms to run analytics on historical event streams by re-streaming the old event data through the ESP engine.”⁴⁶⁵ “This is particularly relevant when developing models for subsequent use in real-time, continuous intelligence ESP applications.”⁴⁶⁵

ESP platforms are not the only type of software optimized for high performance analytics on event stream data. Some stream analytics products like First Derivatives KDB+, Interana Platform, Logtrust Platform, One Market Data OneTick, Quartet ActivePivot, and Splunk Enterprise combine analytics and longer term data storage in one product.⁴⁶⁵ “These products typically provide on-demand, pull-based analytics, but some are also used for continuous, push-based continuous intelligence. They ingest and store high volume event streams very quickly, making the ‘at rest’ data immediately available for interactive queries, exploration and visualization,” explains Schulte.⁴⁶⁵

For a real-time platform to work, data must be gathered from multiple and disparate sources, which can include Enterprise Resource Planning (ERP), Customer Relationship Management (CRM), Social CRM (SCRm) platforms, geofencing applications (like Jiebang and Foursquare), Over-The-Top services (like WhatsApp and WeChat), mobile apps, augmented reality apps, and other

mobile and social media systems. This data must be collected and then seamlessly integrated into a data warehouse that can cleanse it and make it ready for consumption.²³⁹ As the authors' state in *Mobile Advertising*:

*"The analytical system must have the capability to digest all the user data, summarize it, and update the master user profile. This functionality is essential to provide the rich user segmentation that is at the heart of recommendations, campaign and offer management, and advertisements. The segmentation engine can cluster users into affinities and different groups based on geographic, demographic or socio-economic, psychographic, and behavioral characteristics."*⁴⁶

In his article *Real-Time Stream Processing as Game Changer in a Big Data World with Hadoop and Data Warehouse*³⁶, Kal Wähler states that:

"Stream processing is designed to analyze and act on real-time streaming data, using 'continuous queries' (i.e. SQL-type queries that operate over time and buffer windows). Essential to stream processing is Streaming Analytics, or the ability to continuously calculate mathematical or statistical analytics on the fly within the stream. Stream processing solutions are designed to handle high volume in real time with a scalable, highly available and fault tolerant architecture. This enables analysis of data in motion."

As a batch processing framework, Hadoop can't handle the needs of real time analytics. As the first open source distributed computing environment, Hadoop has garnered a lot of attention recently, but it is not necessarily the best platform for real-time analytics of dynamic information.⁴⁶⁶

One recent development in stream processing methods is the invention of the "live data mart", which "provides end-user, ad-hoc continuous query access to this streaming data that's aggregated in memory," explains Wähler.³⁶ "Business user-oriented analytics tools access the data mart for a continuously live view of streaming data"³⁶ and a "live analytics front ends slices, dices, and aggregates data dynamically in response to business users' actions, and all in real time," adds Wähler³⁶

For a hotel operator, streaming data could be coming in from facial recognition and geo-location software, fraud or anti-money laundering solutions, loyalty card systems, campaign management databases, social media feeds, IoT data, as well as wearables and employee/labor data sets.

Stream processing excels when data must be processed fast and/or continuously. Many different frameworks and products are available on the market already, however the number of mature solutions with good tools and

commercial support today is quite small.

Apache Storm is a good, open source framework, but it suffers from its open source nature and custom coding is required because of limited developer tools. The typical “commercial solution vs. open source” questions must be answered; do I want a pre-built product that will require limited — and sometimes not so limited implementation costs — or do I want to start with a solid solution and be required to customize everything?

As Wähler explains, a stream processing solution has to solve several different challenges, including³⁶:

1. Processing massive amounts of streaming events (filter, aggregate, rule, automate, predict, act, monitor, alert).
2. Real-time responsiveness to changing market conditions.
3. Performance and scalability as data volumes increase in size and complexity.
4. Rapid integration with existing infrastructure and data sources: Input (e.g. market data, user inputs, files, history data from a DWH) and output (e.g. trades, email alerts, dashboards, automated reactions).
5. Fast time-to-market for application development and deployment due to quickly changing landscape and requirements.
6. Developer productivity throughout all stages of the application development lifecycle by offering good tool support and agile development.
7. Analytics: Live data discovery and monitoring, continuous query processing, automated alerts and reactions.
8. Community (component/connector exchange, education/discussion, training/certification).
9. End-user ad-hoc continuous query access.
10. Alerting.
11. Push-based visualization.

Augmented and Virtual Reality

Not just the stuff of science fiction anymore, Augmented Reality (AR) is now a part of our everyday lives. In his article *CrowdOptic and L’Oreal to make history by demonstrating how augmented reality can be a shared experience*⁴⁶⁷, Tarun Wadhwa states that augmented reality works by “displaying layers of computer-generated information on top of a view of the physical world.” It is “a technology that alters the perception of reality by distorting it, allowing escape from it, and enhancing it — all at the same time.”⁴⁶⁷

Webopedia.com adds that augmented reality or AR is⁴⁶⁸:

“A type of virtual reality that aims to duplicate the world's

environment in a computer. An augmented reality system generates a composite view for the user that is the combination of the real scene viewed by the user and a virtual scene generated by the computer that augments the scene with additional information. The virtual scene generated by the computer is designed to enhance the user's sensory perception of the virtual world they are seeing or interacting with. The goal of Augmented Reality is to create a system in which the user cannot tell the difference between the real world and the virtual augmentation of it. Today Augmented Reality is used in entertainment, military training, engineering design, robotics, manufacturing and other industries."

According to Gartner's *Top 10 Strategic Technology Trends 2017*⁴⁶⁹, Augmented reality (AR) and virtual reality (VR) will "transform the way individuals interact with each other and with software systems creating an immersive environment. For example, VR can be used for training scenarios and remote experiences."

AR enables a blending of the real and virtual worlds, which "means businesses can overlay graphics onto real-world objects."⁴⁶⁹ Immersive experiences with AR and VR are reaching tipping points in terms of price and capability but will not replace other interface models.⁴⁶⁹ In the future, AR and VR are expected to expand beyond visual immersion and they might include all of the human senses⁴⁶⁹, although this is a very complicated thing to pull off as smell-o-vision tried and failed to do in the entertainment business last century.

According to its press release *Gartner Says Augmented Reality Will Become an Important Workplace Tool*⁴⁷⁰, "Augmented reality is the real-time use of information in the form of text, graphics, audio and other virtual enhancements integrated with real-world objects." Tuong Huy Nguyen, principal research analyst at Gartner, states that "AR leverages and optimizes the use of other technologies such as mobility, location, 3D content management and imaging and recognition. It is especially useful in the mobile environment because it enhances the user's senses via digital instruments to allow faster responses or decision-making."⁴⁷⁰

Gartner believes "AR technology has matured to a point where organizations can use it as an internal tool to complement and enhance business processes, workflows and employee training."⁴⁷⁰ Gartner contends that "AR facilitates business innovation by enabling real-time decision-making through virtual prototyping and visualization of content."⁴⁷⁰

According to Deloitte, Wearable AR devices can "allow users to access standardized sets of instructions for a particular task in real time, triggered by environmental factors and overlaid on the user's field of vision."⁴⁷¹ Research has

shown that overlaying 3D instructions over a real-life process can reduce the error rate for an assembly task by 82 percent, with a particularly strong impact on cumulative errors due to previous assembly mistakes.⁴⁷¹

“AR allows for improved senses and memory through the capture and enhancement of the user’s perspective. By recording video/audio, capturing images and removing elements that obscure the senses, AR technology allows users’ eyes to act as cameras, and can enhance the senses in ways not available naturally, such as night vision or the ability to zoom in on far-away objects,” says Deloitte.⁴⁷¹

AR uses location-based data for navigation, overlaying digital maps and directions on real-world environments.⁴⁷⁰ Through the lens of an AR device, a user can receive visual guidance based on GPS technology.⁴⁷⁰ AR services generally fall into one of two categories — “location-based or computer vision. Location-based offerings use a device’s motion sensors to provide information based on a user’s location. Computer-vision-based services use facial, object and motion tracking algorithms to identify images and objects.”⁴⁷¹

Mr. Nguyen claims AR’s benefits include the “potential to improve productivity, provide hands-on experience, simplify current processes, increase available information, provide real-time access to data, offer new ways to visualize problems and solutions, and enhance collaboration.”⁴⁷¹

Augmented reality has many potential applications in the hospitality industry as well and the following ideas might seem a little like science fiction, but they are certainly within the realm of technical possibilities, and today there is no question that they would take the concept of personalization to a whole new level.

In his article *Augmented Reality and Hospitality...the Next Generation of Hotels?*⁴⁷², Matt S-J lays out a very interesting scenario for AR in a hospitality environment, whether that is for a hotel, a standalone hotelier, or an integrated resort. If a hotel provided its front desk staff with a pair of AR glasses that connected to an EDW that provided real-time patron information, the staff would be empowered to greet and interact with a patron on a truly personal level. The clerks could know all of the customer’s past history and, perhaps even if these were well-known VIPs, the recent news headlines associated with them. This type of engagement would bring the concept of customer service to a whole new level, a level that would be unlike anything these patrons had ever witnessed before, even if they were high-level celebrities.⁴⁷²

A guest who had stayed at the property in the past would immediately be identified and all of his or her preferences and necessary patron information could appear on the AR glasses’ virtual screen.⁴⁷² “The guest could be checked in before they even reached the door. The extent goes further as restaurants could identify guests’ allergies or preferences, orders would be recognized by dish then

linked to the table and guest images shown to see who has ordered what, so the food would always be served to the correct person.”⁴⁷²

Birthday or anniversary greetings could be offered up without having to research a patron’s profile.⁴⁷² Staff who interact with VIP guests could be informed of sensitive topics to avoid.⁴⁷² Many of these things can be achieved through excellent staff, but they all require research, time and a good long memory, which not everyone possesses.⁴⁷²

For the hotel’s patron, AR could enhance his or her on-property experience considerably. By simply downloading the hotelier property’s AR app onto his mobile phone, the patron could be checked in virtually and then be given personalized directions to his room, where hotel staff members could greet him. A free bottle of champagne or Chateau Laffite wine could be awaiting him in his suite.⁴⁷² The hotelier’s general manager could even appear in a video to offer a personalized greeting on the television.⁴⁷²

Continuing with the AR journey, a patron could go to one of the hotel’s restaurants and, when seeing an appetizing meal being brought out from the kitchen, he could whip out his mobile phone, snap a picture of the meal, quickly scan it on the app, and then discover that it is a dish of beef wellington, and then, potentially, place an order for it.⁴⁷² If interested, the patron could even pay for the dish on his mobile device, possibly utilizing patron points, should he chose to redeem those.

After dinner, if the patron is interested in going to one of the hotel bars, a quick scan of the line of people waiting to get into the bar would reveal the wait time needed. If the AR system connected with the hotel’s patron system (which revealed that he was a high roller whose card allowed him to skip the line), the patron could be notified that he could jump the queue. If the patron didn’t have such a vaunted status and didn’t want to wait, he could be shown the name and location of the hotel’s other bars, which might not be so crowded.⁴⁷²

The AR app could also help with hotel maintenance. As a user scans his or her hotel room, the app could take notice of any minor maintenance issues.⁴⁷² These issues would not be highlighted for the user, but would be relayed to the appropriate hotel maintenance departments so that they could be fixed.⁴⁷² This, of course, does raise privacy issues, but they are probably nothing a good corporate lawyer’s legalese couldn’t overcome.

Continuing on the patron’s AR journey: if the patron liked to play golf, a quick scan of the golf course with the AR app would reveal the average par shots.⁴⁷² If she chose to play, the app could then keep track of her score.⁴⁷² Nearby structures could also be explained so that she could actually discover local areas of interest.⁴⁷² Discounts on services could also be pushed out to her and, if they were coupled with a dynamic pricing system, these discounts could actually help

sell what might otherwise be empty seats in one of the integrated resort's venues.⁴⁷²

So where is AR going? In his article *Augmented reality: expanding the user experience*⁴⁷³, John Moore claims that “app creators have begun to engage more of a mobile device's sensors—accelerometers and gyroscopes, for example. Augmented reality apps that use detailed animations are also in the works. The objective: inject augmented reality technology in a wider range of apps to boost the user experience.”⁴⁶⁷

Pokémon Go was the first location-based augmented reality game that hit it big. Despite mixed reviews, the mobile app quickly became a global phenomenon and it was one of the most used and profitable mobile apps of 2016, having been downloaded more than 500 million times worldwide.⁴⁷⁴ It certainly revealed the enormous potential of AR and it proved, without a doubt, that the barriers to AR technology were limited and easily scaled by humans, at least those seeking out little dueling pocket monsters.

Internet of Things (IoT)

As previously mentioned the Internet of Things is “the network of physical objects that contain embedded technology to communicate and sense or interact with their internal states or the external environment.”²⁹ Technology costs are down, broadband's price has dropped, while its availability has increased. There is a proliferation of devices with Wi-Fi capabilities and sensors built into them, and smart phone penetration is exploding; all of these individual technological advances were good for the IoT, together they have created a perfect storm for it.⁴⁷⁵ Simply put, IoT is the concept of basically connecting any device with an on and off switch to the Internet, including cell phones, coffee makers, washing machines, headphones, lamps, wearable devices and almost anything else imaginable.²⁹

According to its article *Gartner Says the Internet of Things Installed Base Will Grow to 26 Billion Units By 2020*⁴⁷⁶, Gartner claims that, “The Internet of Things (IoT), which excludes PCs, tablets and smartphones, will grow to 26 billion units installed in 2020 representing an almost 30-fold increase from 0.9 billion in 2009.” Gartner predicts IoT product and service suppliers will generate incremental revenue exceeding \$300 billion, mostly in services, in 2020. It will result in \$1.9 trillion in global economic value-add through sales into diverse end markets.”⁴⁷⁶

Today, it is almost impossible to understand how all-encompassing the Internet of Things will be in our daily lives in the not-too-distant future. From such life-changing technology as Google's driverless cars — which could help optimize traffic, thereby reducing traffic congestion, as well as making people more

productive — sensors that can help regulate room temperature thereby saving energy, IoT is definitely here to stay.

“The growth in IoT will far exceed that of other connected devices. By 2020, the number of smartphones tablets and PCs in use will reach about 7.3 billion units,” said Peter Middleton, research director at Gartner⁴⁷⁶ “In contrast, the IoT will have expanded at a much faster rate, resulting in a population of about 26 billion units,” Middleton adds.⁴⁷⁶

For a hotel, IoT applications can be utilized in the following ways:

- Internet of things:
 - Smart parking
 - Smartphone detection
 - Traffic congestion
 - Smart lighting
 - Waste management
- Smart Metering:
 - Smart grid
 - Tank level
 - Water flow
 - Silos stock calculation
 - Water leakages
- Security & Emergencies:
 - Perimeter access control
 - Liquid presence
 - Explosive and hazardous gases alerts
- Retail:
 - Supply chain control
 - NFC payment
 - Intelligent shopping applications
 - Smart product management
- Inventory optimization
- Logistics:
 - Quality of shipment conditions
 - Item location
 - Storage incompatibility detection
 - Fleet tracking
- Industrial Control:
 - Smart Warehouse
 - M2M applications
 - Indoor air quality
 - Temperature monitoring
 - Indoor location tracking
 - Vehicle auto-diagnosis

- Video analytics:
 - Object detection
 - Slip fall analysis
 - People counting
- Swimming pool remote measurement

IoT isn't a standalone technology and when combined with wearable technology that is equipped with AR, personalized interactions with the physical world can be created, which I discuss next.

IoT is faced with the typical problems of new technologies, a lack of standards as the big and small players jockey for position, although there is a movement in place to create a vendor-independent protocol that will allow devices to connect with each other under the guise of a common service layer.

Currently, IoT's growing pains are being tackled and security issues are being addressed. The addition of edge analytics, which can reduce network and connectivity costs, is also circumventing the need for cloud integration.

Improving computer processing power and memory in semiconductors and modules increases by the month. This should allow IoT devices to add an ML component, which could help IoT devices realize the potential of ambient intelligence, allowing them to grow smarter over time. However, heavy duty number crunching power is still needed when performing intensive predictive and prescriptive analytics.

In his article *The Data of Things: How Edge Analytics and IoT Go Hand In Hand*⁴⁷⁷, Gadi Lenz explains that, although IoT data has similar characteristics to Big Data, it is much more complicated. IoT data is:

- "Messy, noisy, and sometimes intermittent because sensors are often deployed in the field. IoT data is ultimately collected by sensors sitting somewhere — for example, a sensor could be deployed on a telephone pole or streetlight. Sensors often cut in and out.
- Often highly unstructured and sourced from a variety of sensors (fixed and mobile).
- Dynamic — 'data in motion' as opposed to the traditional 'data at rest'.
- Sometimes indirect — we cannot measure a certain relevant quantity directly, for example, using a video camera with video analytics to count people in a certain area."⁴⁷⁷

The idea of collecting all of this sensor information and bringing it into one centralized computing station is not viable over the long term, particularly as the volume of IoT devices increases exponentially.⁴⁷⁷ "Bringing such a large amount of data into a relatively small number of data centers where it is then analyzed in the cloud, simply [sic] not scale."⁴⁷⁷ The cost, too, would be prohibitive.⁴⁷⁷

“With so many devices producing so much data, a correspondingly large array of analytics, compute, storage and networking power and infrastructure is essential. Though analytics will be necessary to the growth and business value of IoT, the traditional approach to analytics won’t be the right fit,” Lenz argues.⁴⁷⁷

Edge analytics addresses these problems. A hotel operator can “harness the smartness of the myriad of smart devices and their low cost computational power to allow them to run valuable analytics on the device itself.”⁴⁷⁷ As Lenz explains, “Multiple devices are usually connected to a local gateway where potentially more compute power is available (like Cisco’s IOx), enabling more complex multi-device analytics close to the edge.”⁴⁷⁷

Distributed IoT analytics would work in three ways, “simple” analytics would be done on the smart device itself, more complex multi-device analytics on the IoT gateways, and finally the high computational computing — the Big Data analytics, if you will — would connect to and run on the cloud.⁴⁷⁷ “This distribution of analytics offloads the network and the data centers by creating a model that scales. Distributing the analytics to the edge is the only way to progress,” advises Lenz.⁴⁷⁷

As the DHL Trend Research and Cisco Consulting Services paper *Internet of Things in Logistics*⁴⁷⁸ explains:

“With the advent of IoT, Internet connections now extend to physical objects that are not computers in the classic sense and, in fact, serve a multiplicity of other purposes. A shoe, for example, is designed to cushion the foot while walking or running. A streetlight illuminates a road or sidewalk. A forklift is used to move pallets or other heavy items. None of these have traditionally been connected to the Internet — they did not send, receive, process or store information. Nonetheless, there is information latent in all of these items and their use. When we connect the unconnected — when we light up “dark assets” — vast amounts of information emerge, along with potential new insights and business value.”

A connected shoe can reveal the number of footfalls in a given period of time, or the force with which the foot strikes the ground.⁴⁷⁸ A connected street light can understand traffic patterns, and “provide information to drivers or city officials for route planning and to optimize the flow of traffic.”⁴⁷⁸ A connected forklift can be fitted with predictive asset maintenance alerts that can warn a warehouse manager of an impending mechanical problem.⁴⁷⁸

In *The A.I. Hotelier*, cameras immediately pick up a customer once he or she enters or even when he or she boards a hotelier bus at the China-Macau border gate. In this case, it makes sense for the analytics to be done inside the camera itself, rather than having the data sent back to a centralized server as that can

be both inefficient and it risks bottlenecking.⁴⁷⁷ Lenz adds, “Edge analytics is all about processing and analyzing subsets of all the data collected and then only transmitting the results.”⁴⁷⁷ So, the systems is essentially discarding some of the raw data and potentially missing some insights, but it should be a calculated loss as analyzing everything is just not productive in most cases.⁴⁷⁷

“Some organizations may never be willing to lose any data, but the vast majority can accept that not everything can be analyzed. This is where we will have to learn by experience as organizations begin to get involved in this new field of IoT analytics and review the results,” adds Lenz.⁴⁷⁷ Overall, the potential for the hotel to understand its business processes is enormous.

However, some trade-off must be considered with edge analytics. Lenz notes that, “Edge analytics is all about processing and analyzing subsets of all the data collected and then only transmitting the results.”⁴⁷⁷ Some of the raw data is discarded and potentially some insights are lost.⁴⁷⁷ “The question is, Can we live with this ‘loss’ and, if so, how should we choose which pieces we are willing to ‘discard’ and which need to be kept and analyzed?”⁴⁷⁷

It is also important to learn the lessons of past distributed systems. “For example, when many devices are analyzing and acting on the edge, it may be important to have somewhere a single ‘up-to-date view,’ which in turn, may impose various constraints. The fact that many of the edge devices are also mobile complicates the situation even more.”⁴⁷⁷ Although incredibly powerful devices in their own right, mobile phones and tablets will never reach the capacity and compute technology of EDWs.

Wearables

Wearable products include smart watches, activity trackers, smart jewelry, head-mounted optical displays, and earbuds. According to wearabledevices.com⁴⁷⁹:

“The terms ‘wearable technology’, ‘wearable devices’, and ‘wearables’ all refer to electronic technologies or computers that are incorporated into items of clothing and accessories which can comfortably be worn on the body. These wearable devices can perform many of the same computing tasks as mobile phones and laptop computers; however, in some cases, wearable technology can outperform these hand-held devices entirely. Wearable technology tends to be more sophisticated than hand-held technology on the market today because it can provide sensory and scanning features not typically seen in mobile and laptop devices, such as biofeedback and tracking of physiological functions.”

In general, wearable technology includes some form of communications capability that allows the wearer to access real-time information.⁴⁷⁹ “Data-input

capabilities are also a feature of such devices, as is local storage. Examples of wearable devices include watches, glasses, contact lenses, e-textiles and smart fabrics, headbands, beanies and caps, jewelry such as rings, bracelets, and hearing aid-like devices that are designed to look like earrings.”⁴⁷⁹

Wearable technology isn't just for items that can be put on and taken off with ease, there are also more invasive and permanent versions of the concept as implanted devices such as micro-chips or even smart tattoos can be considered wearables. Ultimately, whether a device is worn on or incorporated into the body, “the purpose of wearable technology is to create constant, convenient, seamless, portable, and mostly hands-free access to electronics and computers.”⁴⁷⁹

In its *Adoption of IoT for Warehouse Management*⁴⁸⁰, Israel Gogle argues that wearable devices and augmented reality are some of the best technologies to help improve the performance of human operators.

John Bermudez, VP of Product Management at Infor, explains that, “In our innovation lab, we are looking into options like providing workers with wearable video cameras that can upload information to the warehouse management system or with smart glasses. This augmented reality solution will give the operator a visual confirmation on a small screen in front of his eye that he is picking the right thing.”⁴⁸⁰

“Wearable devices will add a new layer of visibility that does not exist now. It will work in route management, showing wearers where to go via the glasses, and pick and pack verification, where bar code scans or RFID readings in real time can be used to ensure correct pick and order management,” added Douglas Bellin, Global Lead for Manufacturing and Energy Industries at Cisco Systems.⁴⁸⁰

Another advantage of wearables is their ability to collect information that can also be used for such things as employee safety.⁴⁸⁰ This has a doubly positive effect, not only does it ensure the employees' wellbeing, but it can also save the company money, minimizing losses due to injured employees and lost productivity, maybe even saving lives.⁴⁸⁰

“Our wearables platform serves as a real-time warning system. It analyzes a vast amount of information gathered from wearable sensors embedded in personal protective equipment, such as smart safety helmets and protective vests, and in the workers' individual smartphones,” said Asaf Adi, Senior Manager of IoT and Wearables at IBM Research.⁴⁸⁰ “Information from the sensors and smart protective equipment feeds directly to the worker's smartphone, which can then immediately process and analyze the personal data,” explains Gogle.⁴⁸⁰

By tracking a worker's pulse rate, his movement, his body temperature, even, potentially, his hydration level, sensors can continuously monitor a worker's physical condition.⁴⁸⁰ The noise level and/or an employees' location in relation

to moving machinery and forklifts can also be monitored to guard against accidents.⁴⁸⁰ Alerts can also be sent out in cases where sensors detect a worker that has fallen or fainted in the warehouse.⁴⁸⁰

Robotics

In their paper *Progress on robotics in hospitality and tourism: a review of the literature*⁴⁸¹, Ivanov et al. believe that, “The concept of the robot is not particularly old, only being coined in 1920 by Karel Čapek in his play R.U.R—Rossum’s Universal Robots⁴⁸², and it took several decades before the concept was incorporated fully into popular culture.”

By the 1950s, Hollywood movies depicting both malevolent and benevolent robots broadly disseminated the concept of the robot and inspired development of physical robots and the robotics industry.⁴⁸¹ While Ivanov et al. admit that there might be a colloquial understanding of what a robot is, there is also a more technical and industry-accepted definition⁴⁸¹, which is, “A robot is defined by the International Organization for Standardization⁴⁸³ as an “actuated mechanism programmable in two or more axes with a degree of autonomy, moving within its environment, to perform intended tasks.”⁴⁸¹

According to Ivanov et al., “The incorporation of robotics came relatively late to the industries involved in travel, tourism and hospitality, probably since many of the services provided require sophisticated reactions to the needs of the customer.”⁴⁸¹ “While some automobile factories were largely staffed by robots by the mid-1990s, it was only in 2015 that a hotel predominantly staffed by robots opened (the Henn na Hotel in Japan)” add Ivanov et al.⁴⁸¹ “At present, robots are used in hotels for such tasks as checking guests in, vacuuming floors, delivering things to guests, concierge services, and other common chores.”⁴⁸¹ Robots also prepare drinks, entertain guests, guide guests through a property and offer guests information.⁴⁸⁴

In his *Ultimate transformation: How will automation technologies disrupt the travel, tourism and hospitality industries?*⁴⁸⁵, Stanislav Ivanov argues that “Companies from the travel, tourism and hospitality industry have started adopting robots, artificial intelligence and service automation technologies (RAISA) in their operations.”⁴⁸⁵ “Self-check-in kiosks, robotic pool cleaners, delivery robots, robot concierges, chatbots, etc., are used increasingly by tourism companies and transform the ways they create and deliver services.”⁴⁸⁵ Ivanov believes that “in the future companies will divide into two large segments – high-tech tourism companies offering standardized cheap robot-delivered services, and high-touch companies, which rely on human employees.”⁴⁸⁵

Every generation has witnessed technological breakthroughs that revolutionized the tourism industry.⁴⁸⁵ In the middle of the 19th century, train travel allowed

tourists a feasible way to visit far off lands and the first organized trips emerged.⁴⁸⁵ “In the first half of the 20th century, the car added a great deal of flexibility to the selection of tourist routes and contributed to the democratisation of travel,” says Stanislav Ivanov.⁴⁸⁵ The introduction of the jet engine in the second half of the 20th century made long haul destinations accessible and affordable for the working middle class.⁴⁸⁵ At the end of the 20th and beginning of the 21st century, the Internet and social media contracted the world and changed the rules of the business of and competition among travel, tourism and hospitality companies.⁴⁸⁵ Today, the tourism industry faces “a new revolution, one more powerful, transformative and with longer term implications than the previous changes. Tourism is entering the robotics era.”⁴⁸⁵

According to Ivanov, “While during the previous tourism revolutions humans played a central role in the system, both as customers/tourists and as service providers/employees in tourism companies, the new realities would induce changes to both the demand and the supply sides of the tourism system.”⁴⁸⁵ “The advances in robotics, artificial intelligence and service automation technologies (RAISA)^{486 487 488} allow companies from various sectors to use RAISA in order to decrease costs, streamline operations, eliminate waste, and improve productivity and efficiency,” says Ivanov.⁴⁸⁵ Robots already greet guests at hotel receptions, act as waiters in restaurants and room service, clean floors and swimming pools, cut grass at hotels’ green areas, provide information at airports kiosks, and even cook food in automated kitchens.^{489 490}

Currently, Ivanov believes that, “robots seem quite clumsy in their interactions with humans and navigation through the premises of hotels, restaurants and airports.”⁴⁸⁵ However, with advances in robotics, robots should “become much more capable of serving guests and implementing various tasks beyond the 3D (dirty, dull and dangerous) tasks which human beings do not want to implement, hence widening their potential application and adoption by tourist companies.”⁴⁸⁵

Researchers have applied AI in forecasting tourism arrivals, demand, and expenditure^{491 492 493} as well as overall hotel occupancy⁴⁹⁴, identification of destination attributes⁴⁹⁵, sentiment analysis of online reviews^{496 497}, analysis of the impact of online reviews on hotel performance⁴⁹⁸, analysis of hotel employee satisfaction⁴⁹⁹, market segmentation⁵⁰⁰, forecasting waste generation rates in hotels⁵⁰¹, or their energy demand⁵⁰², to name just a few areas of interest in the field. The application of facial recognition systems at airports has been studied by Del Rio et al.⁵⁰³, while Nica et al.⁵⁰⁴ developed a chatbot for recommendations in tourism.

RAISA technologies can work 24/7, 365 days a year.⁴⁸⁵ “Unlike human employees who can work 40-60 hours a week depending on their job position, legal regulations, health and mental condition and work urgency, RAISA technologies are available 24/7, 168 hours a week,” says Ivanov.⁴⁸⁵ “A hotel would need at

least 5 receptionists to have a non-stop working reception, something that could be achieved with one kiosk only.”⁴⁸⁵

“RAISA technologies could implement various tasks and expand their scope with software and hardware upgrades,” adds Ivanov.⁴⁸⁵ A kiosk only needs a new software package or upgrade in order to be used for an alternate purpose from its original design.⁴⁸⁵ “A new block answers and set of rules would allow a chatbot to be able to provide relevant answers to customer queries,” explains Ivanov.⁴⁸⁵ On the other hand, human employees need training that could be both significant and time consuming depending on the new tasks they have to implement.⁴⁸⁵

RAISA technologies could do routine work repeatedly.⁴⁸⁵ “Unlike human employees, robots and kiosks can perform the same task numerous times, without complaints and they do not need to be motivated to do it,” says Ivanov.⁴⁸⁵ RAISA technologies don’t strike, spread rumors, or discriminate against customers or employees, quit their job without notice, show negative emotions, shirk from work, ask for pay increases, or get ill.⁴⁸⁵ This makes the life of a company managers much easier. In fact, it could be argued that “every strike of human employees is a step towards the automation of tasks they currently perform.”⁴⁸⁵

On the other hand, RAISA technologies lack creativity.⁴⁸⁵ “At the current state of technological development service robots, kiosks or chatbots cannot invent new ways to deliver services to customers, regardless whether the innovation is in the form of a new service or a new way to deliver an existing service,” says Ivanov.⁴⁸⁵

RAISA technologies won’t be completely independent of human supervision any time soon.⁴⁸⁵ RAISA technologies lack the human, personal touch so necessary in the hospitality industry.⁴⁸⁵ Kiosks follow a service protocol to script, without ever deviating from it because of unique requests.⁴⁸⁵ “Service robots and chatbots can adapt their responses on the basis of the specific interactions they have with humans (customers or employees),” but they have no independent thought.⁴⁸⁵ “Chatbots and robots can provide answers to questions that include specific key words, which they recognise in order to activate a particular predetermined set of answers.”⁴⁸⁵ Robot navigation through a hotel or IR property also requires navigation markers.⁵⁰⁵

People understandably think robots will threaten their jobs.⁴⁸⁵ A recent study by Frey & Osborne⁵⁰⁶ revealed that 47% of jobs in the US could be lost due to computerization. The travel, tourism and hospitality industry should consider and address these very real and understandable fears.⁴⁸⁵

RAISA can “change the way companies operate and influence all the aspects of their value chain – marketing, operations, facilities design and maintenance, human resource management, financial management and supply chain

management.”⁴⁸⁵ Additionally, the use of RAISA technologies will influence how potential customers perceive a company, its brand, and the quality of its services, as well as how a company competes or cooperates with other companies.⁴⁸⁵

According to Ivanov, “One of the most important impacts of RAISA technologies on travel, tourism and hospitality companies is on the design of their premises.”⁴⁸⁵ Ivanov adds that, “In the future, the premises of hotels, restaurants and airports, among others, would be used by a wide variety of mobile robots (wheeled, legged, flying or underwater) such as security robots, robot guides, robot waiters, companion/sex robots, pet robots, room service deliver robots, robotic vacuum cleaners / lawnmowers / pool cleaners, entertainment robots, delivery drones, etc.”⁴⁸⁵ It doesn’t matter if “these mobile robots belong to the customers or to the hospitality companies, the latter would need to ensure the robot-friendliness / robot-inclusiveness of their premises.”⁵⁰⁵

In their paper *Toward a framework for robot-inclusive environments*⁵⁰⁷, Tan, Mohan & Watanabe define “robot-inclusiveness of an environment in which a robot operates as how much the design of the environment takes into account the robot therein, i.e. whether it helps the robot fulfil its tasks.” They add, “It depends on the design of the premises where the robot needs to operate in, their cleanliness, tidiness, signage, lightning, noise, physical barriers (e.g. doors, doorsteps, stairs), presence of people and dynamic of the environment, presence/lack of predetermined routes for robot movement, presence/lack of (artificial) landmarks and sensors to help robot navigation, etc.”⁵⁰⁷ “When the hospitality premises are more robot-inclusive, the same task can be performed by a less intelligent robot and vice versa: an environment that is not robot-inclusive would require a more intelligent robot to navigate through it,” say Ivanov and Webster.⁵⁰⁵ Therefore, a hospitality company that invests in the robot-friendliness of its facilities, can use less intelligent (and cheaper!) robots operationally, which means that more types of customer-owned robots would be able to use them.⁴⁸⁵ Therefore, the robot-friendliness of hospitality facilities could actually be a new competitive advantage for travel, tourism and hospitality companies.⁴⁸⁵

The adoption of RAISA will unquestionably have both positive and negative implications for human resources at travel, tourism and hospitality companies.⁴⁸⁵ On the plus side, employees won’t have to perform tedious and repetitive tasks, instead focusing on more creative and revenue generating activities.⁴⁸⁵ For this reason, RAISA technologies are actually enhancing rather than replacing employees lives.⁴⁸⁵ “Human employees improve their productivity and can implement more activities/tasks for the same amount of time,” says Ivanov.⁴⁸⁵ Additionally, as Ivanov points out, “RAISA would trigger changes in the required skills of employees – they would need more technical skills in order to be able to operate with and maintain the new technology, and

communication and social skills to interact with the customers.”⁴⁸⁵

“RAISA would solve some of the problems with hiring and firing of employees, especially seasonal personnel and immigrants – robots and kiosks can be leased/turned on during periods of high demand, and returned/turned off during off-season without the need to deal with the bureaucracies of labour laws,” notes Ivanov.⁴⁸⁵ “Moreover, due to the high employee turnover, travel, tourism and hospitality companies need to constantly train employees, which takes both time and money.”⁴⁸⁵ The hotelier industry is often seen as a sin industry as well, so keeping employees is more important in this industry than the general tourism and travel industry as a whole.

Ivanov points out that, “On the negative side, the use of RAISA technologies leads to changes in the number of employees in various departments, usually decreasing the number of employees whose tasks can easily be automated (e.g. reception, information provision, cleaning of common areas, menu ordering and food delivery, etc.).”⁴⁸⁵ Furthermore, RAISA have the potential to eliminate or at least significantly decrease the number of entry-level jobs available.⁴⁸⁵ This will significantly hinder the job opportunities for some of society’s most vulnerable socio-economic groups, i.e., people with low education or students looking for part-time jobs.⁴⁸⁵ In extreme cases, there has been an emergence of zero-employee properties (or automated hotels/motels/hostels) in Japan, Korea, Bulgaria and other countries.^{508 509} Of course, the wheels, or perhaps the gears, of progress can’t be held back, but it is only natural that these changes concern human employees, who may perceive RAISA technologies as a threat for their jobs and therefore resist their usage.⁴⁸⁵

From a financial perspective, RAISA technologies can reduce labor costs. Additionally, “RAISA can lead to increased sales – some customers, for example, may make an order for room service out of curiosity in seeing the robot delivering the order.”⁴⁸⁵ Admittedly, a successful, ongoing operation can’t be built on the back of one-time curiosity purchases, but RAISA technologies are associated with other expenses, including⁵¹⁰:

- Acquisition costs – e.g. for purchasing a robot or kiosk, for purchasing a chatbot/payment for its development;
- Installation costs – for a robot or kiosk. It might be virtually zero for a chatbot;
- Maintenance costs – they include electricity consumption of the robot/kiosk, spare parts, periodic maintenance, repair works, etc., but could be very low for a chatbot;
- Software update costs;
- Costs for adapting the premises to facilitate mobility for robots – e.g. removing any barriers for robot’s movement within a hotel;

- Costs for hiring specialists to operate and maintain the robots/kiosks/chatbots;
- Costs for training human employees to use them;
- Insurance costs for the robots/kiosks, insurance for damages caused by a robot, etc.

“The adoption of RAISA technologies allows the integration of the information systems of suppliers and travel, tourism and hospitality companies,” explains Ivanov.⁴⁸⁵ This started at the beginning of the century, when tourism websites introduced back-to-back xml connections.⁴⁸⁵ “These connections allow, for example, the inventory of hotels, rooms and their availability from one website to be visualised in another website. When a customer makes a booking in the second website, the booking goes directly to the first website without the need for human intervention.”⁴⁸⁵ This integration, however, was mostly on the website level.⁴⁸⁵ Today’s RAISA technologies allow much deeper integration – “for example a booking made by a customer through a travel chatbot of one company (e.g. a tour operator or online travel agency) could be automatically registered into the booking system of that company’s supplier (e.g. hotel chain).”⁴⁸⁵

“RAISA allows the implementation of automated pricing of products based on sets of rules and real-time data on buyer behaviour of customers,” explains Ivanov.⁴⁸⁵ At the extreme end, AI allows for personalised pricing, i.e., separate pricing for every single customer based on his/her willingness to pay, which should lead to revenue maximization.⁴⁸⁵ Ivanov contends that, “The dropping cost of RAISA solutions compared to human employees and the increases in their productivity mean that we can expect lower prices for mass ‘high-tech’ hospitality products (e.g. automated hostels and restaurant) and higher prices for exclusive ‘high-touch’ products delivered by human employees.”⁴⁸⁵

RAISA will allow “automated communications with customers via chatbots, voice assistants, kiosks, robots.”⁴⁸⁵ “On the one hand, this means that companies could communicate with more customers, and do this in numerous languages and at any time,” says Ivanov.⁴⁸⁵ “On the other hand, the lack of human involvement in these automated communications may frustrate the customers, especially when they do not receive answers to their specific questions and cannot contact a human employee to help,” he concludes.⁴⁸⁵ Overriding it all, “a company that adopts RAISA may boast positive word-of-mouth due to its image of an innovative high-tech company.”⁴⁸⁵ However, as Ivanov & Webster warn, “it may also suffer negative publicity and be perceived as a company that puts profits before humans.”⁵¹⁰ “Furthermore, customers may feel frustrated if they need to communicate with a chatbot or robot when they have a complaint. Therefore, even high-tech tourism/hospitality companies may need to keep human contact with their customers, especially in emotionally charged service situations like handling of complaints,” recommends Ivanov.⁴⁸⁵

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CHAPTER SEVEN: THE A.I. HOTELIER

“You can’t win in the digital era with industrial-age technology.”
~Adobe

Overview

In their article *Data-Driven Transformation: Accelerate at Scale Now*⁵¹¹, Gourévitch et al. argue that “Data-driven transformation is becoming a question of life or death in most industries” and more so for the hospitality industry than many others. “Most CEOs recognize the power of data-driven transformation. They certainly would like the 20% to 30% EBITDA gains that their peers are racking up by using fresh, granular data in sales, marketing, supply chain, manufacturing, and R&D,” Gourévitch et al. claim.⁵¹¹ What’s not lost on these CEOs is the fact that today the top five companies with the highest market capitalization worldwide are all data-driven, tech companies—Apple, Alphabet, Microsoft, Amazon, and Facebook.⁵¹¹ Five years ago, there was only one of these tech companies in the top in the top five (Apple), whereas ten years ago there was only one in the top ten (Microsoft).⁵¹¹

CEOs are correct in worrying about how their organizations are going to handle a tenfold increase in company data when their managers are already complaining about a lack of data skills and overburdened IT systems.⁵¹¹ “Transformations should start with pilots that pay off in weeks or months, followed by a plan for tackling high-priority use cases, and finishing with a program for building long-term capabilities,” Gourévitch et al. recommend.⁵¹¹

“It starts with small-scale, rapid digitization efforts that lay the foundation for the broader transformation and generate returns to help fund later phases of the effort,” Gourévitch et al. advocate.⁵¹¹ “In the second and third phases, companies draw on knowledge from their early wins to create a roadmap for companywide transformation, ‘industrialize’ data and analytics, and build systems and capabilities to execute new data-driven strategies and processes.”⁵¹¹

In terms of infrastructure and data transformation, Gourévitch et al. advise asking the following questions: “Can our current infrastructure support our future data value map? Should we make or buy? Should we go to the cloud? Do we need a data lake? What role should our legacy IT systems play in our data

transformation? The company should design a data platform (or data lake) that can accommodate its product map and should use that platform to progressively transform its legacy systems.”⁵¹¹

“To progressively transform its legacy system,” is an important idea here because it is imperative that companies don’t bite off more than they can chew when they decide to embrace the data driven culture. The Japanese have a concept known as *Kaizen* — continuous incremental improvement — and it is an idea that should be kept in mind when a company steps into the data driven an AI world.

While the company architects its transformation roadmap, it needs to begin industrializing its data and analytics.⁵¹¹ As Gourévitch et al. explain, “This means setting up a way to standardize the creation and management of data-based systems and processes so that the output is replicable, efficient, and reliable.”⁵¹¹ Digital systems need to have all the attributes of industrial machinery, including reliability and consistency.⁵¹¹

For analytics, a flexible open architecture that can be updated continuously and enhanced with emerging technologies works best.⁵¹¹ “Rather than embracing an end-to-end data architecture, companies should adopt a use-case-driven approach, in which the architecture evolves to meet the requirements of each new initiative,” advise Gourévitch et al.⁵¹¹ “The data governance and analytics functions should collaborate to create a simplified data environment; this will involve defining authorized sources of data and aggressively rationalizing redundant repositories and data flows,” recommend Gourévitch et al.⁵¹¹

To prepare an organization for a digitized future, a company “needs to move on four fronts: creating new roles and governance processes, instilling a data-centric culture, adopting new ways of working, and cultivating the necessary talent and skills.”⁵¹¹

Change starts at the top and senior leaders need to buy into and adopt data-driven objectives and instill a data driven culture in every department throughout the organization.⁵¹¹ Gourévitch et al. recommend that top management “set up data councils to extend the work to all sectors of the organization and to carry it out more effectively. The company should promote data awareness by using data champions to disseminate data-driven practices.”⁵¹¹

“Not everyone needs to become steeped in data analytics or learn to code in order for digital transformation to work. However, everyone does need to adopt a less risk-averse attitude,” advise Gourévitch et al.⁵¹¹ The writers recommend companies embrace the software company model that utilizes a test-and-learn philosophy that accepts failure and is constantly changing – and learning.⁵¹¹

Companies can also foster the desired cultural change through organizational

moves, “such as creating internal startup units where employees can focus on experimentation or co-locating data labs within operating units.”⁵¹¹ “The company can also promote the new culture by using cross-functional teams that share data across silos, thereby encouraging openness and collaboration throughout the organization,” advise Gourévitch et al.⁵¹¹

For any data-based transformation to succeed, a company needs talent with the right skills to execute data-driven strategies and manage data-based operations.⁵¹¹ Hospitality companies should start by assessing their current employees and defining their future needs.⁵¹¹ “The company should create an inventory of the talents and skills that its employees will need, and it should identify where the gaps are in the current workforce,” say Gourévitch et al.⁵¹¹

Companies should retrain current employees, hire new talent, or use a partnership to get the right capabilities. “To recruit people with digital skills, the company may need to rethink the value proposition it offers — work, opportunity, rewards, career path, and so on — in relation to what tech companies offer,” advise Gourévitch et al.⁵¹¹

Hotel executives should be inspired by the idea of using data to make better decisions, to create stronger customer bonds, and to digitize all sorts of processes to improve performance. They should also be motivated “by fear that they won’t be able to keep up with competitors who are ahead of them in data-driven digital transformation.”⁵¹¹

However, some caution is due; sweeping, companywide change to go digital can easily lead to counterproductive overreaching.⁵¹¹ In this case, the contest will not necessarily be won by making huge bets.⁵¹¹ As Gourévitch et al. conclude, “The winners will be agile, pragmatic, and disciplined. They will move fast and capture quick wins, but they will also carefully plan a transformation roadmap to optimize performance in the functions and operations that create the most value, while building the technical capabilities and resources to sustain the transformation.”⁵¹¹

As I mentioned at the beginning, one philosophy being adopted now is the “experience is the new brand”²⁵ mantra. Hotels need to take this philosophy to heart and, throughout the rest of this book, I will reveal ways for them to do just that.

Text

Text use cases break down into several different areas, including chatbots, NLP, sentiment analysis, augmented search, and language translation.

According to Amazon, “Lex is a service for building conversational interfaces into any application using voice and text. Amazon Lex provides the advanced deep

learning functionalities of automatic speech recognition (ASR) for converting speech to text, and natural language understanding (NLU) to recognize the intent of the text, to enable you to build applications with highly engaging user experiences and lifelike conversational interactions.”⁵¹² Amazon Lex contains the same deep learning technology that powers Amazon Alexa that are now available to any developer. They will enable users to quickly and easily build sophisticated, natural language, conversational chatbots.⁵¹²

Amazon Transcribe “is an automatic speech recognition (ASR) service that makes it easy for developers to add speech-to-text capability to their applications.”⁵¹³ Using the Amazon Transcribe API, brands can analyze audio files stored in Amazon S3 and have the service return a text file of the transcribed speech. Brands can also send a live audio stream to Amazon Transcribe and receive a stream of transcripts in real time.

Amazon Transcribe can currently transcribe customer service calls and generate subtitles on audio and video content. The service can transcribe audio files stored in common formats, like WAV and MP3, with time stamps for every word so that you can easily locate the audio in the original source by searching for the text. Because it is an AI-based technology, Amazon Transcribe is continually learning and improving to keep pace with the evolution of language.

Amazon Comprehend is “a natural language processing (NLP) service that uses machine learning to find insights and relationships in text. No machine learning experience required.”⁵¹⁴

“There is often a treasure trove of potential sitting in a company’s unstructured data. Customer emails, support tickets, product reviews, social media, even advertising copy represents insights into customer sentiment that can be put to work for a business,” says Amazon.⁵¹⁴ Machine learning is “particularly good at accurately identifying specific items of interest inside vast swathes of text (such as finding company names in analyst reports).”⁵¹⁴ “Amazon Comprehend can learn the sentiment hidden inside language (identifying negative reviews, or positive customer interactions with customer service agents), at almost limitless scale.”⁵¹⁴

Amazon Comprehend “identifies the language of the text; extracts key phrases, places, people, brands, or events; understands how positive or negative the text is; analyzes text using tokenization and parts of speech; and automatically organizes a collection of text files by topic.”⁵¹⁴

In his article *Turning Up Your Brand’s Voice to Reach the Most Advanced Customers*⁵¹⁵, Pini Yakuel explains why digital assistants are unique to every other channel when it comes to personalization — they cut through the noise. “Yes, emails can be personalized, just like paid search and social ads, but they share their real estate with thousands of other pieces of content. When there are 20 personalized messages asking for your attention, which one will

consumers go for?” ask Yakuel.⁵¹⁵

“Like any other marketing channel, the key to winning with digital assistants lies in the deep knowledge of the purchase lifecycle customers go through. Delving into the desire to know, go, do and buy that consumers have will deliver success,” says Yakuel.⁵¹⁵

“Micro-moments are defined as intent-rich moments when a person turns to their device to act on a need through the conversational nature of queries to digital assistants. Analyzing these intent-rich moments and acting upon them might be the gate to showing up as the preferred answer,” says Yakuel.⁵¹⁵

Brands should always keep in mind “that retention through digital assistants works so well because consumers want to make life easier for themselves every chance they get.”⁵¹⁵ “For example, smart fridges that know when we’re running out of food and talk to digital assistants are already out there. Digital assistants will likely broaden their reach across the broad spectrum of consumer needs to anticipate upcoming purchases,” says Yakuel.⁵¹⁵

“Whether by diving into data or by directly speaking with existing and past customers, marketers should always learn what questions and online behavior drives folks toward their brands. Analyze their pain points, and focus on creating content that uses their phrases and makes their lives easier quickly,” advises Yakuel.⁵¹⁵ “The better you get at this, the more likely you are to be the digital assistant’s chosen option,” he concludes.⁵¹⁵

Chatbots

In its *14 Powerful Chatbot Platforms*⁵¹⁶, Maruti Tech lists some of the best chatbot publishing and development platforms for brands to use. According to Maruti Tech, a “chatbot publishing platform is a medium through which the chatbot can be accessed and used by the users.”⁵¹⁶ “A chat bot development platform, on the other hand is a tool/ application through which one can create a chatbot,” says Maruti Tech.⁵¹⁶ These chatbot platforms let users add more functionality to a bot by creating a flow, machine learning capabilities, API integration, etc.⁵¹⁶ These chatbot platforms are simple to use, and users don’t need to have deep technical knowledge or programming skills as many come with drag-and-drop functionality.⁵¹⁶ (Please note, there aren’t 14 platforms as several have been discontinued or acquired, which is a testament to how quickly this space can change.)

Chatfuel

Calling itself “the leading bot platform for creating AI chatbots for Facebook,”⁵¹⁷ Chatfuel (chatfuel.com) claims that 46% of Messenger bots run on its platform.⁵¹⁷ No coding is required with Chatfuel, which “provides features like adding content cards and sharing it to your followers automatically, gathering

information inside Messenger chats with forms.”⁵¹⁷ Chatfuel also uses AI to script interactive conversations.⁵¹⁷

The platform is completely free for anyone to build a bot, but after the bot reaches 100K conversations/month users have to subscribe as a premium customer.⁵¹⁷ Chatfuel’s client list includes multinational companies like Adidas, MTV, British Airways, and Volkswagen.

Botsify

“Let your bot chat like a human” is Botsify’s (botsify.com) tagline⁵¹⁸ and it is another popular Facebook Messenger chatbot platform that uses a drag and drop template to create bots.⁵¹⁷ Botsify offers features like easy integrations via plugins, Smart AI, Machine learning and analytics integration.⁵¹⁶ Botsify’s platform allows seamless transition from a bot to a human.⁵¹⁶ First bot is free, but any others are charged for thereafter.⁵¹⁶

Flow XO

According to its website (flowxo.com)⁵¹⁹, “Flow XO is a powerful automation product that allows you to quickly and simply build incredible chatbots that help you to communicate and engage with your customers across a wide range of different sites, applications and social media platforms.” It is the only chatbot platform to provide over 100 integrations.⁵¹⁶ It boasts an easy to use and visual editor.⁵¹⁶ Flow XO’s platform allows users to build one bot and implement it across multiple platforms.⁵¹⁶ In terms of pricing, users are limited to a certain number of conversations, surpassing that requires a subscription.⁵¹⁶

Motion.ai

Recently purchased by Hubspot, Motion.ai was a chatbot platform that helps users to visually build, train, and deploy chatbots on FB Messenger, Slack, Smooch or any business’ website.⁵¹⁶ Motion.ai lets users diagram a conversation flow like a flowchart to get a visual overview of the outcomes of a bot query.⁵¹⁶ The bot can be connected to a messaging service like Slack, Facebook Messenger, and go.⁵¹⁶ Motion.ai allows Node.js deployment directly from its interface along with several other integrations.⁵¹⁶

Chatty People

This platform has predefined chatbots with templates for e-commerce, customer support, and F&B businesses.⁵¹⁶ When users select the e-commerce chatbot, he or she can simply add products, Q&A information as well as some general settings.⁵¹⁶ The platform even includes PayPal and Stripe API integration.⁵¹⁶

According to Maruti Tech, “The chatbot platform’s simplicity makes it ideal for entrepreneurs and marketers in smaller companies.”⁵¹⁶ While its technology

makes it suitable for enterprise customers, users can make a simple bot answering customer service questions or integrating it with Shopify to potentially monetize one's Facebook fan pages. (Chatty People was recently acquired by MobileMonkey in 2018 and can now be found at mobilemonkey.com.)

QnA bot

Microsoft has created QnA (qnamaker.ai) bot for the same reason as its name suggests, i.e., for answering a series of user questions.⁵¹⁶ The URL FAQ page must be shared with the service and the bot will be created in a few minutes using the information on the FAQ page and the structured data.⁵¹⁶

Furthermore, the bot can be integrated with Microsoft Cognitive Services to enable the bot to see, hear, interpret and interact in more human ways.⁵¹⁶ QnA Maker seamlessly integrates with other APIs and can scale to be a know-it-all part of a bigger bot.⁵¹⁶

Recast.ai

In January 2019, Recast.AI was integrated into the SAP portfolio and renamed SAP Conversational AI.⁵²⁰ This bot building platform enables users to train, build and run their bots.⁵¹⁶ By creating and managing the conversation logic with Bot Builder, SAP Conversational AI's visual flow management interface and API lets users build bots that understand predefined queries as well as quickly set up responses.⁵¹⁶ Messaging metrics and bot analytics tools are also included.⁵¹⁶

BotKit

Their rather alliterate tagline is, "Building Blocks for Building Bots" and it is a toolkit that gives users a helping hand to develop bots for FB Messenger, Slack, Twilio, and more.⁵¹⁶ "BotKit can be used to create clever, conversational applications which map out the way that real humans speak," says Maruti Tech.⁵¹⁶ "This essential detail differentiates from some of its other chatbot toolkit counterparts," BotKit adds.⁵¹⁶

"BotKit includes a variety of useful tools, like Botkit Studio, boilerplate app starter kits, a core library, and plugins to extend your bot capabilities. Botkit is community-supported open-source software that is available on GitHub," says Maruti Tech.⁵¹⁶ Online, the company can be found at: botkit.ai.

ChatterOn

On its website, ChatterOn (chatteron.io), claims it can help users build a chatbot in five minutes. ChatterOn is a bot development platform which gives users the required tools to build Facebook Messenger chatbots without any coding.⁵¹⁶ The platform helps users "build the bot flow (each interaction with a user has to have

a goal that the user has to be taken to the next chat) and setup the AI by entering a few examples of the expected conversation between the user and bot.”⁵¹⁶

India’s first full stack chatbot development platform, ChatterOn is, according to the company, “far superior in ease of development and functionalities than its international counterparts.”⁵¹⁶ “All the bots on ChatterOn’s platform are powered by a proprietary self-learning contextual AI,” claims Maruti Tech.⁵¹⁶

Octane AI

According to its website (octaneai.com), Octane AI “enables Shopify merchants to increase revenue with a Facebook Messenger bot that customers love.”⁵²¹

Octane AI has pre-built features that make it easy for users to add content, messages, discussions, showcase merchandise, and much more to their bot.⁵¹⁶ According to Octane AI, convos are conversational stories that can be shared with an audience. It’s as easy as writing a blog post and the best way to increase distribution of a company’s bot, at least according to Octane AI.⁵¹⁶ The platform also integrates with all of the popular social media channels as well as provides real-time analytics.⁵¹⁶

Converse AI

The Converse AI (converse.ai) platform has been built to handle a wide range of use cases and integrates seamlessly with Facebook Messenger and Workplace, Slack, Twilio, and Smooch. Some of its features include⁵¹⁶:

- A complete UI that allows easy, code-free builds.
- Integration with multiple platforms, including complete user, request and conversation tracking.
- Inbuilt NLP parsing engine, that includes the ability to easily build conversation templates.
- Can converse while using both plain text and rich media.
- An inbuilt query and analytics engine allows for easy tracking and drill down that helps brands understand how users are engaging with the service.

GupShup

The leading smart messaging platform that handles over 4 billion messages per month, GupShup (gupshup.io) has processed over 150 billion messages in total.⁵¹⁶ “It offers APIs for developers to build interactive, programmable, Omni-channel messaging bots and services as well as SDKs to enable in-app and in web messaging,” says Maruti Tech.⁵¹⁶ “Unlike plain-text messages, GupShup’s innovative smart-messages contain structured data and intelligence, thus enabling advanced messaging workflows and automation,” add Maruti Tech.⁵¹⁶

In conclusion, chatbot platforms are essential for the development of

chatbots.⁵¹⁶ With the availability of such platforms, Maruti Tech argues, anyone can create a chatbot, even if they don't know how to code. However, to make an intelligent chatbot that works seamlessly, AI, machine learning and NLP are required.⁵¹⁶

Chatbots will undoubtedly revolutionize the future of industries by their rich features.⁵¹⁶ They will reduce human errors, "provide round the clock availability, eliminate the need for multiple mobile applications and make it a very seamless experience for the customer."⁵¹⁶

Augmented Search

In his article *How to use AI for link building and improve your search rankings*⁵²², Kevin Rowe claims that "AI's applications in the search engine optimization (SEO) world are continuing to expand to new horizons." Besides the Y Combinator-backed RankScience, which uses thousands of A/B tests to determine how best to positively influence search engine rankings, it is unlikely that a complete handling of SEO by AI will catch on any time soon.⁵²² While no software exists that leverages AI to build links, brands can still use multiple types of software for various stages of the link building process.⁵²² These include⁵²²:

- Data collection. NLP tools can be used to determine if the sites are contextually relevant and keyword relevant.
- Site analysis. AI can determine if a site will predictably have an impact on rankings.

This means that AI can be used to augment, automate or automatize processes, claims Rowe.⁵²² Link building can't specifically be a fully autonomous process, but AI can be leveraged to augment human processes, which can help find bloggers and influencers, as well as improve the quality of sites that are approached for links, advises Rowe.⁵²²

Rowe believes to leverage existing AI in a link-building campaign, hotels must first look at websites as a whole, including the multiple contributors or people on staff at these websites.⁵²² "These can be good link-building opportunities through sponsored or contributed content," explains Rowe.⁵²² Hotel brands should find industry publications or other informative sites that appeal to the brand's target audience.⁵²² Brands should look for the following items⁵²²:

- Frequent publication: is new content often being published on the site?
- Last publish date: Has there been any new content in the last month?
- User experience and design: Is the design up-to-date and easy to use?

Secondly, brands should identify important industry blogs and influencers.⁵²² These sites usually have less people on staff than standard publications, however, they just might have a wider reach.⁵²²

Rowe believes that, "Text processing analytics like Watson Analytics can be used

to find influencers and blog content that hits a brand's target market."⁵²² "For instance, someone might not always say, 'I am interested in polymer manufacturing,' online, but using AI tools that can predict related text patterns and speech, you might be able to find more influencers who haven't directly used the terms you're looking for," says Rowe.⁵²²

Things to look for include⁵²²:

- Comments and social shares on posts: Do the influencer's posts get a lot of engagement?
- Last publish time and frequency: Is content published actively consistently?
- User experience and design: Is it up-to-date and easy to use?
- Social platform: Does the influencer have a large social media following on the platforms that are preferred by the brand's industry players?
- Reputation: Sometimes, individual influencers or blogs might have a strong opinion about hot topics that you might not want to be associated with for either political or religious reasons.

Once a list of publications, influencers and blogs have been compiled, it's time for the hard part, i.e., determining if they will have an impact on your target keyword rankings.⁵²² Rowe calls this "the powerful part of AI — the part that can improve the impact of the links."⁵²² "AI can process data from multiple sources to identify likely variables or variable clusters that correlate with ranking in Google," claims Rowe.⁵²²

Image

Facial Recognition

Facial recognition technology is the capability of identifying or verifying a person from a digital image or a video frame from a video source by comparing the actual facial features of someone on camera against a database of facial images, or faceprints, as they are also known.

As previously mentioned, rapid advancements in facial recognition technology have reached the point where a single face can be compared against 36 million others in about one second.¹⁰¹ A system made by Hitachi Kokusai Electric and reported by DigInfo TV shown at a security trade show recently was able to achieve this blazing speed by not wasting time on image processing.¹⁰¹

Using edge analytics, the technology takes visual data directly from the camera to compare the face in real time.¹⁰¹ The software also groups faces with similar features, so it can narrow down the field of choice very quickly. The usefulness to the company's security enforcement is pretty obvious, but it can be used by multiple departments; facial recognition technology can be set up to send alerts

to clerks, managers, or just about anyone needing to identify customers.

As customers enter an area, “security cameras feed video to computers that pick out every face in the crowd and rapidly take many measurements of each one’s features, using algorithms to encode the data in strings of numbers,”⁵²³ as explained in the *Consumer Reports* article *Facial Recognition: Who’s Tracking Who in Public*.²⁸⁹ The faceprints are compared against a database, and when there’s a match, the system alerts the VIP department or sales people. Faceprints could also be used to allow people to purchase tickets or as part of a boarding system.

In some sense, facial recognition technology is becoming second nature to consumers, especially in Asia. Worldwide, consumers are used to tagging themselves in photos on Facebook, Snapchat, Picasa, and/or WeChat. In 2015, Google launched a photo app that helped users organize their pictures by automatically identifying family members and friends.²⁸⁹

This technology is moving so fast that privacy advocates are having trouble keeping up with it. In this regard, today’s facial recognition technology is reminiscent of the World Wide Web of the mid-1990s.²⁸⁹ Back then, few people would have anticipated that every detail about what we read, watched, and bought online would become a commodity traded and used by big business and sometimes, more sinisterly, hacked and used by nefarious individuals for criminal purposes.²⁸⁹

According to his article *Qantas have seen their Future. It’s Facial Recognition*⁵²⁴, Chris Riddell explains how Qantas is taking facial recognition technology to a whole new level. According to Riddell⁵²⁴:

“Qantas have just started a brand-new programme of trialing facial recognition to enable them to monitor passengers from the very moment they check in, all the way through to the gate when they board the plane. They’re also going to be monitoring everything in between, including what café you’re getting your coffee at, and where you are shopping for that last minute pair of jeans. They’ll also know what electrical gadgets you were playing with at the tech shop, and whether you were too busy trying free shots of cognac to buy that gift for your other half that you promised, but then ‘forgot’”

Riddell sees this as “a big retail play by the red kangaroo and it is pushing the national airline into very new and uncharted territory. Qantas are exceptionally interested in the movement of people through the terminals, and how they spend their time.”⁵²⁴

Riddell adds that, “Qantas will want to know what people are doing, how long they are doing it, which shops they are spending the most time, and which shops

they spend the least time in. By combining that with the incredible amount of data from frequent flyer programme and passenger information they collect, they'll be catapulting themselves into the world of hyper intelligent retail."⁵²⁴

Of course, Qantas are not alone in wanting to capture all this customer data, explains Riddell, every major airline is doing it.⁵²⁴ "The truth is though, few are using the data they hoard with any level of real sophistication for the customer," claims Riddell.⁵²⁴

"All airlines know who you work for, who you book travel through, where you go on holiday, where you travel for work and for how long you are away," says Riddell.⁵²⁴ "They also know what food you like, what food you are allergic to, and who you bank with. They also know where you live, and who lives there with you, whether you've got children, and how old they are. The list goes on.... If you've linked other loyalty programmes to your frequent flyer account, they also know a whole lot about your shopping habits," adds Riddell.⁵²⁴

All of this data helps a business understand its customer down to a macro level, which is information that is more critical than ever.⁵²⁴ For a business like Qantas this data helps them deliver services and experiences that are relevant, personal and predictive.⁵²⁴

Next up, Riddell believes "will be the delivery of experiences in real-time as you are in an airport retail store. Facial Recognition technology will be able to deliver you services based on *how you feel* at the exact moment it matters. *This is the future*, and it's called emotional analytics."⁵²⁴

As CB Insights reports in its *What's Next in AI? Artificial Intelligence Trends*⁸³, "Academic institutions like Carnegie Mellon University are also working on technology to help enhance video surveillance." "The university was granted a patent around 'hallucinating facial features' — a method to help law enforcement agencies identify masked suspects by reconstructing a full face when only periocular region of the face is captured. Facial recognition may then be used to compare 'hallucinated face' to images of actual faces to find ones with a strong correlation."⁸³

However, CB Insights warns that the tech is not without glitches. The report states that "Amazon was in the news for reportedly misidentifying some Congressmen as criminals"⁸³ — although perhaps there's a predictive element in the technology that we're unaware of as well?

"'Smile to unlock' and other such 'liveness detection' methods offer an added layer of authentication," claims CB Insight.⁸³ For example, "Amazon was granted a patent that explores additional layers of security, including asking users to perform certain actions like 'smile, blink, or tilt his or her head.'"⁸³ These actions can then be combined with 'infrared image information, thermal imaging data, or other such information' for more robust authentication."⁸³

In his article *Machine Learning and AI: If Only My Computer Had a Brain Wired for Business*, Michael Klein writes that, fifty-nine percent of fashion hoteliers in the U.K. are using facial recognition to identify V.I.P clients and provide them with special service.⁷² “The technology also enables hoteliers to track customer sentiment and gauge how customers respond to in-store displays, how long they spend in the store and traffic flow in each of their retail locations,” says Klein.⁷²

“But that’s not the only way hoteliers are taking advantage of facial recognition and its AI technology. They’re using the technology, which is typically employed in airports, for added security,” notes Klein.⁷² For example, Saks “has leveraged facial recognition technology to match the faces of shoppers caught on security cameras with that of past shoplifters. From this perspective, AI can serve the dual purpose of preventing losses while improving the customer experience — and that ultimately helps hoteliers boost sales.”⁷²

Image Search

“If a picture is worth a thousand words, visual search — the ability to use an image to search for other identical or related visual asset — is worth thousands of spot-on searches — and thousands of minutes saved on dead-end queries,” says Brett Butterfield in his Adobe blog *See It, Search It, Shop It: How AI is Powering Visual Search*.⁵²⁵ In the article, Butterfield explains how visual search can become a big part of a buyer’s shopping future. With visual search, you don’t need to try and guess the brand, style, and/or retail outlet something was purchased on, you can simply snap a picture of the item you like, upload the image, and immediately find exactly the same sneakers or ones like them, and purchase them, all rather seamlessly.⁵²⁵

“That spot-it/want-it scene is common, and good for business. It could be a shirt on someone walking down the street, an image on Instagram, or a piece of furniture in a magazine — somewhere, your customer saw something that made them want to buy one, and now they’re on a mission to find it,” explains Butterfield.⁵²⁵

“While it’s a seemingly simple task, in many cases the path from seeing to buying is a circuitous and friction-filled route that leads to a subpar purchase — or no purchase at all. Just one in three Google searches, for example, leads to a click — and these people come to the table with at least a sense of what they’re searching for,” notes Butterfield.⁵²⁵

“Visual search is all about focusing your attention toward a target,” says Gina Casagrande, senior Adobe Experience Cloud evangelist, “and helping you find what you’re looking for that much faster. You also get the added benefit of finding things you didn’t even know you were looking for.”⁵²⁵

“Like text-based search, visual search interprets and understands a user’s input — images, in this case — and delivers the most relevant search results possible.

However, instead of forcing people to think like computers, which is how the typical text search works, visual search flips the script,” adds Butterfield.⁵²⁵

“Powered by AI, the machine sees, interprets, and takes the visual cues it learns from people. After applying metadata to the image, AI-powered visual search systems can dig through and retrieve relevant results based on visual similarities, such as color and composition,” explains Butterfield.⁵²⁵ Visual search is another technology that can facilitate better, more frictionless retail experiences that can help buyers find what they want faster.⁵²⁵

“One early adopter of visual search is Synthetic, Organic’s cognitive technology division, an Omnicom subsidiary,” says Butterfield.⁵²⁵ “Synthetic’s Style Intelligence Agent (SIA) — powered by Adobe Sensei — uses AI to help customers not just find specific clothing items, but also find the right accessories to complete their new look.”⁵²⁵

To use SIA, customers simply upload an image, either from a website, from real life or even from an ad in a magazine and from there, “Adobe Sensei’s Auto Tag service extracts attributes from the image based on everything from color, to style, to cut, to patterns.”⁵²⁵ SIA’s custom machine-learning model then kicks in, correlating those tags with a massive catalog of products.⁵²⁵ “SIA then displays visually similar search results as well as relevant recommendations — items with similar styles, cuts, colors, or patterns, for example.”⁵²⁵ Just as importantly, SIA then “uses these visual searches to build a rich profile for that customer’s preferences and tastes — a much deeper profile than what could be built from text-based searches alone.”⁵²⁵ Here you are getting customer preferences on steroids, an enormous amount of personalized data that can then be used in customer marketing.

“This is where visual search goes beyond just search and becomes a true shopping consultant,” says Casagrande, “and a superior, more sophisticated way to search for what you want and what you didn’t know you wanted.”⁵²⁵

“In delivering such a simple, seamless experience, AI-powered visual search removes the friction from traditional search-and-shop experiences,” says Butterfield.⁵²⁵ “No longer do customers have to visit multiple hoteliers or sites and strike out. They can now find virtually anything, anywhere, even without knowing exactly where to find it,” he adds.⁵²⁵ This is another important moment for marketers because if brands invest in visual search, they can propel their brand up the Google rankings and get a solid leg up on the competition.

Several retailers currently “use visual search to make the distance between seeing and buying virtually nonexistent — within their own brand experience.”⁵²⁵ “Macy’s, for example, offers visual search capabilities on its mobile app, which allows customers to snap a photo, and find similar products on Macys.com. It’s ‘taking impulse buying to new heights,’ one source says.”⁵²⁵

Frictionless image search is just the beginning.⁵²⁵ “The value of visual search technology grows as the customer returns to the site,” says Casagrande.⁵²⁵ “On that next visit, it’s a more personalized, powerful targeted search. Just being able to pick up where I left off and get to that product that much faster helps reduce friction, and has been shown to increase conversions and order rate.”⁵²⁵

“Visenze, which builds shopping experiences using AI, is already seeing these benefits,” says Butterfield.⁵²⁵ For example, “the company saw a 50 percent increase in conversion among clients such as Nike and Pinterest that implemented visual search technology.”⁵²⁵

“In the United States, Amazon and Macy’s have been offering this feature for some time,” says Visenze CEO Oliver Tan. “Consumers are crying out for a simpler search process,” claims Tan.⁵²⁵ If brands don’t have that, their customers will move on to other companies that do.⁵²⁵

Though the benefits of visual search are clear, there’s still a gap in between customer expectations and delivery.⁵²⁵ “Our current iteration of visual search gets us maybe 70 percent of the way there,” says Casagrande.⁵²⁵

“Keep in mind, as more data and content become available the algorithms will get smarter, and the visual search experience will only continue to get better,” says Casagrande.⁵²⁵

Another interesting use of AI is what Pinterest is doing with its visual search technology. According to Lauren Johnson’s *Adweek* article *Pinterest Is Offering Brands Its Visual Search Technology to Score Large Ad Deals*⁵²⁶, “The visual search technology is Pinterest’s version of AI and human curation that lets consumers snap a picture of IRL things and find similar items online. Taking a picture of a red dress for example, pulls up posts of red dresses that consumers can browse through and shop,” states Johnson.¹²⁶

“The idea is to give people enough ideas that are visually related so that they have a new way to identify and search for things,” said Amy Vener, retail vertical strategy lead at Pinterest.¹²⁶ “From a visual-discovery perspective, our technology is doing something similar where we’re analyzing within the image the colors, the shapes and the textures to bring that to another level of dimension,” Vener adds.¹²⁶

Utilizing the technology, someone who points his or her phone’s camera at a baby crib will receive recommendations for similar baby products.¹²⁶ “Eventually, all of Target’s inventory will be equipped with Pinterest’s technology to allow anyone to scan items in the real world and shop similar items through Target.com,” states Johnson. “Target is the first retailer to build Pinterest’s technology into its apps and website, though the site also has a deal to power Bixby, Samsung’s AI app that works similarly.”¹²⁶

“We’re now in a place where we’re using Pinterest as a service to power some

visual search for other products,” Vener said. “I think there’s an opportunity for retailers to be a little more of a prominent player when it comes to visual discovery.”¹²⁶

Although these examples are mostly in the retail business, it’s important for hospitality executives to be aware of what is happening in a closely related business.

Video

In his article *The Future of Video Advertising is Artificial Intelligence*⁵²⁷, Matt Cimaglia sees a video advertising world that is completely different to the current one. He describes it as such: “Meanwhile, somewhere in another office, in that same year, a different team is creating a different digital video. Except they’re not shooting a single video: They’re shooting multiple iterations of it. In one, the actor changes shirts. In another, the actor is an actress. In another, the actress is African American. After finishing the shoot, this agency doesn’t pass the footage off to a video editor. They pass it off to an algorithm.”⁵²⁷

Cimaglia states that, “The algorithm can cut a different video ad in milliseconds. Instead of taking one day to edit one video, it could compile hundreds of videos, each slightly different and tailored to specific viewers based on their user data.”⁵²⁷ “As the video analytics flows in, the algorithm can edit the video in real-time, too — instead of waiting a week to analyze and act on viewer behavior, the algorithm can perform instantaneous A/B tests, optimizing the company’s investment in a day,” claims Cimaglia.⁵²⁷

Cimaglia believes this is what is happening right now.⁵²⁷ Cimaglia contends, “We are witnessing a moment in video marketing history, like moments experienced across other industries disrupted by the digital revolution, where human editors are becoming obsolete.”⁵²⁷ This is the evolution of advertising — personalized advertising, i.e., tailoring content to individuals rather than the masses⁵²⁷; surgically striking relevant offers to a market of one, rather than blasting a shotgun of offerings to the uninterested many.

“Savvy agencies are turning to artificial intelligence for help making those new, specialized creative decisions,” says Cimaglia.⁵²⁷ “It’s the same logic that’s long overtaken programmatic banner and search advertising, machine learning and chatbots: There are some things computers can do faster, cheaper and more accurately than humans,” contends Cimaglia.

“In this future of data-driven dynamic content, viewers’ information is siphoned to AI that determines aspects of the video based on their data,” explains Cimaglia.⁵²⁷

Cimaglia sees advertising being tailored towards individuals.⁵²⁷ “The options for

customization extend beyond user data, too. If it's raining outside, it could be raining in the video," easily done by the agency plugging in a geolocating weather script.⁵²⁷ Similarly, if a user is watching the video at night, the video could mirror reality and be a night scene filled with cricket sounds.⁵²⁷ For Cimaglia, "This is a logical progression for a society already accustomed to exchanging their privacy for free services."⁵²⁷ The video could also be in multiple languages thanks to tools like Amazon Polly.

Cimaglia believes that "this customization model of video production is more effective than the current model of creating a single video for the masses."⁵²⁷ He rightfully questions the current preoccupation in investing tremendous resources in single, groundbreaking commercials.⁵²⁷ Currently, "It's all about producing a multimillion-dollar, 30-second mini-film that screens during the Super Bowl, gets viewed on YouTube 10 million times and wins a Cannes Lion," claims Cimaglia, but what really does that gain you? It's less about the viewer and more about stroking the already inflated egos of a select creative set, who are doing nothing more than delivering a one-size-fits-all product to millions of prospects.⁵²⁷

Cimaglia believes there is a place for this in a one-size-fits-all advertising product, but making them "the centerpiece of a multimillion-dollar campaign is foolhardy in an era when companies are sitting on more customer information than ever before — and when AI is even taking over in that arena."⁵²⁷ "Personalization is the way of the future, but, unfortunately, most companies simply don't know what to do with their stores of customer data," laments Cimaglia.⁵²⁷ However, the companies that do will surely reap huge financial rewards.

Once hoteliers have created their content, the next question is where to put it. In its *Top 5 Programmatic Advertising Platforms for 2020 and Beyond*⁵²⁸, Indrajeet Deshpande specifically lists out SmartyAds, TubeMogul, Simpli.fi, MediaMath, and PubMatic as their top platforms for 2020.

"SmartyAds offers a full-stack programmatic advertising ecosystem to cater to brand, agency, publisher, and app developer needs," says Deshpande.⁵²⁸ The platform "ecosystem consists of a Demand-Side Platform (DSP), Data Management Platform (DMP), Supply-Side Platform (SSP), and an ad exchange."⁵²⁸ "SmartyAds also offers a white-label solution that allows brands to build their product on top of it," adds Deshpande.⁵²⁸

The platform enables hotel advertisers "to run display, in-app, video, and native advertising campaigns across desktop and mobile devices. Features such as ad creation tools, robust analytics, and rich targeting capabilities help advertisers with inventory selection, ad placement, and campaign management."⁵²⁸ "SmartyAds' header bidding solution allows publishers to run pre-bid auctions to sell the ad inventory at a premium price. App developers can use the platform to run in-app ads in formats such as rewarded video, native, banner, and

playable ads,” says Hollander.⁵²⁸

TubeMogul’s programmatic advertising software, which is a part of the Adobe Advertising Cloud, “allows brands and agencies to plan, run, and optimize their advertising efforts.”⁵²⁸ “TubeMogul gives brands access to premium ad inventory through the real-time bidding (RTB) process. Brands can also import their direct deal or programmatic reserves inventory into the software,” explains Deshpande.⁵²⁸

“You can run desktop video, mobile video, connected TV, display, native, and digital out-of-home (DOOH) ads through the platform,” says Deshpande.⁵²⁸ “TubeMogul’s programmatic TV buying solution can be used to access the inventory, which is not usually available through traditional media buying.”⁵²⁸

“Simpli.fi Programmatic Marketing Platform is a localized programmatic platform that allows advertisers to buy ad inventory on multiple RTB ad exchanges,” says Deshpande.⁵²⁸

“Advertisers can build audiences on various criteria such as device, OS used, browser, geography, intent-based search data, etc.,” explains Deshpande.⁵²⁸ Users can import their CRM data to enhance audience targeting.⁵²⁸ “The audience can be further optimized on the search and contextual keywords, IP data, frequency capping, CRM data, etc.,” says Deshpande.⁵²⁸ Look-alike and search-alike modeling can also be used to expand the audience base.⁵²⁸

MediaMath’s omnichannel programmatic marketing platform enables marketers integrate data sets from first- and third-party sources, which can be broken into segments before activation.⁵²⁸ Advertisers can also discover and connect with their most valuable audience by utilizing the MediaMath Audience feature.⁵²⁸

“The omnichannel DSP takes care of omnichannel ad campaigns that include mobile, display, video, audio, native, and Digital Out of Home (DOOH) ads. The Creative Management and Dynamic Creative features enable marketers to deliver a consistent brand experience through all mediums,” notes Deshpande.⁵²⁸

With PubMatic, advertisers can access a high-quality ad inventory through the platform’s private marketplace.⁵²⁸ “The media buyer console helps advertisers plan and manage programmatic direct campaigns across different ad formats and channels,” says Deshpande.⁵²⁸ “PubMatic’s fraud-free program refunds a credit amount in case an ad fraud is detected.”⁵²⁸ Advertisers can also utilize the PubMatic real-time analytics feature to optimize their campaigns.⁵²⁸

Audio

In his article *AI’s role in next-generation voice recognition*⁵²⁹, Brian Fuller notes

that “speech is a fundamental form of human connection that allows us to communicate, articulate, vocalize, recognize, understand, and interpret. But here’s where the complexity comes in: There are thousands of languages and even more dialects.” “While English speakers might use upwards of 30,000 words, most embedded speech-recognition systems use a vocabulary of fewer than 10,000 words. Accents and dialects increase the vocabulary size needed for a recognition system to be able to correctly capture and process a wide range of speakers within a single language,” states Fuller.⁵²⁹

Today, the state of speech-recognition and AI still has a long way to go to match human capabilities.⁵²⁹ Fuller claims that, “With the continually improving computing power and compact size of mobile processors, large vocabulary engines that promote the use of natural speech are now available as an embedded option for OEMs.”⁵²⁹

“The other key to improved voice recognition technology is distributed computing,” says Fuller.⁵²⁹ We’ve gotten to this amazing point in voice-recognition because of cloud computing, but there are limitations to cloud technology when real-time elements are needed.⁵²⁹ Things are improving radically but this is a very tricky world to operate in because user privacy, security, and reliable connectivity are difficult to get to work in concert.⁵²⁹ “The world is moving quickly to a new model of collaborative embedded-cloud operation — called an embedded glue layer — that promotes uninterrupted connectivity and directly addresses emerging cloud challenges for the enterprise,” says Fuller.⁵²⁹

As Fuller explains⁵²⁹:

“With an embedded glue layer, capturing and processing user voice or visual data can be performed locally and without complete dependence on the cloud. In its simplest form, the glue layer acts as an embedded service and collaborates with the cloud-based service to provide native on-device processing. The glue layer allows for mission-critical voice tasks — where user or enterprise security, privacy and protection are required — to be processed natively on the device as well as ensuring continuous availability. Non-mission-critical tasks, such as natural language processing, can be processed in the cloud using low-bandwidth, textual data as the mode of bilateral transmission. The embedded recognition glue layer provides nearly the same level of scope as a cloud-based service, albeit as a native process.”

Fuller believes that, “This approach to voice recognition technology will not only revolutionize applications but devices as well.”⁵²⁹

Voice Activated Internet

In his article *2019 Predictions from 35 voice industry leaders*⁵³⁰, Bret Kinsella quotes Jason Fields, Chief Strategy Officer of Voicify, who claims that “2019 is going to be the year voice and IVA’s are integrated into brands overall CX strategy.”

In her article *Voice search isn’t the next big disrupter, conversational AI Is*⁵³¹, Christi Olson explains the importance of being what she calls ‘position zero’ in the search rankings. She says⁵³¹:

“When you type a query into a search engine, hundreds of options pop up. It’s different with voice. When people engage in a voice search using a digital assistant, roughly 40 percent of the spoken responses today (and some say as many as 80%) are derived from ‘featured snippet’ within the search results. In search speak, that’s position zero. When you are that featured snippet in an organic search, that’s what the assistant is going to default to as the spoken response. Siri, Google, Cortana and Alexa don’t respond with the other ten things that are a possibility on that search page. Just the one.”

Understanding this, it’s clear why position zero is so important; “while you might be number two in the text-based searches, you’re getting little to no traffic if people are engaging with intelligent agents and listening to the spoken response.”⁵³¹

The opportunity here is for companies to reverse-engineer the process to ensure they get position zero, so they can win the search race and therefore gain the traffic. But how? “It goes back to the best practices of organic search, basic SEO, and having a solid strategy,” argues Olson.⁵³¹ “It’s embracing schema markup and structured data within your website, so you are providing search engines with signals and insights to be included in the knowledge graph. It’s claiming your business listings so that the data is up-to-date and correct. It’s understanding the questions people are asking and incorporating that question and conversational tone into your content,” says Olson.⁵³¹ “Simply put: It’s understanding the language your customers are using so that you can provide value and answers in their own words and phrases. So, let’s conclude with that,” Olson adds.⁵³¹

“Conversational AI for voice-assisted search is different from text-based search. If you look at the top 80 percent of queries, text-based searches typically range between one to three words. When we (at Microsoft, my employer) look at our Cortana voice data, the voice searches coming in range from four to six words. That’s substantially longer than a text-based search,” says Olson.⁵³¹

It means that people are engaging with the digital assistant conversationally, asking questions and engaging in almost full sentences.⁵³¹ “Given this insight,

there's an opportunity to think about the questions your customers are now asking. Think about what their need is in the way that your customers naturally talk, not in marketer speak or marketing terms. Then, provide value back to them in that manner," recommends Olson.⁵³¹

"With conversational AI, we're going back to being able to create an emotional connection through more meaningful conversations with our customers to build relationships," says Olson.⁵³¹ "Brands will be able to differentiate themselves by adding emotional intelligence to IQ through these conversations," concludes Olson.⁵³¹

Amazon Polly is a service that turns text into lifelike speech, allowing users "to create applications that talk, and build entirely new categories of speech-enabled products."⁵³² Amazon Polly is a text-to-speech service that uses advanced deep learning technologies to synthesize speech that sounds like a human voice.⁵³²

Amazon Polly contains dozens of lifelike voices across a wide range of languages, allowing users to select the ideal voice and build speech-enabled applications that work in many different countries.⁵³² At Intelligencia, we use it to quickly create videos in multiple languages. Some of the Polly voices sound a little stilted and machine-like, but there is usually one in the series of specific languages who does a passable job.

Voice Search

In its article *The Next Generation of Search: Voice*⁵³³, seoClarity argues that brands should take voice search seriously because it is becoming a zero-sum game. seoClarity states that⁵³³:

"Because of the rise in voice search, Google has recognized the increasing need to improve the experience for consumers conducting these searches. Instead of simply displaying a list of 10 blue links, Google increasingly provides a single direct answer to queries. This makes sense since voice searches are often conducted when our hands and eyes are otherwise occupied (for instance, while driving). A standard SERP result would not be helpful in such situations. Rather, having the answer (which Google believes to be the best answer for the query) read out aloud provides immediate gratification and a much better user experience. Therefore, Google's response of creating the Answer Box is no accident."

"Now, and for the foreseeable future, Google's Answer Box is the golden ticket in the organic search rankings sweepstakes," says seoClarity.⁵³³ "In addition to it being the only answer to voice search queries, it is the result that appears above all other results on the SERP, 'ranking zero', seoClarity notes.⁵³³ "Capturing the

Google's Answer Box can mean a dramatic increase in traffic to your website, credibility and overall brand awareness," they add.⁵³³

Google's Answer Box, or "featured snippet block," is the summary of an answer.⁵³³ "Not only is the Google Answer box at the very first spot, above standard organic results, but also has a unique presentation format that immediately sets it apart from the remainder of the page. This instantly increases the credibility and authority of the brand providing the answer to the user's query. Consequently, Google's Answer Box may be the only search result viewed by the user," says seoClarity.⁵³³ Perhaps more importantly, it is the only answer read in response to a voice search.⁵³³ "Not only does Google's Answer Box dominate the SERP, it also boosts organic traffic, leverages mid- to long-range keywords, and focuses on the searcher's intent," notes seoClarity.⁵³³ "Given the great importance of the Answer Box, brands should be focused on delivering the best search experience rather than worrying about any specific tactic to trick the algorithms," argues seoClarity.⁵³³

"It's valuable to think about the shopper's journey. Shoppers at different stages of their journey are searching for different things. So, it is crucial that brands provide content that meet shoppers' needs wherever they are in their journey. When you are able to capture Google's top result for searches along the shopper's journey, you will maximize your brand's credibility and authority," argues seoClarity.⁵³³

"Voice search users tend to use specific, long-tail search phrases. Instead of inquiring about a term or phrase, voice searchers typically ask proper questions," says seoClarity.⁵³³ "For example, when looking for places to dine out, desktop users might type 'Italian restaurant.' However, when using voice search, they're more likely to ask, 'where's the nearest Italian restaurant?'"⁵³³

Voice searchers tend to use language that's relevant to them.⁵³³ "When speaking to their device, queries are more conversational, leaving it to the search engine to decipher the actual intent," says seoClarity.⁵³³

Voice searches are more targeted in the awareness and consideration phase.⁵³³ Many voice searches have local intent — "as much as 22 percent of voice queries inquire about local information such as directions, restaurants, shopping, local services, weather, local events, traffic, etc.," says seoClarity.⁵³³ "The remainder of queries is distributed between non-commercial queries like personal assistant tasks, entertainment, and general searches," note seoClarity.⁵³³ "This makes local the biggest commercial intent among voice searches. As a result, you should incorporate new strategies to position your business in local voice search," argues seoClarity.⁵³³

Voice search is still messy and complex.⁵³³ "Google's RankBrain algorithm leverages artificial intelligence to discover contextual connections between searches," says seoClarity.⁵³³ Google "tries to understand 'intent' based on

context of the search (such as location, time of day, device used, previous searches, connected data from email and other assistant sources) instead of just plainly matching words from on a page.”⁵³³ However, the machine is learning and training, so, “instead of trying to keep up with Google’s algorithms, it is essential to understand what your audience needs and focus your optimization to your end user, not on chasing the latest algorithm shifts.”⁵³³

seoClarity recommends brands to “build a more effective content marketing strategy to win the Answer Box by optimizing for topics that reflect the intent of your audience instead of just optimizing for keywords.”⁵³³ When brands focus their content strategies on the intent of the audience, it better addresses the real needs of the customer.⁵³³ Additionally, the created content can solve challenges and answer most commonly asked brand questions.⁵³³ By targeting the awareness and consideration phases of the customer journey, brands can capture their audience early in the customer journey.⁵³³

Brands should optimize to short attention spans.⁵³³ It is essential to connect with customers at the right moment.⁵³³ seoClarity says that, “Google outlines the following moments that every marketer should know: I-want-to-know moment; I-want-to-go moment; I-want-to do moment; I want-to-buy moment.”⁵³³

Always create a FAQ page as it can provide answers to common questions that users may have.⁵³³ “By figuring out what questions your customers are asking, you can create the type of content that they are most likely to find useful,” says seoClarity.⁵³³

“Answer the five W’s & H — Be sure to answer the essential questions that everyone asks when collecting information or solving a problem: Who, What, Where, When, Why. And don’t forget the all-important How,” says seoClarity.⁵³³ “The data also showed some other important trigger words including Best, Can, Is, and Top,” says seoClarity.⁵³³ Brands should also “Explain steps to complete tasks — Focus on content that details steps and how to complete tasks that relate to your product or service and also other explanations specifically for your product or service. “How to” and “What Is” contain significant lead over other trigger words.”⁵³³

Other things seoClarity recommends are, “Highlight the best options for customers. Create buying guides that help aid the decision making process in list and bullet point type of format to demonstrate the best options for customers.”⁵³³

“Focus on structuring content in a way that matches consumer intent — Use formats that work for your customers and structure the content to intent,” recommends seoClarity.⁵³³ “Consider using tables, ordered lists, bullet points, and video. Use schema markup — Always use the best SEO practices by placing your keywords and key phrases in your header, metadata, URL structures, and alt tags,” says seoClarity.⁵³³

One of the most important recommendations seoClarity offers is for brands to produce in-depth content.⁵³³ “In your SEO efforts, you must never forget that content is the most important thing. Be sure to create relevant content that provides in-depth answers to the questions your target audience asks,” says seoClarity.⁵³³

According to seoClarity⁵³⁴, nearly 20% of all voice search queries are triggered by only 25 keywords (see Table 22), which include “how”, “why”, or “what”, as well as adjectives like “best” or “easy”. The top ten are listed below, others included “Why”, “Who”, “New”, “Recipe”, “Good”, “Homes”, “Make”, “Does”, “Define”, “Free”, “I”, “List”, “Home”, “Types”, and “Do.”

Trigger Words	Count	% of Total
How	658,976	8.64%
What	382,224	5.01%
Best	200,206	2.63%
The	75,025	0.98%
Is	53,497	0.70%
Where	43,178	0.57%
Can	42,757	0.56%
Top	42,277	0.56%
Easy	31,178	0.41%
When	27,571	0.36%

Table 22: Voice search words

Search: Dialogtech.com⁵³⁴

Programmatic Advertising

“When it comes to advertising,” the Adobe Sensei Team believes that, “the promise of AI is that customers will receive the most relevant ads, while allowing brands to drive awareness, engagement, conversions, and loyalty.”²⁶ This should result in happier customers and less wasted ad spend.²⁶ “With AI, advertisers can budget, plan, and more effectively spend limited ad dollars,” claim the Adobe Sensei Team.²⁶

The Adobe Sensei team provides the following example: “Cynthia is a travel and

hospitality media buyer trying to determine the best mix of search advertising for her global hotel brand.”²⁶ “She knows that with millions of keywords, multiple search engines, and different audience segments to consider, coming up with the right bid amount for each combination, as well as determining how to allocate her budget across her campaigns to most efficiently meet her goals is simply too much for her to handle alone.”²⁶ Cynthia “turns to her media buying platform to help her make sense of the data.”²⁶ The Adobe Sensei Team sees the process working as follows for Cynthia²⁶:

“With AI leading the way, she reviews a forecast simulation to see how an increase or decrease in budget will impact her clicks, revenue, conversions, and other metrics. Once she selects her budget, she reviews AI-powered ad spend recommendations to see how to best allocate her advertising budget. She clicks on her preferred allocation. Later, as her ad campaigns are running, she accesses model accuracy performance reports so she can see how actual performance numbers compare with AI-generated forecasts, allowing her to make any necessary adjustments along the way. Once her campaigns have run, she’s thrilled to see that they delivered 99 percent of the clicks that were forecast, and actual revenue was five percent higher than forecasted. Now that Cynthia has a clear picture of what worked during her search ad campaigns, she checks the performance of her display and video campaigns. Again, she calls on AI to report on awareness and performance while letting her demand-side platform (DSP) guide automated budget allocation so she can stay focused on strategic media planning and buying.

The Adobe Sensei Team believes that with the help of AI, brands “can keep up with changing customer preferences, navigate mountains of data, and make adjustments multiple times per day if needed to make sure”²⁶ budgets are allocated “most effectively across channels like search, display, and video, or even within a specific channel.”²⁶

In her article *Experts Weigh in On the Future of Advertising*, Giselle Abramovich believes that AI can help build a media-buying platform that allows a marketer to input goals “and a transparent algorithm does the rest, executing buys and optimizing every millisecond.”¹⁹⁷ The ad could dynamically change the tone of the voiceover based on the preferences of the viewer.¹⁹⁷ Abramovich believes that, “The convergence of AI with human creativity and insight will transform advertising, and we’re just beginning to see what’s possible.”¹⁹⁷

One of the companies delving into AI head-first is Citi, which recently launched its “Welcome What’s Next” campaign.¹⁹⁷ “[AI] is allowing us to create custom ads that meet people where they are. For example, if you’re looking at the weather,

it's serving up the ad in a customized way so it's relevant to what you're looking at," says Jennifer Breithaupt, global consumer CMO at Citi.¹⁹⁷ "It integrates with a consumer's path online and provides a more seamless way to experience the ad."¹⁹⁷

AI is already helping Citi surpass its advertising benchmarks, Breithaupt adds.¹⁹⁷ "For example, the financial giant has realized a 10%+ lift in video completion rates versus standard, non-customized ads as a result of AI."¹⁹⁷

"But what's going to be crucial to the success of AI is structuring it in a transparent manner that involves a partnership between parties," says Breithaupt.¹⁹⁷ "In other words, above all as advertisers, it's crucial we're clearly defining the value exchange and providing consumers with the opportunity to make an informed choice about their participation."¹⁹⁷

In his article *How AI is Driving a New Era of TV Advertising*⁵³⁵, Varun Batra states that in November 2017, eMarketer reported that 70% of U.S. adults "second screen" while watching TV. Although that sounds pretty discouraging for brands that spend millions on TV spots, one should consider that this is reported, not observed, behavior.⁵³⁵ "No doubt we all second screen, but we don't do so all the time. That begs the question: how does a brand know consumers paid attention to its \$5 million Super Bowl ad rather than their mobiles?" asks Batra.⁵³⁵

"Using AI, data scientists have been able to map multiple devices to the same individual and household, as well as to connect online behavior with offline behavior, such as watching the Super Bowl via a connected TV and engaging with a smartphone during commercials," explains Batra.⁵³⁵ Brands "can determine when consumers second screen during the commercials by counting the number of bid requests from their devices," says Batra.⁵³⁵

"Of course, AI can't tell us if an inactive device meant the consumer watched the ad or went to the kitchen for another beer, but if we track ad requests across millions of household, we can get a lot of insight into a creative's ability to captivate consumers," says Batra.⁵³⁵

"AI can also help determine the impact of an ad on consumer behavior, thanks to that same ability to link online and offline behavior. For example, if we know that a particular household was presented with a TV ad for a 'one-day-only sale' on GM pickup trucks, and a mobile device associated that household shows up at the local dealer on sale day, then we can assume the ad had an impact," explains Batra.⁵³⁵ "The connection becomes more compelling when the behavior is seen across all households that see the ad," he adds.⁵³⁵

"Marketers will continue to see new opportunities to improve their campaigns as TV becomes more digitized," argues Batra.⁵³⁵ He adds that, "As of 2017, there are nearly 133 million connected TV users in the US and will grow to at least 181

million in” 2018.⁵³⁵ That means the online and offline behavior of 55% of the population can now be tied to ad-views, which is obviously a huge number.⁵³⁵

“Many programmatic companies allow marketers to incorporate TV inventory into their multi-channel programmatic campaigns. These connected TVs are targeted using first- and third-party data sets, just as if they were laptops and tablets,” says Batra.⁵³⁵ “Marketers can create surround-sound marketing, hitting consumers with messages on their laptops, mobile devices, and TVs,” he adds.⁵³⁵

“AI is more precisely transforming the very segments we use to pinpoint consumers who are in the market for a particular product,” says Batra. “Machine learning excels at sifting through massive amounts of observed online and offline user behavior to discover distinct signals that indicate purchase intent,” explains Batra.⁵³⁵ AI can also make sub-millisecond decisions to remove a consumer from a targeting segment as soon as he or she stops sending in-market signals.⁵³⁵ Humans just don’t have the capacity to do this, so the models do it completely autonomously and at a scale far beyond human capability.⁵³⁵

“Through numerous applications of machine learning, we’ve learned that there is a host of common — and often non-intuitive — behaviors that people engage in before they exhibit the signals of being in the market,” says Batra.⁵³⁵ For example, “in the classic digital marketing use case, airlines will retarget consumers who search for flights to Las Vegas. In a machine-learning use case, airline marketers would target consumers who look at wedding chapels, an early signal that they’ll soon look for a flight to the city.”⁵³⁵ “In other words, the machine predicts who an airline’s future customer will be, giving the airline the opportunity to get a jump on its competition,” notes Batra.⁵³⁵

Batra believes that, “Television has always been a powerful awareness tool, enabling brands to reach millions of consumers quickly and effectively.”⁵³⁵ He concludes that, AI can only enhance “that power by predicting the right people to receive a TV ad, gauging its effectiveness, and assessing its impact on online and offline consumer behavior.”⁵³⁵

The Customer Journey

As I wrote in chapter one, successful marketing is about reaching a customer with an interesting offer when he or she is primed to accept it. Knowing what might interest the customer is half the battle to making the sale and this is where customer analytics comes in. Customer analytics has evolved from simply reporting customer behavior to segmenting customers based on their profitability, to predicting that profitability, to improving those predictions (because of the inclusion of new data), to *actually manipulating customer behavior* with target-specific promotional offers and marketing campaigns.

The hotelier needs a single view of the customer in real-time that will enable its

marketers to deliver personalized experiences whenever the customer is primed to receive them. Data can come from transactional systems, CRM systems, app impressions, operational data, facial recognition software, wearables, iBeacons, clickstream data, amongst a whole host of other data systems.

As Dan Woods explains in his amusing comparison of the different environments that marketers face today when compared with what their 1980's counterparts saw.²³ Today, stealthy marketers are forced to use "email campaigns, events, blogging, tweeting, PR, eBooks, white papers, apps, banner ads, Google Ad Words, social media outreach, search engine optimization."²³ Woods didn't include SMS, but that is still an integral part of today's marketing chain.

In practice, all these channels should work in concert; an email campaign can promote a sale at an event, which can be blogged and tweeted about through social media. PR can also promote the event through its typical channels. Coupons for the event can be disseminated through the company's mobile app and SMS messaging services. Banner ads will appear on the company's website, while Google ads and SEO will drive buyers and potential buyers to the hotelier's website or its social channels. Hopefully, viral marketing then kicks in, with customers and potential customers sharing on Facebook, Instagram, Pinterest, Twitter, Weibo, WeChat, etc., etc. Of course, influencer marketing can also help the viral marketing process.

Seen through the lens of the *hotelier Engagement and Loyalty Platform*, all of these activities can increase personalization to the point where it will be recognized by the customer.

Lovelock and Wirtz's "Wheel of Loyalty" concept and its three sequential steps — building a foundation for loyalty, creating loyalty bonds, and identifying and reducing factors that result in churn⁸⁵ should be kept in mind when building up the foundation of *The A.I. Hotelier's* CRM system. The most important part of the second step is the cross-selling and bundling of products and a real-time stream processing recommendation engine can certainly help with that. One thing that should be kept in mind regarding loyalty programs is the fact that hoteliers should try to foster relational behaviors and gain long-term benefits from a loyalty program, and to do this hotels need to consider offering both social and economic rewards.¹¹⁰

Listening

In the *Listening* part hotels should define and look out for triggers such as photos, hashtags, keywords, likes, video views, etc., etc.

In their article *Artificial Intelligence and Visual Analytics: A Deep-Learning Approach to Analyze Hotel Reviews & Responses*⁵³⁶, Chih-Hao Ku et al. present a framework to "integrate visual analytics and machine learning techniques to investigate whether hotel managers respond to positive and negative reviews differently and

how to use a deep learning approach to prioritize responses.”

According to Chih-Hao Ku et al., “Online travel agencies (OTAs) such as Booking.com, Expedia, and TripAdvisor provide a platform where users can share subjective opinions, recommendations and ratings about their travel and accommodation experiences.”⁵³⁶ Today, TripAdvisor, the largest travel platform in the world⁵³⁷, has over 630 million reviews and opinions with an average of 455 million monthly unique visitors.⁵³⁸ At “TripAdvisor, a managerial response becomes the final conversation on the review because only one registered manager can create such last response. That means, managerial responses can have a significant impact on other potential guests who plan to book a hotel.”⁵³⁹

“In hospitality management, the customer-generated content such as hotel ratings and reviews could be a valuable source for identifying the consumption patterns and trends due to its active and real-time natures,” claim Chih-Hao Ku et al.⁵³⁶ “Managerial responses to customer reviews may enhance existing customers’ loyalty and turn unhappy customers into loyal customers,” says Pantelidis.⁵⁴⁰

In 2015, Schuckert et al.⁵⁴¹ conducted a content analysis study on 50 articles from 2004 to 2013 that were relevant to hospitality and tourism online reviews. The researchers discovered that existing studies focused predominantly on analyzing secondary data, discovering the relationship between online reviews and sales including customer satisfaction, and opinion mining of online reviews.⁵⁴² They further pointed out the limitations of studies of the time, which included the use of simple variables such as overall ratings and the number of reviews⁵⁴³ for data analyses.⁵⁴¹ Furthermore, prior research has focused mostly on a stand-alone fashion⁵⁴⁴, analyzing either online reviews or managerial responses, which generate limited insights of the interrelated relationship between online reviews and managerial responses.⁵⁴⁵

Chih-Hao Ku et al.’s study filled “the research gaps by taking dimensions such as aspect ratings, types of travelers, and time to respond to reviews into our data analyses.”⁵³⁶ “A novel approach to integrate deep-learning models and visual analytics techniques”⁵³⁶ was then proposed. The overall results can be used to improve customer relationship management, make self-improvements⁵⁴⁰ for response management managers, and generate decision-making information for travelers.⁵³⁶

Today, according to Mauri and Minazzi in their article *Web Reviews Influence on Expectations and Purchasing Intentions of Hotel Potential Customers*,⁵⁴⁶ “tourists usually read online reviews to plan their trip and decide where to stay.” “Traditional word-of-mouth (WOM) communications, oral messages between persons, have evolved into electronic word-of-mouth (eWOM) communications, online messages between users,” say Mauri and Minazzi.⁵⁴⁶ “The proliferation of eWOM has been identified as a strong impact on consumers’ purchase

decision,”⁵⁴⁶ as well as on revisit intentions⁵⁴⁷, search behaviors⁵⁴⁸, and online sales.⁵⁴² Consumers tend to search and compare tourism and hospitality products and services to reduce uncertainty⁵⁴⁹ and potential risks associated with a purchase.⁵⁵⁰

“An average review rating is an important indicator leading to hotel sales,” argue Chih-Hao Ku et al.⁵³⁶ In their article *Pricing in a Social World: The Influence of Non-Price Information on Hotel Choice*⁵⁵¹ Noone and McGuire “examined the relation between online reviews and online hotel booking and found that higher average review ratings lead to higher numbers of hotel bookings.” “However, the overall ratings may not reveal customers’ real satisfaction, and more nuances of response strategies should be further studied,” say Liu, Li and Thomas.⁵⁵²

Prior studies have revealed that a positive correlation between a hotel’s star rating and hotel’s sales.⁵⁵³ Martin-Fuentes⁵⁵⁴ collected a sample of more than 14,000 hotels in 100 cities from Booking.com and TripAdvisor to examine the star-rating classification system of hotels, room price, and user satisfaction measure from user ratings. Martin-Fuentes’ analysis confirmed that hotel stars indicate the overall quality of hotels and the hotel price is well correlated to hotel stars and user satisfaction levels.⁵⁵⁴

Due to the explosion of online reviews over the past decade or two on social media platforms of all kinds, managerial responses have become a new form of CRM.⁵⁵⁵ Law et al.⁵⁵⁶ analyzed 111 hospitality-related articles from March to August 2017 and concluded that hospitality CRM research has grown from a marketing to a social CRM concept. They further point out that technology plays an indispensable role in such processes and AI can generate new knowledge in this rapidly growing field and thus foster strong customer relationships.⁵⁵⁶

Today, managing online reviews for hotels has become an important task for hospitality management⁵⁵⁷ and researchers have urged hotel managers to respond to online reviews proactively.⁵⁵⁰ Existing studies⁵⁵⁸ reveal that deficient service does not necessarily lead to dissatisfaction, but rather improper responses do and most customers recognize imperfect service.⁵⁵³ More recently, Sparks et al.⁵⁵⁰ adopted an experimental approach based on Kardes’s consumer inferences theory⁵⁵⁹ to examine organizational responses to negative eWOM and found that a timely response yielded favorable customer inferences.

According to Andreassen’s service recovery theory⁵⁶⁰, managerial responses to negative reviews can identify service failures and enhance customer satisfaction.⁵⁶¹

Kim et al.⁵⁶² collected online reviews and responses from 128 hotels in 45 states in the U.S. and found that overall ratings and responses to negative comments are the most salient predictor of hotel performance. As Sparks et al. contend, “Seeking effective approaches to manage eWOM, especially negative ones, is a widely recognized challenge for hospitality management.”⁵⁵⁰

Obviously “Understanding and responding to massive online reviews is a time-consuming and exhausting task.”⁵³⁶ As Chih-Hao Ku et al. reveal, “A customer review may contain both positive and negative information, which make the in-depth analysis of online reviews even more challenging.”⁵³⁶ To automate the analysis process with millions of data records, AI techniques almost have to be used.⁵³⁶

One of the popular unsupervised learning algorithms is the k-means clustering algorithm, which groups data points that are found to possess similar features together.⁵³⁶ Zhang and Yu⁵⁶³, for example, “use a Word2Vec tool, a deep-learning tool proposed by Google, k-means clustering algorithm, and ISODATA, a clustering algorithm based on k-means, to conduct the experiments of sentiment analysis on hotel reviews and found a slight performance improvement by using Word2Vec together with ISODATA.” Chong et al.⁵⁶⁴ used a neural network approach to investigate the use of online reviews, online promotion strategies, and sentiments from user reviews to predict product sales and the researchers did find a positive correlation.

For Chih-Hao Ku et al.’s study, London was selected because it is both an English-speaking city and the most visited city in Europe and Northern America based on the volume of visitors.⁵³⁶ Chih-Hao Ku et al. selected “43 Hilton hotels, up to 25 miles from London, in 2017 based on Hilton’s website. Only 4- and 5-stars hotels were selected, because luxury hotels are more likely to provide better experience and service to guests. Three Hampton hotels that have lower or no star rankings are eliminated from our data analysis. This results in a total of 40 hotels used in this study.”⁵³⁶

Relying on an automatic web crawler, Chih-Hao Ku et al. collected user review, manager response, and hotel rating data from TripAdvisor.⁵³⁶ For each hotel, Chih-Hao Ku et al. “collected hotel name, star, the number of excellent, good, average, poor, and terrible reviews, an average of a price range, hotel address, amenities, type of rooms, and description.”⁵³⁶ For each hotel review, Chih-Hao Ku et al. “collected the hotel name, review title, review content, manager response, overall rating, aspect ratings, types of travelers, and review date.”⁵³⁶ “A total of 91,051 reviews were collected. Among them, 70,397 reviews contain managerial responses, resulting in an overall 77% response rate.”⁵³⁶

To preprocess the collected data, Chih-Hao Ku et al. first joined two datasets – hotel data and review data – to create a holistic view of the data, then keyword extraction, value extraction and data classification were done on the data.⁵³⁶

Chih-Hao Ku et al. examined summary statistics and data visualizations containing more than 20 dimensions such as sentiment, aspect rating, managerial response, review time, response time, latitude, longitude, and type of traveler.⁵³⁶

An Öğüt and Taş study⁵⁴² compared hotels in London and Paris listed on booking sites and revealed that hotel star ratings significantly affect room prices and

customer ratings; star ratings are highly correlated with room prices and frequently used to rate hotel quality.⁵⁴² Glauber Eduardo⁵⁶⁵ also discovered that cleanliness, location, and facilities in 8,000 hotels worldwide are relevant to hotel quality and price differentials. Another researcher, Ye et al.⁵⁶⁶, found that a good reputation is related to a higher hotel price.

Chih-Hao Ku et al. believe their study breaks new ground in several ways.⁵³⁶ They “developed a data crawler to collect data automatically and presented a novel approach to integrating visual analytics and deep-learning models to gain insights into various aspects of hotel review and response data.”⁵³⁶ According to Chih-Hao Ku et al.⁵³⁶:

“The study result produces managerial, decision-making, and technical contributions. First, hotel managers can prioritize response orders and gain insights into online reviews and responses to make self-improvement. Second, the overall results also provide decision-making information for travelers to select 4-star hotels and enjoy 5-star service and environment based on our clustering analysis. Finally, we are among the first to integrate visual analytics and deep-learning models to analyze hotel reviews and responses. This can be justified by our experimental results, which indicate our proposed approach outperforms existing machine learning methods such as NB, KNN, SVM, DKV, and RNN.”

Prior research, such as Berger, Sorensen, and Rasmussen’s⁵⁶⁷ emphasized that consumers are likely to pay more attention to negative reviews when making purchase decisions, specifically negative reviews could increase consumer awareness of hotels.⁵⁶⁸ However, Chih-Hao Ku et al.’s results showed “that 72.5% of hotels in our study have a neutral preference of response strategy, implying that the hotel managers put an equal amount of effort to respond to customers’ positive and negative reviews.”⁵³⁶ As negative reviews reduce purchase likelihood and sales⁵⁶⁷, Chih-Hao Ku et al.’s findings “suggests that managers should provide detailed strategies to respond to negative and positive reviews.”⁵³⁶

Although the Chih-Hao Ku et al. study was quite illuminating, there are several limitations to it, the writers admit;⁵³⁶ the “study only took the response time, response rate, and hotel rating in response data analysis;”⁵³⁶ “The nuances of response strategies need to be further studied, which should provide practical decision-making information for hotel managers when they respond to positive and negative reviews using different response strategies,” contend Chih-Hao Ku et al.⁵³⁶ Another limitation was the small sample.⁵³⁶ Chih-Hao Ku et al. confess that, “The performance of the deep-learning models needs to be tested in future research by including more cities, hotel brands, and hotels. This will provide additional insights into data analysis.”⁵³⁶

Not all eWOMs are of equal value, Chih-Hao Ku et al. admit.⁵³⁶ “After analyzing the textual features of the hotel reviews and managerial responses, future research can focus on the social network among those hotel questions and answers.”⁵³⁶ Also, “The analytical framework applied in this study can be expanded to include social network analysis, which can show how the structure of social ties may influence the hotel reviews and manager’s response strategy.”⁵³⁶

Chih-Hao Ku et al. see the potential for each hotel to have a small social network that is based on the communication between customers.⁵³⁶ “If one customer answers another customer’s question, this indicates a one directional tie between these two customers. Based on these conversation ties, a small social network of each hotel can be generated.”⁵³⁶ This does propose the following interesting question: “if the structural cohesion of social network will influence the hotel reviews and response strategy.”⁵³⁶ “An equally intriguing question is whether the structural holes in each network will cause a different impact on the hotel reviews and response strategy,”⁵³⁶ but that’s for another time and another study.

Hootsuite’s *14 of the Best Social Media Monitoring Tools for Business*⁵⁶⁹ lists some of the best tools for hotels to use for this listening step, including Reddit, Streamview, Reputology, and Synthesio, Crowd Analyzer, amongst others (see Table 23).

SERVICE	DESCRIPTION
Streamview for Instagram	With a community of over 700 million users it makes sense to monitor what people are posting on Instagram, especially if your audience falls in the 18 to 29 age range. With the Streamview for Instagram app you can monitor posts by location, hashtag, or username. The app within Hootsuite allows you to monitor and engage with users that are posting in your area, or an area you choose to follow. For example, you can use this tool during events to see what is being posted and to engage with attended.
Hootsuite Syndicator Pro	Manage and monitor all your favorite blogs and websites with Hootsuite Syndicator Pro. This tool provides a quick and easy way to view RSS feeds and quickly share them to your social media channels, as well as rich filtering, monitoring, and tracking tools. You can also track which stories you’ve shared.
Reputology	Online (and offline) reputation management is extremely important and surprisingly easy. The Reputology app lets you monitor and check major review sites, such as Yelp, Google, Facebook reviews, so that you can engage with reviewers and resolve any issues in a timely manner. You can track activity across multiple storefronts and locations, and respond quickly via quick links.
Hootsuite Insights	Hootsuite Insights combines social media listening, analytics, and powerful social media monitoring capabilities. It allows you to gain powerful real-time insights about your brand, track influencers, stories, and trends, and visualize the metrics — all in one place. You can filter and tailor results by sentiment, platform, location, and language, and engage directly from your stream to take action on previously hidden results.

SERVICE	DESCRIPTION
Brandwatch	The name says it all; the Brandwatch app in Hootsuite lets you keep watch over your brand through deep listening. You can identify key insights from more than 70 million traffic sources across the web, including major social channels, blogs, forums, news and review sites, and much more. This tool lets you make real-time, informed decisions and take action on them.
ReviewInc	Whether it's a positive or negative online review, your response should be in the same place as that review. The ReviewInc app for Hootsuite lets you view over 200 popular review sites across over 100 countries. Organize positive reviews for sharing on social media sites, and resolve negative issues instantly.
Synthesio	Synthesio is a comprehensive social monitoring tool for finding the information you need to gain deeper insights and better inform business decisions. The tool lets you monitor multiple mention streams at once, so you can listen to the social media conversations most important to you. You can then analyze these conversations and join them.
Crowd Analyzer	If you or your customers are based in the Middle East, Crowd Analyzer is an invaluable analytics and social media monitoring tool. As the first Arabic-focused social media monitoring platform, Crowd Analyzer analyzes "Arabic content in terms of relevancy, dialect and sentiment." It not only monitors major social networks, but also blogs, forums, and news sites.
76Insights	If content marketing is an important aspect of your Facebook marketing strategy, consider 76Insights. This social media monitoring tool measures the resonance of your social media content and breaks down your resonance score, which measures how much social media engagement someone receives after publishing something.
Keyhole	Keyhole lets you see what's being said about you on Twitter and Instagram in real-time. You can monitor keywords, hashtags, URLs, and usernames, and see historical as well as real-time data. One cool feature is the heat maps that show you activity levels around the world.
Digimind	Digimind lets you track keywords in news outlets and social media platforms for mentions of your company in real-time. It also measures sentiment, so you can gauge whether what is being said about you is good, bad, or "meh." You can also compare how your company is perceived online against your competitors.
Google Alerts	Google Alerts lets you monitor the web for mentions of your company, your competitors, or other relevant topics. Just go to the Google Alerts page, type a keyword or phrase in the search box, and provide your email address to receive a notification every time Google finds results relevant to your alert criteria. You can set alerts for specific regions and languages.
Hootsuite	On top of all the social media monitoring tools mentioned above, Hootsuite Pro provides social listening capabilities right in the dashboard. Monitor specific keywords, hashtags, regions, and more. Stay on top of what people are saying about your brand and listen to your customers and competitors to gain competitive advantage.

Table 23: Hootsuite's Social Media Monitoring Tools

Source: *14 of the Best Social Media Monitoring Tools for Business*⁵⁶⁹

Hotels should also be listening to comment boards or short-term blogging sites like Tumblr or social news aggregation sites like Reddit for comments about their company and their properties. Visitors to hotels are often happy to post wonderful reviews about their visits and purchases, and this is gold for word-of-mouth marketing so hotel operators should do their best to motivate their customer to provide reviews.

Once all of this data is captured, geofencing, location-based services, and location-based advertising offer some unique ways to reach consumers when they are in the all-important “decision mode.”

Personally, I am not a fan of checking into locations for something as ethereal as a virtual badge, but that is only my opinion, many others seem to enjoy the gamification aspects of this process. There are plenty of people who are more than happy to give away their personal information for a virtual badge or an opportunity to win something of value, so why not take them up on it? A hotel operator that is able to offer highly specific advertisements to customers who might just need a little extra nudge to make that purchase should find an investment in geofencing applications highly profitable.

Geofencing marketing does raise the issue of privacy, but I believe the day will come when mobile users who enter a mall, a hotel, or a shopping area will view messages that ask for their permission to accept a location-based ad as harmlessly as they currently view television and radio advertising. It is very possible that they will embrace this form of advertising because of its immediacy.

Geotrigger services will probably be the next iteration of geofencing applications. These send targeted location-based messages to app users who either enter or leave a geofenced area. Geotriggers can send the right message to the right person at the right time in the right place, which should increase their use as well as prove ROI positive for anyone who makes the investment in it.

“A smart combination of listening to the online conversation already taking place, learning what people want, and then providing what they are open to receive from the brand constitutes the winning ticket,” advises Macy and Thompson.⁴⁶⁴ Whether the engagement is through video, online polls, games, photo sharing, e-mail, blogging, PowerPoint presentations, or podcasting, “engagement strategies present an opportunity for brands to align content creation for social media with a company's priorities and involve cross-functional interaction and collaboration,” argue Macy and Thompson.⁴⁶⁴ “Social media engagement can also be used for front-end campaigns and appearances to help guide the conversation and generate buzz,” conclude Macy and Thompson.⁴⁶⁴

Rules Engine

The Rules Engine step is a pretty straightforward concept to understand; hotel business users are already creating considerable business rules for their establishments and these rules should be extended to each company's defined rewards program, their reward's economy, and the marketing of the program.

Rewards can be as simple as a reward for a hotelier visit, a points threshold reached, a birthday or anniversary, loyalty card utilization, or reaching a spending tier. Reward rules engine must contain the conditions of the loyalty program, i.e., if the member activity of a member fulfills the conditions, the loyalty engine executes the assigned rule actions, which could be giving the member a unique offer based on his or her spend.

At the very beginning of the book, I spoke about the difference between doing things in a rules-based analytics way and an AI-powered way and I believe it's worth repeating the AI-powered way here⁸:

- Provide warnings whenever a company activity falls outside the norm.
 - **AI-powered analytics:** The AI analytics tool automatically determines that the event is worthy of an alert, then fires it off unaided.
- Conduct a root cause analysis and recommend action.
 - **AI-powered analytics:** Your tool automatically evaluates what factors contributed to the event and suggests a cause and an action.
- Evaluate campaign effectiveness:
 - **AI-powered analytics:** The AI analytics tool automatically weights and reports the factors that led to each successful outcome and attributes credit to each campaign element or step accordingly.
- Identify customers who are at risk of defecting:
 - **AI-powered analytics:** Your tool automatically identifies which segments are at greatest risk of defection.
- Select segments that will be the most responsive to upcoming campaigns:
 - **AI-powered analytics:** Your tool automatically creates segments based on attributes that currently drive the desired response.
- Find your best customers:
 - **AI-powered analytics:** Your tool automatically identifies statistically significant attributes that high-performing customers have in common and creates segments that include these customers for the business to take action on.

These should become the new rules of a hotel's IT and marketing departments.

Automation

One of the huge benefits of automating campaigns is that offers based on either stated or inferred preferences of customers can be developed. Analysis can identify which customers may be more responsive to a particular offer. The result: more individualized offers are sent out to the hotel's customers and, because these offers tap into a customer's wants, desires, needs *and* expectations, they are more likely to be used; more offers used mean more successful campaigns, means higher returns on investments.

By understanding what type of customer is at its property, why they are there, and what they like to do while they are there, a hotel operator can individualize its marketing campaigns so that they can be more effective, thereby increasing the hotel's ROI.

Once the customer leaves the property, the marketing cycle begins anew. RFM models can project the time at which a customer is likely to return and social media should be checked for any comments, likes, or uploads left by the customer.

All of a customer's captured information can now become part of the Master Marketing Profile that will be the basis for future marketing efforts. Combining the daily, weekly, and monthly Master Marketing Profiles will also allow the hotelier to develop insightful macro views of its data, views that could help with facilities, labor management and vendor needs as well.

Moderation

Moderating boards and UGC posts create a double whammy for hotels because, as Rachel Perlmutter explains in her article *Why You Need Social Proof on Your Website*,⁵⁷⁰ "People need to see that others also enjoy that product. It's what we call social proof: the idea that buyers are influenced by the decisions and actions of others around them."

Perlmutter offers the following reasons why it is so important to have UGC review on a business' website⁵⁷⁰:

- "Testimonials add credibility for the products and services you offer.
- People tend to trust online reviews when making purchases.
- Social proof earns better SEO: Adds more favorable language surrounding your brand online.
- When sourcing opinions from your client base, you show that you care about their experience with your brand, thus strengthening the relationship you have with your clients."⁵⁷⁰

Perlmutter states that businesses can gather testimonials in a variety of ways, including sending surveys to new clients.⁵⁷⁰ Perlmutter also advises businesses to encourage buyers to post on social media.⁵⁷⁰ Hotels should use hashtags to

track customers' responses to the company's products and services so they can be easily found and responded to accordingly.⁵⁷⁰ Instagram should be a big part of a hotel's strategy because testimonials with images trump text testimonials alone. Testimonials are powerful examples of social proof as well.⁵⁷⁰

Hotels shouldn't be afraid to send free gifts of rooms or food to people with large followings on platforms like Instagram, YouTube, etc. "Whether you want to call them social media influencers, bloggers, or local celebrities, consider getting meatier' testimonials from people who have already gained some amount of trust online," states Permitter.⁵⁷⁰ "Some may ask for a small fee to review your product, but the return you get from their article, video post, Instagram picture, or even just their words and name listed on your site will likely be tremendous," advises Perlmutter.⁵⁷⁰

It is important to get instant reactions, too. Perlmutter recommends that, "If you host events, then you have the prime opportunity to gather testimonials from attendees right on the spot."⁵⁷⁰ Don't be afraid to set up a camera right outside the event space and asks participants to provide their opinions on the spot.⁵⁷⁰

In her Digiday article *How Facebook is wooing luxury brands*⁵⁷¹, Bethany Biron writes that "Facebook is advocating for 'digitally influenced sales,' that assist consumers with the discovery process while still driving them to e-commerce sites and physical stores, said Narain Jashanmal, industry manager of retail at Facebook. This concept has helped major hoteliers like Barneys break out of the traditional retail rut and embrace e-commerce."

In her article *Engage Customers and Gain Advocates Through Social Media and Social Networking*⁵⁷², Wendy Neuberger argues that: "Social commerce is about making a retailer's brand a destination. hoteliers really need to listen to what their customers are saying. Customers can provide valuable input and feedback that can be used to make more informed assortment decisions, changes to website features and enhancements to the shopping experience."

"When customers feel their voice is being heard, they feel a stronger connection to the retailer and are more likely to become advocates."⁵⁷² Neuberger claims it is important for retailers to identify and engage with the key influencers for several reasons, the two most important being: "to empower their advocacy or capabilities, which helps build and foster a sense of community among brand loyalists, and empowers those loyalists to better advocate on behalf of a brand, product and/or service."⁵⁷²

Neuberger recommends that retailers use the following social media platforms (but this is applicable for hoteliers as well)⁵⁷²:

- Blogs: retailers can provide additional product or category information here as well as post how-to information in the form of text, photos

and/or videos. hoteliers should also provide space for customers to add feedback and/or comments about their retailing experience.

- Micro-blogging: coupons, sales and promotions can be offered through these channels. hoteliers can “tweet press releases, provide exclusive tips and tricks to customers, and ask for customer feedback, suggestions or ideas for improvements. Some hoteliers even use Twitter as a customer service mechanism.”⁵⁷²
- Co-Shopping: this is a form of social shopping and it enables two people — a customer and sales associate or two shoppers in different locations — to share a joint shopping session using live instant messaging such as Skype, WeChat or any number of other OTT services.
- Widgets: these are tiny applications that can be embedded into a website, blog or social network that are portable and relatively inexpensive to create.
- Social Bridging: anyone who has signed onto a website using their Facebook, Pinterest or Twitter account knows what social bridging is. “This level of authentication provides enough credentials to participate in the social elements of the site. Additional authentication is required to complete a shopping transaction due to the sensitivity of the content included in a shopper’s account. Social bridging can be used to drive traffic and engage existing and new customers. It can access a user’s identity, their social graph, and stream activities such as purchases and other social participation on the hotelier’s site” explains Neuberger.⁵⁷²
- In-Store Kiosks and Flat Panels can be provided to enable customers to use social networking tools from within a store.⁵⁷²

In her article *Facebook wants to become the new mobile storefront, unveils new ad tools for brands and hoteliers*⁵⁷³, Tanya Dua states that Facebook is trying again to establish itself as a true shopping outlet. Facebook “believes it can play a unique role in the shopping world — helping people both discover new products and make decisions when they’re ready to buy.”⁵⁷³

“In a sense, we are becoming something like the new storefront,” Martin Barthel, Facebook’s global head of retail and ecommerce strategy, says, adding that, “People discover products and then we redirect these people to mobile or desktop properties of the hoteliers we are working with.”⁵⁷³

“Facebook believes that because people spend so much time on its mobile app, it can lay claim to being able to help marketers pitch their products before people know they even want them (like TV) and then help people find products when they know they’re ready to pull the trigger on purchases (like Google and Amazon),” notes Dua.⁵⁷³

“Facebook wants to be a solution not just at the very bottom of the marketing funnel for solutions like retargeting, we actually want to create new purchase

intent and consideration further up,” said Graham Mudd, product marketing director at Facebook.⁵⁷³ “If you look at 20 to 30 years ago, that was actually done through broadcast media but in a feed-based environment we have the opportunity to do that in a much more relevant way,” adds Mudd.⁵⁷³

Facebook might be onto something here as “its own research has shown that shoppers increasingly rely on Facebook and Instagram to find and purchase products.”⁵⁷³ Facebook claims that, “Mobile-first shoppers in the U.S. are 1.7 times more likely to get inspiration for gifts or shopping ideas on Facebook, and 2.5 times more likely to research gift or shopping ideas on Instagram.”⁵⁷³

In 2018 and beyond, video will drive more online sales. When Facebook surveyed 20,824 mobile shoppers across 17 markets, 30% of them said they preferred to discover new products via video.⁵⁷³ This is why the “company is enhancing its dynamic ads feature, which allows brands and hoteliers to upload videos to show-off their products catalogues, instead of just static images.”⁵⁷³

According to Dua, “Dynamic ads automatically promote products to people who have expressed some interest in a brand, whether on its website, in its app or anywhere else on the internet. The new video feature in dynamic ads has already been trailed by hoteliers like made.com.”⁵⁷³

“Facebook has also introduced overlays for dynamic ads, a product which enables brands to add price tags and visuals into their dynamic ads, touting discounts and other offers,” adds Dua.⁵⁷³

One other item that should be noted, Facebook will now let retailers and brands target consumers on Facebook based on households, rather than just as individuals.⁵⁷³ According to Dua, “Facebook will allow marketers to create a new ‘household audience,’ which enables marketers to target to family members in the same household, with the idea being to inspire members of their audience's household to purchase.”⁵⁷³ Facebook believes that advertisers will be able to “measure the impact of these ads, including whether they influence household members who didn't actually see the ads to make purchases.”⁵⁷³

In her article *WhatsApp For Business—What Does It Mean?*⁵⁷⁴, Holly Turner explains that in August 2017, “WhatsApp announced it was experimenting with verified business accounts on the platform, which would offer brands the opportunity to communicate with its users; a platform the average user checks 23 times a day and which boasts 1.2 billion monthly active users.”

“Businesses can gain a verified green checkmark icon to indicate the authenticity of the account, assuring users its legitimacy, alongside opening the door to the platform’s previously walled off garden,” Turner adds.⁵⁷⁴

“The platform could be following in the footsteps of other messaging apps such as Facebook Messenger and Kik, implementing a chatbot function to enable WhatsApp users to ask businesses questions, make purchases and receive

instant bot responses.”⁵⁷⁴

The opportunity is considerable. WhatsApp business accounts offer up one more channel for brands to send out simple automated messaging to users who opt into their messages.⁵⁷⁴ “Whether it be discount codes, new products or brand news, users could stay up to date with businesses they invest in and brands would be presented with the opportunity to reach people on a platform that sees 6 out of 10 users accessing the app on a daily basis,” argues Turner.⁵⁷⁴

WhatsApp’s history will work in its favor. Having never allowed any form of advertising previously, WhatsApp currently feels like a very intimate and private environment for its users.⁵⁷⁴ Turner believes that, “content delivered to users would, therefore, benefit from having an ‘organic’ feel; providing useful and totally personalised content.”⁵⁷⁴

A good example of the potential can be seen in the Nike On Demand WhatsApp service.⁵⁷⁴ It is a one-to-one messenger-based service that was “created to connect athletes with Nike experts on a regular basis to keep them motivated and on-track with their fitness goals.”⁵⁷⁴ The campaign delivers “personalised content in the form of images, conversation, playlists, etc. as well as providing expert advice from pacers and trainers all through the WhatsApp platform, akin to a real peer’s motivational reminder,” explains Turner.⁵⁷⁴

“Whether WhatsApp intends to follow the crowd by implementing a chatbot strategy or go against the grain to offer users something truly useful and personalised will soon become clear,” adds Turner.⁵⁷⁴ “What is already very clear, however, is the opportunity WhatsApp business accounts presents, regardless of what strategy they choose, to reach inside the walled gardens of messaging apps,” Turner concludes.⁵⁷⁴

Messaging

In the future, it is likely that all marketing will become interactive and the consumer will become a participant rather than a “target audience”. As Shar VanBoskirk states in his article *US Interactive Marketing Forecast, 2007 To 2012*⁵⁷⁵, “Instead of planning for a set ‘search budget’ or an ‘online video campaign’, marketers will instead organize around ‘persona planning’ — that is, they will plan around generating a desired response from a customer type. In response to changing customer behavior, channel optimization will take place on the fly, shifting between channels dynamically.”

Hotel operators can also use social media to manage their brand, enhance brand loyalty, as well as engage both their current customers and their potential customers. The social media world is also the perfect place to harvest customer feedback, provide real-time customer service, build fanbases, and drive traffic to a hotel’s website.

Hotels need to empower their customers to post on Facebook or WeChat or Twitter or comment about their experience and, hopefully, turn them into apostles. In Jones and Sasser's *zone of affection*, satisfaction levels are high and "customers may have such high attitudinal loyalty that they don't look for alternative service."⁸⁹ It is within this group that "Apostles" — members who praise the firm in public — reside and this is the group that is responsible for improved future business performance.⁸⁹ A simple search of the Twitter feed on the multiple services I mentioned in the previous chapters will probably reveal a list of customers who could be courted for marketing purposes.

Facebook should be a part of every hotel's social and mobile media marketing plan, but simply putting up a Facebook page won't cut it these days; creativity and uniqueness are needed to get noticed in today's highly competitive social media world. Gamification is also a good way to stand out from the crowd. Facebook bots can also add a customer service channel that can answer common customer questions quickly, efficiently and inexpensively.

Instead of filling newspapers and magazines with advertisements, a hotel operator should create databases of opted-in customers who have the propensity to purchase goods in the future. By tracking OTT, SMS opt-in use, a hotelier can get immediate and highly quantifiable data on who has signed up for their loyalty cards, who has used a coupon, who has opted-in to their mobile campaigns, and who might be planning to attend certain advertised events.

In her article *Retailers Doing It Right in Social Media*⁵⁷⁶, Cherise Luter advises that whether done on Wordpress or Tumblr, blogging is an important part of a hotelier's social media strategy. Luter adds⁵⁷⁶:

"Of all the places a company can build a lifestyle around their brand, a blog is the best suited. On Tumblr, Labrotatoria's Musing On... and The Classroom's Stay Classy Houston are great examples. They both share inspirational style images, product info and behind the scenes posts. CakewalkStyle Shop has three blogs, yes three. Lifes a Cakewalk is its main blog, Influencers focuses on bloggers and taste makers, and Style Guide shares its latest store items and trends."

What works for a retailer will, in many cases, also work for a hospitality company. The best part about being on Twitter or Weibo or any of the other instant messaging services is the ability to interact with a customer in real time.⁵⁷⁶ This, I believe, can really be a game changer. A direct, two-way dialogue can be created, which helps with engagement and, probably, sales. As Luter explains, this can help "Resolve customer service issues, get a pat on the back, or valuable feedback all from the comfort of home or the store backroom."⁵⁷⁶

"The retailer Lilly Rain is really great about interacting with its customers online. They retweet and reply to the messages and even re-post blogger websites that

show them love. They also have an active Google+ page, which is great for Google searches,” Luter explains.⁵⁷⁶ Luter also advises that “Twitter should not be ignored. Use Twitter to tweet out ‘instant sales.’ Get the word out about leftover products, new products in limited supply, or last-minute sales. Believe it or not — your customers ARE using Twitter. And if they see something great at your store — they WILL retweet.”⁵⁷⁶

Table 24 reveals Pega System’s *Next Best Action Advisor* showing the typical use case for marketing to hotelier patrons.

Use case	Description
Retention	Pega Marketing provides the agent with the tools to ensure that they understand the value of the customer and the best options to retain customers who are looking to churn.
Cross-Sell/Upsell	Next Best Offer prioritized ranking is supported by all the necessary arguments and collateral to convert the opportunity.
Negotiation-Based Selling	This engagement type takes a more consultative approach to selling by putting the customer in charge of the conversation while ensuring that the negotiation stays within the budgets calculated for this customer.
Product/Service Usage Stimulation	Communicating to customers proactively to entice or stimulate product or service usage. Calculating the right incentive for each customer will ensure a higher conversion rate.
Renewal Reminders/Retention	Targeting customers who are approaching key product events to ensure they remain loyal customers.
Newsletter, Article, Content Marketing	Driving traffic to landing pages or microsites to capture customer details and fuel lead capture and conversion processes.
Significant Event/Anniversary Communication	Daily Campaigns that seek out customers with important anniversary dates with specific, personalized messages, e.g., Birthday Campaign.
Acquisition	Either direct to customers or via prospect lists to drive growth of the customer base.
On-Boarding	Initial communications focusing on things like Welcome packs, Sign-up for Auto-Pay, Payment reminders, and product and service awareness.
Product/Service Promotion	Product and service promotions to generate awareness or education to support or coincide with product launches.

Use case	Description
Retargeting	Targeting customers who partially engaged on with appropriate messaging to reinforce the features and benefits.
Viral Marketing	Capturing customer details and other related data items and using these to trigger other marketing messages to create the potential for very high visibility and visibility of the company messages.
Incentive-Driven, Game-Oriented Marketing	Using what we know to tailor individual communications for each customer to ensure they are relevant, timely, and appropriate.
Seasonal Marketing	Keeping organizations in the mind of the customer at relevant times of the year.
Bundling	By packaging up multiple offers within a parent offer, bundling enables organizations to communicate a tailored package of offers to each customer.
Location-based marketing	Target customers based on their location using Geofence functionality.
Event initiated/Trigger marketing	Respond to real-time marketing opportunities by pushing relevant offers to customers.
Significant Event/Anniversary Communication	Daily Campaigns that seek out customers with important anniversary dates with specific, personalized messages, e.g., Birthday Campaign.

Table 24: Pega Systems Marketing Use Case Examples⁸¹
 Next-Best-Action Advisor⁸¹

Data & Analytics

In this final section of the customer journey, hoteliers and IRs should “acquire social identity tied to customer records.” Neuberger argues that it is very important to monitor the market conversation to understand what the marketplace is (or isn’t) saying about a hotel (their brand, products, services, etc.).⁵⁷² Retailers – and hotels – “need to understand the tone and impact of the conversation and begin to identify areas of opportunity for helping shape that conversation and gather valuable market intelligence,” says Neuberger.⁵⁷²

As previously mentioned, ROI is not that tricky of a thing to measure with social media, quite the contrary. Today, the endless search for Facebook fans should be replaced by short-term campaign ROI as the main measure for individual campaigns. Hotels should look at correlation analysis between activities, engagement and sales, which might be unsettling for some traditional marketers, but the reward should be worth the time and the effort.⁵³

“The explicit use of active and control groups, and experimentation of using different treatments will help marketers understand the impact of specific SM activities.”⁵³ More direct marketing type disciplines will be required, in a world where there is real-time feedback on attitude and behavior and a plethora of data.”⁵³ This has become a much more demanding world in terms of capturing and utilizing all of this data, but making the effort to turn this data into actionable intelligence will be noticed by fickle consumers, I have no doubt.

Hotel operators should look to assign a percentage value to social media so that a true attribution measurement can be created. Values should be ascribed to social media for being the site of new customer contact or for numbers of positive reviews by current customers. These are all important metrics to know because a highly followed influencer might not be spending that much at your store, but their followers might be.

For Neuberger, “Social media metrics include sentiment, activity, share-of-voice, and thematic content of online conversations. Trends and key influencers (“mavens”) and the most active sites/blogs are identified and tracked. By understanding the impact, retailers will have a way of identifying measurable progress, quantifying the return on social media investment, and enabling benchmarking against future efforts.”⁵⁷² In this case, what goes for retailers also goes for hoteliers.

Another good example of Big Data use in retail is profiled in Bernard Marr’s *Big Data in Practice*.⁶⁵ In it, Marr describes the story of Pendleton & Son, a local butcher based in north-west London.⁶⁵ Established in 1996, the butcher shop had enjoyed a steady customer base and good reputation for years, but in 2014, a supermarket chain store moved onto the same street, and it affected overall footfall and hit revenues hard.⁶⁵

As Marr explains, “While founder Tom Pendleton was certain his shop offered superior quality and choice compared to the supermarket, the trouble was conveying this message to the public and getting customers through the door. Trying to compete on price wasn’t working and, with falling income, son Aaron Pendleton turned to data to help keep the business afloat.”⁶⁵

A Big Data consultant suggested “installing simple, inexpensive sensors inside the store window to monitor footfall and measure the impact of window displays and promotions.”⁶⁵ Using this sensor data as well as internal data such as transaction and stock data, the butcher shop was able to “measure how many people walked past the shop, how many stopped to look at the window display and sandwich board sign and how many people then came into the store as a result.”⁶⁵ Armed with this knowledge, the butcher shop was able to refine its displays and messaging based on what most interested customers.⁶⁵

The insight on one’s current business was almost eclipsed by sensor data that pointed to an unexpected and potential new revenue stream.⁶⁵ “As two popular

pubs were located at the end of the street, the hours of 9 p.m. to midnight proved particularly busy in terms of passers-by — almost as many as the busy lunchtime period. So the Pendletons decided to trial opening at night and serving premium hot dogs and burgers to hungry folk making their way home from the pub.”⁶⁵

Analytics was even used to decide menu items; “In order to decide on what products to offer at night, Aaron analyzed trend data from Google Trends to see what food items were particularly popular. This led to the creation of their pulled pork burger with chorizo.”⁶⁵

Going forward, the Pendletons were hoping to expand their use of data in order to increase their knowledge of customers even further.⁶⁵ Weather data is now included to predict demand even more accurately and a customer loyalty app was in the works.⁶⁵ Pendleton & Sons are a perfect example of how a company can step into analytics and they are, literally, being richly rewarded for their leap of faith.⁶⁵

The data revealed some interesting behavioral information on their customers as well.⁶⁵ “In short, the Pendletons found that local customers favoured inspiration and ideas over cheap deals, which were available every day in the supermarket. They were able to use this insight to improve their messaging and get more people through the door — and those who entered the shop were far more likely to make a purchase as a result.”⁶⁵

In addition, the late-night openings proved enormously popular and the company decided to make this a permanent feature on Friday and Saturday nights. Not only did this provide much-needed additional revenue, it also introduced the company and their products to a whole new set of customers.

Besides data that is collected by a hotelier, firms can also purchase data from third parties. According to Bourreau et al, data can be obtained from data brokers, which have been defined by the US FTC as, “companies whose primary business is collecting personal information about consumers from a variety of sources and aggregating, analyzing, and sharing that information, of information derived from it, for purposes such as marketing products, verifying an individual’s identity, or detecting fraud.”¹⁸⁷ Companies like Acxiom, Corelogic, Datalogix, eBureau, ID Analytics, Intellius, PeekYou, Rapleaf, and Recorded Future fit under the FTC categorization and could sell useful data to hoteliers for their customer acquisition initiatives.¹⁸⁷

Front Office

In her thesis *Optimizing the Role of Hotel Front Office Staff in Modern-Day Revenue Management*³⁸, Nguyen Hanh Huyen My argues that revenue management can extend beyond rooms all the way down to the front office. For

My, “the term ‘Front Office’ is used in hotels worldwide and refers to employees working directly with guests and often also as the first point of contact for the arrivals.”³⁸ The front office department can be “part of the Rooms Division department and consist itself of different function areas namely [sic] reception, reservations, guest relations, concierge, switchboard, bell service, and so on.”³⁸ Irrespective of the hotel size or type, “front office is still considered a highly visible department and an important information center for both guests and employees throughout the hotel.”³⁸

Traditionally, front desk staff are primarily responsible for “checking the guests in and out, creating and processing reservations and guest accounts, answering phones and maintaining correspondence with guests, assisting guests and coordinating hotel services for them, accurately posting charges on guest folios and collecting payments, and many other tasks.”³⁸

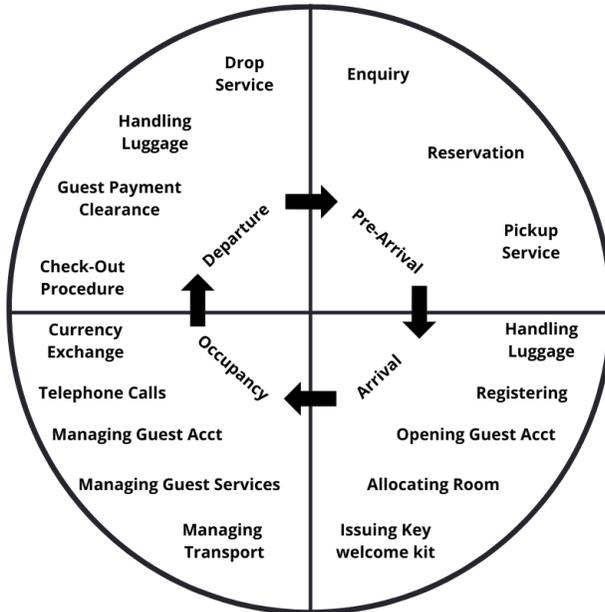


Figure 35: The guest cycle

Source: Baker et al., *Principles of Hotel Front Office Operations*. 2nd ed.⁵⁷⁷

My’s research “focused on the position of the front desk clerk, also known as receptionist or guest service agent, rather than on other positions such as bell staff, telephone operator or the position of the front office manager.”³⁸ In their book *Principles of Hotel Front Office Operations. 2nd ed.*, Baker et al.⁵⁷⁷ claim that the front office functions can be divided into front-of-the-house operations – handling booking requests, collecting and providing information at check-in, or settling guest bills – and back-of-the-house operations, such as managing guest

accounts, rate check, or preparing guest bills and reports.” Baker et al. add that “front office functions can be organized into the different stages of the guest stay including pre-arrival, arrival, occupancy, and departure,”⁵⁷⁷ They present this idea in the form of a so-called Guest Cycle, as per Figure 35.⁵⁷⁷

The main model to be studied is Ivanov and Zhechev’s⁴⁵ seven stage RM process (see Figure 36).

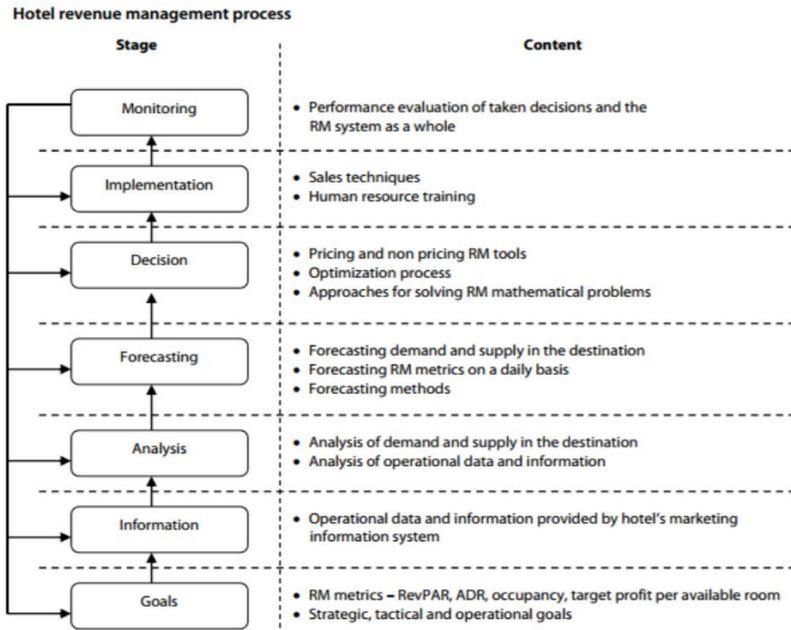


Figure 36: Hotel revenue management process

Source: Ivanov & Zhechev, *Hotel Revenue Management: A Critical Literature Review*.⁴⁵

Another component of a revenue management system that is worth studying is “hotel revenue centers”, i.e. the potential sources of revenue for a hotel, including but not limited to room revenue.³⁹ Linked with this element in the conceptual framework is the concept of “total RM”, which will be discussed later.³⁹

“Since this study is centered on individual staff members at the front desk, their conventional duties and their potential for upskilling, the “human resource” element will also be discussed as part of the hotel RM system,” says My.³⁸ On the one hand, the discussion is about the role of hotel revenue management leaders and their ability to communicate and engage with front office employees; on the other hand, it is about human resource issues amongst the

front office staff themselves, and how these issues affect their involvement in implementing revenue management.³⁸

According to My, “The second key theme in the conceptual framework is RM tools, which refer to techniques or instruments hotels can utilize to execute RM strategies.”³⁸ The third major theme is the “customer” factor and the concept of “customer-centric revenue management.”³⁸ Although the concept of revenue management and CRM as complementary functions has been the subject of much research, it has yet to be fully embraced by the business community.³⁸

For Ivanov, data and information are a decisive factor affecting the quality of revenue management decisions, and therefore should be one of the core elements constituting a hotel’s RM system.³⁹ “To take part in the RM process, front office agents among all staff members should be informed about which RM-related data they can access and utilize,” says My.³⁸ Ivanov also classifies the data requirements for practicing RM under multiple dimensions, including operational (internal), customer, competition, and distribution data.³⁹ My believes that, “In terms of the level of data requirements, it is realistic to infer that front office staff can access and handle operational RM data and implement operational decisions, rather than data at strategic and tactical levels.”³⁸

In My’s study, the interviewees were asked if and how they captured revenue management-related data and common responses including the following³⁸:

1. Briefing on the situation of the day at shift handover meetings;
2. Checking Traces list and Alerts from Opera PMS as well as emails for new offers, last-minute promotions or changes in pricing and booking policies;
3. Checking house status in terms of room demand – supply, occupancy, departures and arrivals of the upcoming day(s), which category is closed and arrival time of groups; and
4. Identifying with which guests to follow up at check-in or checkout, for instance to collect charges or correct bills.

Ivanov categorizes the above information as operational (internal) data.³⁹ Such data helps front office staff “to not only make timely arrangements for guests, but also to better prepare themselves e.g. [sic] for upselling opportunities to different guest segments, and for cases that require special RM decisions such as clarifications of the right prices to apply.”³⁸

Based on operational data, the front office staff can also “help monitor and optimize the use of hotel inventory as well.”³⁸ “For instance, they keep an overview of room availability, by number and room type, and other special instructions in order to judge if they can accept a last-minute reservation, day-use booking or stay extension request on a particular day,” say My.³⁸

“Some interviewees mentioned rate check as one of their daily preparations,”

says My.³⁸ Front office agents “who take part in such activities obviously have more knowledge and influence on RM issues as they process reservation details and monitor rates for each arrival.”³⁸ For example, My says, “according to Interviewee IntercityHotel Dresden, the more rate knowledge they have, the more target groups they can appeal to by offering helpful alternatives to the guests.”³⁸

The rate check helped receptionists understand which segment arrivals might belong to, as well as providing an overview of room pre-allocations to help plan for optimal inventory management.³⁸ It also gave staff the time to leave notes of billing problems or upselling possibilities for fellow workers.³⁸ “For instance, check-in for group arrivals should be well planned to speed up the process and leave time for upselling to other guests, considering that group reservations are often fixed and extra services rarely desired.”³⁸

According to Ivanov and Zhechev⁴⁵, the application of revenue management requires clear RM metrics and objectives as a guide for decision-making and execution processes. “As a participant in the revenue management process at operational level, front office staff would need to understand basic RM metrics related to their job to work towards revenue-optimizing decisions,” says My.³⁸

According to Bardi⁵⁷⁸, metrics to measure the front desk’s efficiency include occupancy, which is an indicator of the agents’ competence in capturing walk-ins and advance bookings, and average daily rate (ADR), a measure of efforts in selling available rooms at optimal rates. By extension, other metrics for front office staff’s contribution to revenue management “can range from revenue per available room (RevPAR), gross operating profit per available room (GOPPAR), to revenue per available customer (RevPAC), depending on the hotel’s objectives and approaches to RM.”³⁸ At an operational level, the front office staff need to be aware of daily or weekly changes to these metrics.³⁹

My believes that, “A synchronized and streamlined PMS platform, where all the information is integrated and accessible, can increase the productivity of the front desk staff in using data to influence guest behavior and make profitable decisions.”³⁸ “Most interviewees implied that an up-to-date PMS would enable them to easily track and record guest information and preferences, which form the base for RM decisions,” says My.³⁸ MS features such as OPERA’s ‘Traces’, which lists notes left by front office staff, and other reporting functions also facilitate interdepartmental communication, claims My.³⁸

Front office staff’s involvement in applying revenue management techniques “RM tools” is another component of Ivanov and Zhechev’s⁴⁵ hotel RM system model, and is featured in the conceptual framework of My’s thesis as a key factor determining the role of front office staff in revenue management. Ivanov and Zhechev⁴⁵ define RM tools as “a variety of pricing and non-pricing techniques a hotel uses to optimize the revenues it can gain from its guests.”

According to Ivanov and Zhechev, *pricing techniques* refer to techniques that make direct impacts on the level, structure and presentation of a hotel's prices, as well as the rules, or "barriers", to get a certain price.⁴⁵ "Price presentation refers to the technique of presenting a price to guests so that their perceived value of the product is increased," notes My.³⁸ The goal of RM in terms of the 'right' price is not merely to increase the charges and about how much is charged, but rather about how to present it to the customers, and maximize average guest spend without guests feeling as if they are being overcharged.³⁹

579

My found that some of her interviewee's "would always offer the highest rate or most expensive package first. Examples include offering Club rate first before a lower-priced option of Deluxe room rate with an upgrade for Club access."³⁸ Other interviewees would quote "first the refundable, non-guaranteed rate whereby the receptionist can claim commissions per booking, and offering the lower, full-prepaid rates only if guests decline the other rate."³⁸

The above, as Lieberman also argues, does not mean that higher prices should always be quoted first.³⁸ There are other rate quoting techniques, such as offering first the average room categories and then the lower ones, or offering the whole price range – "first the advance booking rate, then the standard rate, and then compare both rates with each other by cancellation terms, need for prepayment and other features," says My.³⁸

"For price sensitive guests, the more effective approach may be to quote rates 'bottom-up' as the guests request, start from the lowest rate and inform them after that of possibilities for upgrades at a small extra charge," advises My.³⁸ "The most suitable rate-quoting order can be best determined based on a particular guest's needs," contends My. She concludes that, it is crucial that the front office agent "detect from the conversation with guests their purpose of stay and emphasize the added values the guests would appreciate depending on their needs to convince them to choose a certain price option."³⁸

According to My, "for capturing walk-in guests, it is equally important to offer them a menu of room type choices rather than the standard one only."³⁸ "Front office staff are also in a good position to offer to show the walk-ins the rooms in person if needed," claims My.³⁸

When presenting prices, front office staff should be careful when offering discounts.³⁸ Some hotels allow their front office staff to use their discretion to negotiate the prices with guests as long as they follow the given rates from a PMS rate query.³⁸ If a receptionist was allowed to offer discounts to walk-ins, then he or she would have to consider what the right discounted rate should be and when that rate should be offer, i.e., does it depend on how late it is and the fullness of the hotel?³⁸ "In principle," My concludes, "the interviewees considered it advisable not to voluntarily mention some discount unless the

guests specifically inquire or are officially eligible for it.”³⁸

Upselling is another powerful revenue management technique that front office staff can utilize. As Kotler et al. explain in their article *Marketing for Hospitality and Tourism*⁵⁸⁰, revenue management involves upselling, cross-selling, and analysis of profit margins and sales volume for each product line. Kotler et al. view upselling as one of the basics of effective revenue management.⁵⁸⁰ In the research field, upselling is also usually identified as a front office task.⁵⁸¹

In their article *Revenue Management for the Hospitality Industry*⁵⁸², Hayes and Miller even see it as the single out most important revenue management technique available to a front office agent during a guest’s stay. As the first people to interact face-to-face with and assign rooms to an ever-increasing percentage of guests who already have a reservation, front office staff can make a strong impact on their hotel’s ADR and RevPAR from the same occupancy,” argues My.³⁸

As one of My’s interviewee’s states³⁸:

“The upsells are indeed pure profits for the hotel, because the hotel does not have to pay any higher costs for a Business room than for a Standard room. That way, the FO already contributes a lot to the profit maximization. (...) the upsells can be sold much better in person than through intermediary channels (...) than when on the phone or by email, because when the guests see the staff in person, sympathy for one another can play a big role.”

“Considering that all the interviewees in this research associated their role in RM with the act of upselling, it seems to be a fact that upselling is also among the rare RM activities that FO personnel and their hotel managers explicitly acknowledge as an FO function,” concludes My.³⁸

“While upselling, front office staff can maintain an overview of room allocation and help avoid overselling a certain room category, typically the standard one, in order to optimize revenue,” says My.³⁸ According to two Interviewees, for example, “guests who booked Standard rooms but arrive later in the day when there are no Standard rooms left, then they will get an upgrade free of charge. Therefore, by upselling guests to higher room types beforehand, especially to early arrivals, FO agents help maximize the yield from the room inventory.”³⁸

My concludes that, “Given that front office staff can contribute to RM by practicing upselling, hoteliers need to give them a base i.e. a schema of the service range or of alternative room features with various tiers of room sizes, locations, bedding, view, and facility access.”³⁸ From that base, My believes, “front office staff can make their upselling offers more appealing by describing and comparing the price differences to guests. When there is a range of offers,

they can flexibly package or bundle offers to better target different guests.”³⁸

According to Ivanov, non-pricing revenue management techniques, including capacity management, length-of-stay control and overbooking tactics, do not influence the rates directly but rather concentrate on controlling hotel inventory for revenue optimization.³⁹

Ivanov describes capacity management as activities aimed at controlling a hotel’s room supply, activities of which can include limiting the available room capacity, and controlling a guest’s arrival or departure time.³⁹ Capacity management is important because empirical findings indicate that front office personnel can play a part in certain sales and inventory decisions, while knowing very little of revenue management principles.³⁸ Some interviewees believed that front office staff should accept any new booking, no matter how long they planned to stay.³⁸ Legohérel et al.⁵⁸³, however, argue this approach might lead to “price dilution”.

Another non-pricing revenue management tool utilized by front office associates is length-of-stay control.³⁸ As My explains, “Length-of-stay control refers to the technique of setting a minimum or, very seldom, maximum limit on the duration of stay.”³⁸ A minimum length-of-stay requirement might be implemented during times of high demand, such as during a major sporting event, a local concert or a festival.³⁹

Hotels overbook their rooms for a multitude of reasons – unanticipated no-shows, last-minute cancellations, and/or early departures – and it makes sense as humans can be highly unpredictable. The management of overbooking is another area where the role of front desk staff is expressly mentioned.³⁸

In practice, there are two types of overbookings, overbookings for specific room types and overbooking of all rooms.³⁸ In the first scenario, a solution is pretty easy to find – upgrade guests to a room of another type and promote it as a free upgrade.³⁸ In the second scenario, some interviewees mentioned how they would proceed in the more aggressive overbooking situation.³⁸ As My explains, “Firstly, the interview responses coincide with the step of checking details of arrival bookings and house status, such as early departures versus late-checkout groups, to forecast demand and behavior patterns.”³⁸ “Front office staff’s access to reservation database also provides them with information on historical cancellations,” says My.³⁸ “On sold-out nights, FO staff can check for duplicate reservations and contact guests to inquire if they need all the rooms reserved,” says My.³⁸

“Secondly, regarding the step of walking guests to another hotel and arranging assistance or compensation, the desk clerks’ active contact with guests gives them a meaningful role in communicating the situation in a tactful way to the guests who need to be walked,” says My.³⁸

Most importantly, My adds, “FO staff should be well informed of their

responsibility in oversell situations. For instance, they may be allowed to cancel certain bookings during the night audit, but if overbooking happens during the day, they must keep the rooms for guests.”³⁸

My concludes that, “In general, when it comes to non-pricing RM tactics, the role of FO staff is mostly to implement policies set by the revenue managers and hotel executives. They need to possess enough data and knowledge as well as an RM-oriented mindset to be able to apply them in an optimal way. It is crucial that FO staff follow a consistent approach that complies with the hotel’s strategies.”³⁸

For Ivanov, the term “combined RM tools” refers to techniques that can influence both the room rates and the number of rooms available at each rate.³⁹

As Deloitte explains, while their focus has been largely on managing a network of multiple distribution channels to acquire more customers, hotels must try to counter the power of third-party distributors, especially of OTAs, through their efforts to encourage direct bookings.⁵⁸⁴ Direct bookings obviously help reduce intermediary commission costs and maximize the margins.³⁸ Despite these obvious incentives, hotel managers often overlook a direct booking channel of their own – their front office personnel – say Kotler et al.⁵⁸⁵

In its *2018 Travel and Hospitality Industry Outlook*⁵⁸⁴, Deloitte argues that OTAs and hotels should collaborate instead of competing. Similarly, some of My’s interviewees “remarked that they do not try to compete against third-party channels, which they believe actually benefit everyone – lower rates for customers, more bookings for the hotel, and commissions for the intermediary.”³⁸ “A front office agent may therefore lack a good argument for encouraging guests to book directly,” contends My.³⁸

However, one of My’s interviewees said the following³⁸:

“In case a guest calls and asks us to check if the price offered on an OTA is the lowest or if we have a better deal for them, we cannot really offer any lower rate (...) against our third-party booking channels. The only thing that we can offer to them is the promotions that we have. That you tell the guests that the OTAs may have much lower rates than ours, but we can provide the refundable rates. Because reservations made on Booking.com are mostly non-refundable.”

This, says My, is a tactic front office staff can use to convert channels; they can offer added value and exclusive benefits to encourage direct bookings.³⁸

According to My, “direct bookers can be given exclusive incentives such as free cancellation, changes to reservation allowed, or flexible party split, although the hotel’s published rates seem to be higher than OTA rates.”³⁸ “A good opportunity is when guests, who have booked through an OTA, call to request an additional service, such as late checkout,” explains My.³⁸ “Front office agents can then offer

an all-inclusive booking which includes late checkout along with breakfast, or offer a room upgrade with exclusive VIP benefits including the late checkout,” says My.³⁸ “Because the charge for a service add-on alone, such as for late checkout, is often very high, offering packages as good value for money can increase the chance of guests turning to directly booking with the hotel,” adds My.³⁸

“Secondly, front office staff is in an advantageous position to secure direct bookings for return visits, because they typically develop an intimate knowledge of or a personal relationship with regular guests,” notes My.³⁸ Converting repeat guests from higher-cost to lower-cost channels helps increase the net ADR yield, according to Hayes & Miller.⁵⁸⁶

“Thirdly, several responses referred to member-only offers, such as loyalty points, as a handy tool for FO associates to incentivize direct bookings,” says My.³⁸ “The difference between third-party bookings and direct bookings from InterContinental Hotel Group’s own channel is that we encourage and allow the direct bookers to participate in our membership program,” claims one of My’s interviewees.

According to Deloitte⁵⁸⁴, while OTAs effectively compete in the segment of budget travelers, hotel brands can gain a significant advantage by offering exclusive benefits for more loyal, higher-spending segments. However, there is a clever work-around: “Member-only rates can allow hotels to bypass rate parity agreements with the OTAs, meaning that hotels can provide an exclusive rate option besides their published rates for the same room, which they are bound by rate parity to match with all their distribution channels,” says My.³⁸

Hayes & Miller contend that desk clerks should handle guests’ phone calls properly and recognize them as an opportunity to capture direct, commissions-free reservations and consequently higher net ADR yields.⁵⁸⁶ According to My’s interview responses, “it is not uncommon that guests may call just to inquire after something, or double-check if they can get a better rate than the one found online.”³⁸ “If not adequately trained or informed, the front office employees and especially new recruits might well leave the guests to the OTA and miss out on the opportunity to make direct sales,” warns My.³⁸ Instead of losing a potential sale, the clerks can offer to make the booking immediately, and guests are likely to consent if they are convinced by useful information given directly to them from a known hotel representative.³⁸

From what was gleaned from My’s interviews, room allocation was “still an important front office function to perform a day prior to and upon a guest’s arrival.”³⁸ “During the course of assigning rooms as per type of guests, room type and services reserved, VIP and membership treatments, and other special requests, FO agents can exert their influence on the hotel’s room-rate allocation,” claims My.³⁸ “By pre-blocking rooms that have all their features and

criteria specified by guests, the FO clerks help prepare for the following day a clearer overview and forecast of the house status, such as how many rooms are left in each price class,” explains My.³⁸ Based on this information, front office staff “can re-allocate guests into different room types available, for instance by upselling room type alternatives, and avoid having to offer room up-grades for free in case lower room categories are not anymore available when the guests arrive.”³⁸

During the room allocation process, receptionists can inform housekeeping of the arrival time of certain guests as needed, so that housekeeping can find enough time to prepare for those arrivals accordingly.³⁸ This might alleviate the need to dole out free room upgrades for guests arrive at inappropriate times.³⁸

“By upselling and allocating discounts to the current number of guests in-house, FO agents also help maximize the average rate per night, and spending levels per guest,” says My.³⁸

According to Ivanov and Zhechev, modern hotel revenue management systems have acknowledged a broader range of profit sources, or “revenue centers”, which encompass both rooms and other service outlets such as restaurants, bars, casinos, spas, room service, and meeting facilities.⁴⁵ “Connected with the hotel revenue centers element in the conceptual framework, ‘total RM’ is one of key [sic] concepts or trends that are defining the future of RM practices,” argues My.³⁸ “While RM has focused largely on the Rooms Division as a hotel’s main source of revenues, the concept of total RM brings into focus the need to optimize all revenue streams within the hotel beyond the guestrooms,” says My.³⁸

In their book *Revenue Management in Service Organizations*⁵⁸⁷, Rouse et al. specifically define RM as a set of strategies created to enhance a company’s competence in capturing all revenue streams possible from its resources. Kimes and Wang⁴⁴ agree that, a “total RM” culture should be developed which, involves associates across the organization and aims for total profit and GOPPAR rather than just room revenue metrics like ADR and RevPAR.

“As an information and guest activity center in a hotel, the FO can play an important role in a total revenue culture as such,” says My.³⁸ Front office personnel can promote services of all kinds to guests at multiple touch points throughout a property as well as judge when an offer would best suit a guest’s needs.³⁸ While four of My’s interviewees “directly pointed out this advantage as their unique contribution to RM, all the interviewees mentioned cross-selling as opportunities for them to generate additional revenues.”³⁸

As per Ivanov, “Cross-selling is a sales technique whereby an employee attempts at selling product or service add-ons provided by other departments, typically upon arrival and during the guests’ stay.”³⁹ My’s interviewees suggested various ways they could cross-sell, “from promoting to the guests upon check-in what

ancillary services are on offer to suggestive-selling during guest stay.”³⁸ Recommendation of the hotel’s own restaurant, offers to make table or spa reservations, and the promotion of in-house food and beverage campaigns were all considered for cross-selling opportunities.³⁸ “Other responses include cross-selling tourist activities such as sightseeing tours or cruises, and access to facilities such as Club Lounge or Health Club, or lounge promotional packages,” says My.³⁸

Another paradigm shift of hotel RM that has been well researched in RM literature is the integration of RM and CRM, or “customer-centric RM”.^{551 588 44} In fact, when defining RM as “strategies to allocate the right capacity to the right customer at the right price at the right time”, Kimes and Wirtz already stressed that “right” implies achieving the most revenue possible while providing the most value to customers.⁴⁰ “In light of the potential for integrating RM and CRM, the hotel front office – a highly customer-concentrated department – can take on an added importance in RM, which is to help resolve the conflicts between short-term-oriented RM and long-term CRM strategies,” argues My.³⁸

“As can be seen from the FO staff’s potential to implement RM techniques such as rate-quoting, upselling or cross-selling, they do practice profiling and targeting to be able to offer what customers need or want at the price they are willing to pay,” says My.³⁸ Front office staff record guest preferences as well as identify sales opportunities based on guest profiles, for example offering different rates for member and non-member guests, or between FITs and OTA bookers.³⁸ “While generating extra revenues, front desk agents can serve as an important force for value creation,” contends My.³⁸ “They customize and present greater perceived benefits and added value with a view to convincing guests of the offers, which in turn can also enhance guests’ experience and their perception of the total bill value,” says My.³⁸

There is, however, the inherent risk in an upsell program that front office staff place more emphasis on the revenue side of things than on the guests’ interests and comfort.³⁸ “When asked about their techniques for upselling, most of the interviewees noted that they would skip the upselling step to speed up the check-in for regular guests, guests who look busy or stressed, or when there is a line at the reception,” states My.³⁸

“By and large, the implementation of RM tools, such as upselling, cross-selling, maintaining rate fences and overbooking, all indicate the importance of understanding and influencing customer behavior,” contends My.³⁸ “If done properly, these RM tools can increase customers’ perceived value for money, thus facilitating long-lasting profitable relationships with them,” says My.³⁸

However, implementation of RM procedures runs the very real risk of guests perceiving the hotel as unfair.^{40 589} To alleviate this risk, pricing policies and applied rate fences must be both simple to manage and easy to communicate to

customers.^{40 590} “Since the FO staff typically stay in direct contact with customers, they can play a critical role in countering perception of unfair RM practices. Conflict situations may arise during daily interaction, in which FO clerks need to explain to guests how the system works, and apply compensation policies to soothe unhappy guests,” recommends My.³⁸

“While technology has continuously developed as a support, from synchronized multi-channel reservation systems and cloud-based PMSs, to mobile apps and other automation technologies, FO staff need to possess not only technical know-how but also interpersonal skills to strengthen their role in influencing the hotel’s bottom line,” says My.³⁸ “The analysis of FO staff’s role in implementing RM techniques and in resolving conflicts between RM and CRM has shown the importance of interpersonal techniques for the front desk clerks to qualify the right guest for their sales effort and then use the right approach,” My concludes.³⁸

“Rewards and incentives are included in the conceptual framework as another “internal environmental factor” influencing the success of engaging FO staff to apply RM,” argues My.³⁸ According to My, “The incentives can be established on the basis of RM metrics such as RevPAR and GOPPAR, or based on previous month/quarter/year’s yield statistics as more often seen in practice.”³⁸ “In any case, concrete performance measures should be clearly communicated to the FO staff so that they understand the principles behind the RM goals they are supposed to work towards,” adds My.³⁸

Overall, My asserts that, “most of the RM techniques studied, from price presentation, defending rate fences, to booking channel conversion, require a thorough knowledge of products, prices and policies, as well as skills at anticipating and influencing customer behavior.”³⁸ “The application of those techniques at the front desk should therefore result in both higher guest satisfaction and higher ADR and revenue,” she argues.³⁸ “For non-pricing techniques, the role of FO staff is more limited – they only apply the managers’ decisions; however, as they can play a significant part in communicating and explaining the decisions to guests, they themselves need to be explained and kept abreast of the policy changes as well,” suggests My.³⁸

To conclude the research outcomes, My “proposes some changes in the perception of FO functions and encourages both hotel managers and FO employees to explore and develop the revenue-optimizing potential at the front desk.”³⁸ “The key idea behind integrating RM into FO’s daily functions is first and foremost to change the mindset. An RM-oriented mindset not only ensures consistent RM efforts but may also increase FO workers’ job significance and work motivation,” says My.³⁸

Table 25 contains a list of My’s recommendations for multiple departments during the guest pre-arrival, check-in, occupancy and departure phase.

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GUEST CYCLE / FRONT OFFICE FUNCTIONS	RM PRACTICES
PRE-ARRIVAL	
Inquiry	Secure/Convert direct bookings
Reservation	<ul style="list-style-type: none"> • Price presentation - Capture walk-ins • Maintain rate fences; Consider whether to offer discounts • Inventory control
Processing Guest Account	<ul style="list-style-type: none"> • Understand rates for different guest segments and channels. • Rate Check: Record and process guest preferences, pre-as-sign rooms, maintain rate fences.
Cancellation	Offer to move the booking to another date at a small fee.
Pickup service	Upsell transportation service
ARRIVAL/CHECK-IN	
Greeting	Upsell to early arrivals
Registration	<ul style="list-style-type: none"> • Detect guest preferences/cues for upselling. • Request documents from guests entitled to special rates.
Establishment of Credit	Check and confirm with guests what they have paid and are to pay; ask for credit card to charge available-to-spend deposits
Room Allocation	<ul style="list-style-type: none"> • Upsell - Cross-sell • Optimal room-rate allocation (e.g. juggle bookings to optimally fit capacity, contact housekeeping, avoid free room upgrades). • Offer membership enrolment to encourage direct re-bookings.
OCCUPANCY	
Managing/Coordinating Guest Services	<ul style="list-style-type: none"> • Upsell room/package upgrades during guest stay. • Sell F&B specials, transportation, tourist activities, access to VIP Lounge, meeting rooms and other facilities, souvenirs, etc. <p>Consider compensation/room move requests.</p>

GUEST CYCLE / FRONT OFFICE FUNCTIONS	RM PRACTICES
Charge posting	<ul style="list-style-type: none"> • Answer guest inquiries about prices • Properly post or collect extra charges according to rate fences.
Overbooking	<ul style="list-style-type: none"> • Check historical cancellation and no-show patterns, expand us-able capacity, and help identify bookings to cancel • Stay informed of what not to do (e.g. take day-use/walk-in/late-checkout guests, override rate restrictions) • Communicate and settle with guests who need to be walked
DEPARTURE	
Charge posting	<ul style="list-style-type: none"> • Answer guest inquiries about prices • Properly post or collect extra charges according to rate fences.

Table 25: Example of integrating RM activities into FO work routine

Source: *Optimizing the Role of Hotel Front Office Staff in Modern-Day Revenue Management*³⁸

My suggests hotels optimize their FO staff’s contribution to a modern RM system; “the FO employees should be equipped with enough data and tools needed for making informed RM efforts.”³⁸ For example, My contends, “they need to be kept up-to-date with the hotel’s pricing structure and selling points of each service or promotional area, and of the objectives and metrics for their RM practices.”³⁸

In addition, “standard training should be provided to ensure that FO staff have the skills to use the right data and successfully apply RM techniques during normal FO tasks.”³⁸ “Lastly, supervision, recognition and incentive programs should be in place,” adds My.³⁸ These should not only increase the FO associates’ commitment to hotel revenue optimization, but should also be able to thoroughly assess an associate’s performance, including his or her impact on the company’s total profits, as well as on an individual customer’s lifetime value.³⁸

Restaurants, Bars and Nightclubs

The continuous mission for every bar, coffee shop, nightclub and restaurant owner is to constantly increase sales. With so many similar drinking and dining establishments vying for a customer’s attention, effective marketing measures are key not only to attracting new patrons, but also to increasing loyalty from current patrons. Effective marketing helps foster an establishment’s identity and

enhances customer loyalty.

In their *Implementing Revenue Management in Your Restaurants: A Case Study with Fairmont Raffles Hotels International*⁵⁹¹, Sheryl E. Kimes and Jeannette Ho describe a restaurant revenue management system implemented at Singapore's prestigious Fairmont Raffles Hotel. Fairmont initiated a restaurant revenue management (RRM) program in 2011, starting with several pilot restaurants in their Singapore hotels.⁵⁹¹ Shortly after, they expanded the pilots into restaurants in China, the U.S., and Canada.⁵⁹¹ According to Kimes and Ho, "By 2018, RRM had been deployed to over 70 percent of their F&B revenue. The results were striking. Restaurants using RRM generated five times more new revenue growth than restaurants not using RRM in their first 12 months of application."⁵⁹¹

"Although the principles are similar, restaurant RM requires a somewhat different approach than that applied by airlines," claim Kimes and Ho.⁵⁹¹ The restaurant approach involves implementing the following five-step process⁵⁹¹:

1. Establish the restaurant's baseline performance.
2. Understand the causes for this performance.
3. Formulate strategies that will drive revenue to these restaurants.
4. When facing the challenging task of implementation, this implementation involves strategies that fall into three categories:
 - a. All-purpose strategies.
 - b. Strategies to use when your restaurant is busy or "hot".
 - c. Strategies to use when your restaurant is not busy or "cold".
5. Measure whether the strategies were successful or not.

For Kimes and Ho, the first issue to overcome involves "acquiring baseline data and then reducing the noise in those data."⁵⁹¹ During the pilots, Kimes and Ho quickly realized the difficulty of obtaining data.⁵⁹¹ Unfortunately, but not surprisingly, once the data was obtained, it was often "dirty."⁵⁹¹ Numerous instances of zero cover counts were found, as well as incorrect starting and ending times, and obviously incorrect check amounts (e.g., zero or impossibly high).⁵⁹¹

Upon inspection, Kimes and Ho "determined that the zero cover counts came about for two reasons: inaccurate server data entry and confusion over the definition of a cover."⁵⁹¹ This issue was addressed as followed; First, the definition of a cover had to be created.⁵⁹¹ "Like many hotels and restaurant chains, Fairmont defined a cover as the sale of an entrée. This meant that almost all cover counts in the lounges were zero, no matter how busy the lounges actually were. Operators recorded incorrect party-size information for parties that shared an entrée or just ordered starters," explain Kimes and Ho.⁵⁹¹ The issue was rectified by defining a cover by the Uniform Systems of Accounts for the Lodging Industry, 10th edition, which clearly states that a cover is a customer, regardless of whether that customer orders an entrée or not.⁵⁹¹

Once the definition of a cover was defined, “the next goal was to reduce the incidence of zero cover counts.”⁵⁹¹ “To address this issue, Fairmont emphasized the importance of entering an accurate cover count in its server training,” explain Kimes and Ho.⁵⁹¹ It worked. “By 2016, the zero-cover-count percentage had dropped to 10 to 11 percent (most probably due to split checks). Only 1 to 2 percent of zero-cover-count transactions remain unexplained.”⁵⁹¹

Kimes and Ho found another source of dirty data at buffets – check openings were only done when diners asked for their check, not when they first sat down. Kimes and Ho admit that, these kinds of data issues are universal and the source of the noise is usually employee-entered data, which is more likely to be error-prone than computer or machine-generated data.⁵⁹¹ “Fairmont, like other companies facing the same dirty data issues, began to stress the importance of entering data correctly and provided training to ensure that correct entry occurred,” say Kimes and Ho.⁵⁹¹

“Before embarking on their RRM journey, Fairmont’s restaurants needed to determine their baseline performance,” state Kimes and Ho.⁵⁹¹ To do this, Kimes and Ho “developed an RRM dashboard for each restaurant and used it as a basis for identifying the appropriate RRM strategies to deploy.”⁵⁹¹

Five key metrics were measured: “table occupancy, seat occupancy, average check per person, meal duration, and RevPASH (revenue per available seat-hour, which we define below). All metrics were calculated by day of week and time of day.”⁵⁹¹

“Table occupancy gives a clear indication as to how busy a restaurant is. Logically, if the table occupancy nears 100 percent, there will almost certainly be customers waiting for tables,” state Kimes and Ho.⁵⁹¹ “Table occupancy is calculated by dividing the number of table-hours used (# of covers multiplied by the average meal duration) by the number of table-hours available (# of tables multiplied by the number of hours in question),” explain Kimes and Ho.⁵⁹¹ They add: “Seat occupancy gives an indication of how completely the restaurant’s tables are being used. The idea here is that occupied tables should not have numerous empty seats.”⁵⁹¹

“Seat occupancy is calculated by dividing the number of seat-hours used (number of customers served multiplied by the average meal duration) by the number of seat-hours available (number of seats multiplied by the number of hours in question),” say Kimes and Ho.⁵⁹¹ “Note that a restaurant can have a high table occupancy, yet have a fairly low seat occupancy, for example, when numerous singletons or deuces are occupying fourtops. This is an indication that the restaurant has a poor table mix,” say Kimes and Ho.⁵⁹¹

“Average check per person is a commonly used metric that is simple to calculate, assuming that the data are available and accurate. It is simply the total check amount divided by the associated party size,” explain Kimes and Ho.⁵⁹¹ However,

“if the check amount is incorrect or if the party size is missing, it may be impossible to develop an accurate estimate of the average check per person,” warns Kimes and Ho.⁵⁹¹

“Meal duration is typically calculated from POS data and is calculated by subtracting the opening time of the check from the closing time of the check,” contend Kimes and Ho.⁵⁹¹ As was shown with the buffet table openings, “meal duration calculations will be inaccurate if checks are not opened and closed in a timely fashion.”⁵⁹¹

“RevPASH (revenue per available seat-hour) is a measure akin to RevPAR (revenue per available room) commonly used in the hotel industry. This measure indicates how well a restaurant is using its inventory of seats,” say Kimes and Ho.⁵⁹¹ “RevPASH can be calculated in two ways. The simplest way to calculate it is to divide the revenue earned by the number of seat-hours available (number of seats multiplied by the number of hours in question). The other approach is to multiply the average check per person by the seat occupancy and divide by the meal duration.”⁵⁹¹

One of the key challenges that Kimes and Ho faced was “helping restaurant operators understand the difference between being operationally busy and revenue-management busy.”⁵⁹¹ They “found that many of the operators stated that they were quite busy, and that was true for some restaurant sections.”⁵⁹¹ But Kimes and Ho “also noticed that some of the other sections in a particular restaurant were closed, and sometimes reservations were being turned away even when there was available capacity.”⁵⁹¹

Fairmont applied one or more of the three categories of strategies to improve its restaurant operations.⁵⁹¹ These were (1) all purpose, (2) hot strategies, and (3) cold strategies.⁵⁹¹

According to Kimes and Ho, “Three all-purpose strategies can help restaurants generate incremental revenue regardless of how busy they are. The strategies are (1) menu engineering, (2) menu design, and (3) server mentoring and upselling.”⁵⁹¹

In other research⁵⁹², menu engineering has been examined in considerable detail since it was introduced three decades ago. “While there are a number of variations, the essential approach involves determining the contribution margin (selling price less food cost) and the sales volume of each menu item by menu category (e.g., starter, entrée, or dessert),” say Kimes and Ho.⁵⁹¹ “For each menu category, the classic approach assigns items to one of four quadrants. Menu items are classified as Stars (above average contribution margin and sales volume), Cash Cows (below average contribution margin and above average sales volume), Puzzles (above average contribution margin and below average sales volume), and Dogs (below average contribution margin and sales volume),” explain Kimes and Ho.⁵⁹¹

“Managers then use these classifications to determine possible actions to take with each menu item,” contend Kimes and Ho.⁵⁹¹ “For example, with Star menu items, recommendations might involve highlighting them on the menu, featuring them as a signature dish, or perhaps raising the price.”⁵⁹¹ Dogs, however, might be bundled with other menu items, dropped from the menu entirely, or prices might even be raised (to gain more contribution margin from the relatively scant sales they produce).⁵⁹¹

The menu engineering process need not be onerous, say Kimes and Ho.⁵⁹¹ “In its simplest form, it just involves meeting every month or two (or whenever the menu is about to be changed), reviewing the classifications, and using those classifications to guide some of the menu changes,” recommend Kimes and Ho.⁵⁹¹ Any resulting “changes in sales volume and contribution will help determine whether the changes were effective or whether further revisions are required (or should be undone).”⁵⁹¹

Fairmont developed an Excel-based tool to analyze their restaurant’s menu items, which also gives guidance on which actions to take for a particular menu item.⁵⁹¹ “For example, the firm’s potential tactics for Cash Cow menu items included reducing the portion size or bundling them with menu items with a higher contribution margin.”⁵⁹¹ “For menu items classified as Stars, the firm tested highlighting them on the menu or raising their prices. Dogs were divided into Strategic Dogs and True Dogs. Strategic Dogs provide balance to the menu (perhaps by offering vegetarian options) or support the restaurant concept, while True Dogs might eventually be dropped from the menu if sales or margins could not be improved,” explain Kimes and Ho.⁵⁹¹ “To adjust items classified as Puzzles, Fairmont proposed such strategies as changing the menu item description, dropping the price, or highlighting the item on the menu.”⁵⁹¹

According to Kimes and Ho, “Menu engineering can be used to determine which menu items to highlight (or hide), but other menu design tools can be used to help restaurants generate more revenue from their menus.”⁵⁹¹ “Designing a menu for revenue generation involves four key issues: (1) how to name the menu item, (2) how to describe it, (3) where to place it, and (4) how and where to display the price. Numerous studies have examined the effects of how an item is presented on a menu,” say Kimes and Ho.⁵⁹¹

Besides menu engineering, another all-purpose tool is to improve the servers’ selling skills.⁵⁹¹ Kimes and Ho provide the example of a “restaurant with 10 servers that has an average check per person of \$16. Say that the top performing server has an average check per person of about \$20, while the bottom-performing server has an average check of around \$13. If the bottom-performing server can increase his or her average check per person up to the overall average, the restaurant can generate an additional \$3 per check.”⁵⁹¹ If the restaurant permits tipping, there will be a corresponding increase of 60 cents in tips per check.⁵⁹¹

“To assist the poor performing servers, Fairmont drew on an innovative approach called Single Server Mentoring (SSM), developed by Avero,” note Kimes and Ho.⁵⁹¹ “Restaurants using this method extract data from the POS system to analyze menu item sales by server. They can then pinpoint areas in which a server is either below or above average and give managers specific advice on how to mentor individual servers on how to improve,” explain Kimes and Ho.⁵⁹¹

Of course, restaurants can train servers to upsell without a formal SSM program.⁵⁹¹ However, “the formal program provides specific financial information regarding upselling. Otherwise, managers must rely on telltale signs that upselling might help increase revenue, for example, when guests are just ordering the lowest cost or simplest menu items with no add-ons or starters.”⁵⁹¹

According to Fairmont, after SSM adoption “in their restaurants, the firm realized an annualized US\$3.5 million incremental uplift in 2015, as the program brought up average checks of 419 lower performing servers.”⁵⁹¹ The training brought “an equivalent of US\$8,273 of revenue uplift per selected server per year. In addition, customer satisfaction increased.”⁵⁹¹

Kimes and Ho use the sales of foie gras, a high-margin signature dish, as an example of the problems they were faced with:⁵⁹¹

“A manager using the SSM approach noticed that the stronger servers sold foie gras to six of every ten guests, but that the lowest performing server sold foie gras only to two out of ten guests. When the manager pointed this out to the server, she explained that since she hated liver, she did not want to suggest that guests order foie gras. Once the server realized that most guests liked the foie gras, she shadowed some of the more successful servers and learned how to pair it with wine. As a result, she became one of their top performing servers.”⁵⁹¹

“A key challenge Fairmont faced was how to motivate the servers to participate in SSM,” say Kimes and Ho.⁵⁹¹ “In countries where tips are common (e.g., the U.S.), it was not difficult to provide motivation since a higher average check results in higher tips. The question, however, was how to implement an upselling program in restaurants where tips are not customary.”⁵⁹¹ At first, the firm offered rewards such as hotel vouchers and monetary awards, but it soon became clear that the competition alone was what the servers enjoyed, the competition and social recognition of the award.⁵⁹¹ The Fairmont restaurants now show sales results on a weekly basis so the servers can judge their performance against their peers.⁵⁹¹

According to Kimes and Ho, the choice of revenue management tools to be implemented next depend upon how busy a hotel’s restaurant is.⁵⁹¹ As a starting point, Kimes and Ho propose classifying different time periods as either hot

(busy) or cold (not busy).⁵⁹¹ This simple approach “makes it easier for restaurants to determine which tools to deploy at which times.”⁵⁹¹ “Telltale signs of hot periods are full tables, queues, and declined reservations. Conversely, cold periods are easy to spot — too many empty tables. Typically, a restaurant will have some hot periods and some cold periods. The trick is to identify when they occur.”⁵⁹¹

To identify hot and cold periods at Fairmont, Kimes and Ho “calculated table occupancy by day of week and month. Hot periods were typically defined as hours in which the table occupancy was over 80 percent, while cold periods were usually defined as hours in which the table occupancy was under 50 percent.”⁵⁹¹ “Each restaurant involved with the RRM program was provided with a simple dashboard that allowed them to quickly see the percentage of time the restaurants had hot or cold periods.”⁵⁹¹ “Once these had been identified, the restaurant manager, the director of food and beverage, and the director of revenue management could begin to determine which tools to deploy at which times,” say Kimes and Ho.⁵⁹¹

“Tools to deploy during hot times are adopting a better table mix, better managing reservations, restricting promotions, and implementing premium pricing,” say Kimes and Ho.⁵⁹¹ “Suggestive selling can also be used, but only if it does not extend meal duration, since it would it most probably be better to seat another party rather than sell espresso and dessert,” recommend Kimes and Ho.⁵⁹¹

During cold periods, “the operator should focus on making the best of the situation by maximizing its use of distribution channels (online and mobile reservations or ordering) and offering targeted promotions and discounts.”⁵⁹¹ “Servers should also use suggestive selling since it really doesn’t matter how long guests stay at a table. On the other hand, trying to find a better table mix is not really an issue since tables are empty anyway,” note Kimes and Ho.⁵⁹¹

Adjusting the table mix in a restaurant is important as well.⁵⁹¹ “The optimum table mix matches the mix of table sizes and availability to the mix of party sizes. Thus, telltale signs that indicate that the table mix should be changed are when there’s a mismatch between table and seat occupancy or a mismatch between the party-size mix and the table size mix, and when there’s a queue because all tables are occupied even though there are plenty of empty seats,” say Kimes and Ho.⁵⁹¹

A study on the impact of the optimal table mix at Chevys FreshMex restaurants found that the optimal table mix would allow a restaurant to serve up to 35% more customers while maintaining the same waiting time.⁵⁹³ Clearly, Kimes and Ho believe, an improved table mix has great promise for busy restaurants.⁵⁹¹

“While an optimal table mix can help increase revenue, Fairmont noticed that many of their restaurants were not busy enough to justify the investment unless

they were undergoing a renovation,” note Kimes and Ho.⁵⁹¹ The firm viewed an optimal table mix as an ideal but not always realistic and went for the next best thing – focusing on “providing a flexible table mix that could be reconfigured by meal period and day of week, on other restaurant design features, and on selecting the right mix of reservations.”⁵⁹¹

This flexible table mix allowed Fairmont to “change their table mix according to expected party size mix for each meal period (either from reservations data or from historical data).”⁵⁹¹ This differs from changing the restaurant’s table mix as parties arrive.⁵⁹¹ As Thompson has shown, changing the table mix “on the fly” is a suboptimal solution for larger restaurants (defined as 200 seats) since it results in idle tables.⁵⁹⁴

“Fairmont has adopted the approach of selecting the party-size mix that best fits their table mix,” say Kimes and Ho.⁵⁹¹ For example⁵⁹¹:

“the Imperial Bar at the Royal York in Toronto is quite busy during happy hour (between 6:00 and 8:00 p.m.) for most days of the week. Most of their tables are designed for four or more guests. Since the GM did not want to change the table mix until the Imperial Bar had to undergo a renovation, they decided to not accept party sizes of less than three during happy hour. Similarly, Singapore’s Jaan restaurant started to select more parties of four so that they could better match their party-size mix to their table mix.”

Restaurants must make it easy for customers to buy.⁵⁹¹ At the restaurants at the Fairmont and Swissôtel in Singapore, Kimes and Ho noticed that about half of the guests made reservations the same day they dined and weekends were reservation-heavy.⁵⁹¹ “In addition, there were significant same-day reservation attempts made between 7:00 and 8:00 p.m., Kimes and Ho noticed.⁵⁹¹ “However, we observed that the reservation office closed at 7:00 p.m., at which point calls were then directed to the restaurants (with a high likelihood of not being answered!).”⁵⁹¹ By simply “extending the reservations office closing time by one hour, the firm was able to generate S\$50,000 in incremental revenue per month.”⁵⁹¹

Like airlines, restaurants should get in the habit of overbooking, recommend Kimes and Ho.⁵⁹¹ “Equinox, a fine-dining restaurant also at the Swissôtel Singapore, had a 40-percent no show and cancellation rate.”⁵⁹¹ Given that there was no penalty levied for no-shows this presented a classic loss leader for the restaurant.⁵⁹¹ Kimes and Ho “analyzed the no-show and cancellation rates in detail and developed appropriate overbooking levels.”⁵⁹¹ To reduce no-shows, they had the reservations staff call to confirm reservations, which resulting in a 21% drop in cancellation rates.⁵⁹¹

Reducing arrival and duration uncertainty can increase profits considerably.⁵⁹¹

Kimes and Ho “noticed that Fairmont’s Chinese restaurants were extremely busy for the traditional Chinese New Year dinner. Offering 6:00 and 8:00 p.m. seatings controlled meal duration to some extent, but the restaurants still experienced no-shows and late shows.”⁵⁹¹ “As a first step, the restaurants implemented a non-refundable pre-payment for the prix fixe meal.”⁵⁹¹ The result – no shows dropped significantly.⁵⁹¹ Management also implemented a no substitutions policy and made sure that food delivery began promptly at 6:00 or 8:00 regardless of whether the guests were seated or not.⁵⁹¹

Kimes and Ho believe that “Pricing can be used to help build demand during slow periods but also to capitalize on high demand periods by charging premium prices.”⁵⁹¹ “During busy periods, a restaurant might be able to charge a premium or possibly increase prices on popular menu items,” they contend.⁵⁹¹ Research by Kimes and Wirtz⁵⁹⁵ and Wirtz and Kimes⁵⁹⁶ has shown that “customers consider time-of-day and day-of-week pricing to be relatively fair, especially if framed as a discount (that is, full price during busy times and a reduced price during slow periods).”⁵⁹¹

“City Space and Equinox at the Swissôtel Singapore, which offered an excellent view, employed premium pricing for their window tables by instituting a \$20 charge for nonhotel guests using those tables,” note Kimes and Ho.⁵⁹¹ This “generated nearly \$100,000 per year from the window table charges.”⁵⁹¹ Who knew views were so valuable? “In addition, the average check per person for guests paying to sit at the window seats was over \$5 higher (\$142.57) than those at non-window seats (\$136.92),” say Kimes and Ho.⁵⁹¹

Kimes and Ho also advise that suggestive selling should be applied judiciously during hot periods.⁵⁹¹ For example, when only one or two guests at a table order a particular course, “the server should suggest that the other guests do so as well, or if guests only order one or two drinks during their meal, effective servers should ask all guests if they would like another drink.”⁵⁹¹ During busy times, however, “it is probably unwise for servers to push dessert (or any additional course) if no one has ordered one since all this would do is increase meal duration and preclude other guests from being seated at the table.”⁵⁹¹

Keeping these caveats in mind, “Fairmont restaurants developed and deployed a number of innovative methods of suggestive selling during hot periods.”⁵⁹¹ “For example, Prego in Singapore offered a set menu. If one person at a table chose that prix fixe option, the server would suggest it for everyone. Similar approaches were used at other Fairmont restaurants,” explain Kimes and Ho.⁵⁹¹

There are also tools for cold periods, which are “intended to encourage greater sales in slow times.”⁵⁹¹ As mentioned above, “adjusting the table mix isn’t one of those tools, but improving reservations, pricing, and upselling can be valuable.”⁵⁹¹

When a restaurant is cold, managers should ensure that it is easy for a customer

to make a reservation.⁵⁹¹ If the reservations are not encouraged, the restaurant should make it easy for customer to order food.⁵⁹¹ “Well-chosen outside distribution channels can also generate additional revenue (even if they add cost) since customers can make reservations or order food whenever they want, regardless of whether you’re open and answering the phone,” state Kimes and Ho.⁵⁹¹ “In addition, food-service distribution sites increase awareness of your restaurant and may result in new customers who want to give you a try,” say Kimes and Ho.⁵⁹¹

“Cold-period promotions could include offering live music, developing special menus, and building affiliate programs,” offer Kimes and Ho.⁵⁹¹ “The important thing to remember is to carefully target the promotions so that they are only available during cold periods, and they attract customers who might not normally have come to your restaurant at all or at least would not have come at that time,” say Kimes and Ho.⁵⁹¹

“Pricing tactics during cold periods could involve offering lower prices at certain times of day or days of week,” say Kimes and Ho.⁵⁹¹ “The important point here, of course, is not to lower prices for guests who were going to buy at full price. Thus, discounts must be fenced, meaning that customers must meet certain conditions in order to obtain the special price,” recommend Kimes and Ho.⁵⁹¹ They add that, “Rate fences come in all forms including physical (e.g., table location), transaction-based (e.g., time of day or day of week), customer-based (e.g., age or group affiliation), or controlled availability (e.g., promotional code).”⁵⁹¹

“Upselling and suggestive selling are excellent tactics during cold periods,” say Kimes and Ho.⁵⁹¹ “Since the restaurant is slow anyway, it doesn’t particularly matter how long customers occupy a table, meaning that servers can suggest additional courses. If guests don’t order an appetizer, for instance, servers should recommend a starter. The same approach can be used for espresso and desserts, as well as for after-dinner drinks,” recommend Kimes and Ho.⁵⁹¹

Effective data collection and analysis are the key factors in all the tactics and strategies outlined in Kimes and Ho’s report.⁵⁹¹ With proper revenue management data in hand, “managers can have ready their all-purpose strategies, their strategies to use when the restaurant is busy, and strategies to use when things are slow.”⁵⁹¹

Kimes and Ho also emphasized the fact that implementing restaurant revenue management “often involves overcoming significant organizational challenges.”⁵⁹¹ “Given that RRM is a different way of thinking, it is typical to encounter some resistance,” warn Kimes and Ho, adding that, “In implementing the revenue management approach, it is also important to be sensitive to the operational pressures that the F&B team faces.”⁵⁹¹

As a result of Kimes and Ho’s many recommendations, “by 2016, RRM had been

applied to over 70 percent of Fairmont's restaurants' F&B revenue sources. Within 12 months of implementation, restaurants using RRM generated five times more revenue growth than restaurants not using RRM."⁵⁹¹

The Future is Now

In the introduction of this book, I mentioned Jordan Hollander's article *100+ Hotel Trends to Watch in 2020*⁶⁸. In it, he outlines the 100+ trends that he believes will radically alter the future of the hotel and IR industry.⁶⁸ Hollander breaks the list up into nine overarching themes, including⁶⁸:

1. Smart Rooms
2. Going Green
3. Changing Workforce
4. Alternative Accommodations
5. Technology
6. Traveler Preferences
7. Hotel Business
8. Hotel Design
9. Globalization

"The internet of things is spreading not only into homes, but also into hotel rooms," Hollander claims.⁶⁸ "From access to streaming services to a room key on your smartphone, the essential amenities in a guestroom are becoming increasingly digital. Guests want concierge services or temperature controls at the push of a button (or tap of a finger), and voice-activated controls are expanding beyond simply asking Alexa to play your favorite song," says Hollander.⁶⁸ Hoteliers might think these trends sound futuristic right now, but, in a few years, they will not only be expected but demanded.⁶⁸ "Many of these innovations require only minimal changes to a modern guestroom, so a forward-thinking hotelier can implement them quickly and efficiently," says Hollander.⁶⁸

Hollander believes hotels should allow patrons to bring their own streaming services to their hotel rooms.⁶⁸ "Portable streaming devices like an Amazon Fire Stick allow guests to pack their own movies or shows in their suitcases, but they can only watch them if the guestroom's TV has a USB port," say Hollander.⁶⁸ He adds that, "Hotels can also leverage a platform like Enseo, which allows guests to login to their favorite streaming accounts and then automatically get logged out upon check-out."⁶⁸

Wireless device charging should be a thing of 2020 hotels.⁶⁸ "Cords are so last year."⁶⁸ "Hotels can leverage a platform like Chargifi to deliver wireless charging in guestrooms," states Hollander.⁶⁸

Along with wireless devices, smart panels that control for temperature, light, and power will become a differentiator for hotels.⁶⁸ These can be adjusted and

programmed with the tap of a finger from a smartphone or other device and allow a convenience that travelers will already have in their own homes.⁶⁸

“Forget the traditional binder containing information about hotel services; guests want to see restaurant hours, room service menus, spa services, and area recommendations on an in-room tablet which can also play music, control the room’s lights and temperature, and make special requests,” says Hollander.⁶⁸ Some popular brands include Crestron, Intelity, SuitePad and Crave. “With a quick scan of a QR code, communication systems such as Crave allow guests to talk, text, or video chat with hotel staff in real-time,” explains Hollander.⁶⁸

“Many guests want to watch their favorite Netflix show instead of cable, and a Smart TV - either with an integrated internet connection or an add-on like Apple TV or Roku - allows viewers to select their favorite streaming service from a catalog of apps,” says Hollander.⁶⁸ This could also, potentially, provide some interesting personalization data from streaming services like Roku, should the hotel want to go down that road.

Green initiatives in the hospitality industry aren’t new, but they will take on newfound importance in the coming years. “A focus on environmental sustainability isn’t new, but the degree to which guests expect (and prefer) eco-friendly products and services is,” says Hollander.⁶⁸ “Simply suggesting that guests reuse towels for an extra day isn’t enough; today’s traveler wants to stay at hotels that have integrated green practices in all aspects of their business,” concedes Hollander.⁶⁸ “From physical changes to hotel buildings, like the addition of solar panels, to F&B menus with more vegetarian and vegan choices, it’s evident that these environmentally friendly trends are here to stay.”⁶⁸

Consumers are reducing consumption of plastics, especially single-use ones, so hotels should replace “plastic straws, cutlery, water bottles, toiletry bottles, and to-go containers with compostable or reusable alternatives.”⁶⁸ Starwood is even encouraging “guests to minimize their environmental impact by skipping housekeeping service in exchange for hotel credit or loyalty points.”⁶⁸

Today, meat alternatives like the Impossible Burger and Beyond Meat have become hugely popular. Although they may not be as healthy as advertised, they are considerably more carbon footprint-friendly than your typical animal-based burgers. Hotels should “jump on the vegan and vegetarian trend by offering meatless options on every menu and clearly mentioning whether a dish contains meat or dairy.”⁶⁸

“While an increasingly digital world means that an employee’s tasks are changing, the workforce itself is changing too,” warns Hollander.⁶⁸ “These changes aren’t only in demographics, driven by the rise of Generation Z and a more global workforce, but also evident by a growing focus on safety, unionization, ‘gig’ work, and human resources technology,” says Hollander.⁶⁸

Today's traveler has a myriad of options for accommodations, including Airbnb, upscale hostels, service apartments, treehouses, Yurts, Teepees, and even underwater hotels.⁶⁸ As more and more people travel more and more often and for longer periods of time, more platforms like Airbnb are sprouting up altering the characteristics of accommodations altogether.⁶⁸ "Before long, 'alternative accommodations' won't be strictly an alternative, but part of the mainstream," cautions Hollander.⁶⁸

The coronavirus pandemic, of course, has completely changed the nature of travel and it will take a few years to get people moving again, but it will happen and hotel operators should be preparing for a post-COVID-19 life now.

According to Hollander, "Innovation in the hotel technology sector has been blazing ahead at a rapid pace."⁶⁸ And there will be no stopping it in the years to come. Previously, expensive technologies like AI and digital room keys are now becoming much more affordable, and will probably soon be considerably cheaper.⁶⁸ "Advances in payment systems and app capabilities mean that hoteliers and guests have exciting new options when it comes to booking, paying for, and actually experiencing a hotel stay."⁶⁸ Though these may be 'trends' now, they will soon be considered mainstream technology so hotels should recognize that tech could be a big differentiator in the years ahead.⁶⁸

New technology could also "allow hotels to add compelling upsell options for room upgrades, transportation, F&B amenities, tours, and other add-ons during or after the booking process."⁶⁸ "Activity booking platform Peek is leading the charge to bring small tour operators and experiences online ultimately with the goal of making them money and making travel more fun," explains Hollander.⁶⁸

A.I. based pricing might be the wave of the pricing future.⁶⁸ "Many revenue management systems already use pricing algorithms supported by artificial intelligence, which determines the optimal prices by analyzing a slew of historical, forecast, and market data, and A.I. is likely to bring pricing optimization to restaurants, spas, and other outlets too," contends Hollander.⁶⁸ "Top revenue management system providers like IDeaS, Duetto, Atomize and Pace are leading the pack in the fight for dynamic yield management," relays Hollander.⁶⁸

Mobile check-in lets guests "bypass the front desk and go straight to their rooms with a mobile check-in process, which provides a digital room key on a guest's smartphone instantly," explains Hollander.⁶⁸ "PMS provider Mews Systems has developed some really cool tech that allows guests to check-in via Apple Wallet," notes Hollander.⁶⁸

According to Kyle Wiggers in VentureBeat's article *Mews Systems raises \$33 million for hotel and hostel property management tools*⁵⁹⁷, "Mews' cloud-based and mobile-first tool suite aims to simplify tasks like registration while playing nicely with legacy systems. To this end, Operator — Mews' reception desk

product — allows guests to register with tablets and takes most forms of payment.” “Customers provide credit or debit card details at check-in, at which point their accounts are either charged or preauthorized in order to cut down on chargebacks,” says Wiggers.⁵⁹⁷

“Mews claims its six-step Distributor booking engine generates some of the industry’s highest conversion rates and that 40% of guests choose to check in online so they can skip queues at reception,” contends Wiggers.⁵⁹⁷

“From within Mews’ bespoke multi-property backend, managers get an overview of departments from reservations to maintenance, and they’re able to generate reports and schedule report export jobs,” says Wiggers.⁵⁹⁷

“The Marketplace extends Mews’ capabilities further by letting property owners plug in popular apps, tools, and services, from accounting software like Bookboost and Basware to guest technology platforms such as I Am Max and Acentic,” adds Wigger.⁵⁹⁷ “The breadth of support extends to reputation management solutions like GuestRevu and to software that addresses pain points in facility management (e.g., 4Suites, Leviy, Room Checking), point of sales (Lightspeed), distribution (SiteMinder), upselling (GuestJoy, HotelFlex), event management (LetShare), business intelligence (Hotellistat), and more,” concludes Wiggers.⁵⁹⁷

“With services like Hilton’s digital check-in, guests can choose their specific room before arrival, just like selecting a seat on an airplane,” says Hollander.⁶⁸

“Now that hotels have mastered Facebook and Twitter, there are new platforms to focus on. hoteliers can reach additional audiences with strategic use of TikTok videos and Instagram stories, for example,” says Hollander.⁶⁸ I would add sites like Pinterest, WhatsApp, Vero, LinkedIn, Quora, Periscope, as well as keep an eye on the Chinese social apps, which can explode to millions of users almost overnight.

“More and more, guests are completing the entire booking process on their smartphones, so hoteliers must ensure their websites are mobile-friendly,” adds Hollander.⁶⁸

“WiFi isn’t a one-speed-fits-all amenity anymore; if your internet provider hasn’t made any upgrades in a few years, your WiFi might be too slow to stream movies or download large files. 50 megabits per second (mbps) is the threshold for adequate WiFi these days, and some providers, like Google Fiber, offer up to 1000 mbps,” says Hollander.⁶⁸

As someone who travels between the worst Asia has to offer in terms of internet speeds – the Philippines – and the best Asia has to offer – South Korea – it’s very clear how important fast WiFi is to a businessperson. For someone who uses his laptop as his office, having fast WiFi is the difference between a highly productive day and a day of frustration and wasted time.

“First we swiped, then we inserted the chip, and now we can pay by tapping a credit card or mobile wallet, so hotels must upgrade their payment technology to accept payments via near field communication (NFC),” says Hollander.⁶⁸

In China right now, QR codes are being used to make payments, but they might soon be replaced by facial recognition. In her article *Forget the QR code. Facial recognition could be the next big thing for payments in China*⁵⁹⁸, Yen Nee Lee writes that, “technology giants such as Tencent are now studying the use of facial and fingerprint recognition for such transactions.”⁵⁹⁸

“In China, payment methods using QR codes have replaced cash and cards in just five years. It’s possible that in the next few years, new and better products could emerge to replace QR codes,” said Greg Geng, vice president of Tencent’s WeChat Business Group.⁵⁹⁸

In August 2019, WeChat Pay “introduced its ‘Frog Pro’ system that allows customers to make payments by simply scanning their faces — without the use of their mobile phones,” says Yen.⁵⁹⁸ “The technology is now being tested in several retail chains in China and came after Alipay rolled out its own facial recognition payment system, the ‘Dragonfly,’ last year,” she adds.⁵⁹⁸

Today, “Hotels collect a slew of data about guests, but hoteliers rarely use that data to personalize the guest experience. With new customer relationship management tools (CRM) like Revinate and Cendyn, hotels can pull data points out of the cloud and into the guestroom to create a more tailored experience,” says Hollander.⁶⁸

AR & VR can also help market a hotel or an IR. “Travelers want to know everything about a hotel before booking it, so what could be better than a virtual reality tour of a guestroom? In addition to VR, augmented reality will allow guests to experience a hotel by simply strapping on a headset,” explains Hollander.⁶⁸

“In a world so connected by business and economic ties, it only makes sense that globalization would have implications in the hotel industry,” claims Hollander.⁶⁸ “As globalization drives incomes in countries around the world, more people can afford to travel, which means that hotels face opportunities and challenges that come with accommodating new travelers from different places,” contends Hollander.⁶⁸ “Along with this rising middle class, increased income inequality further distances the highest earners from the rest,” states Hollander.⁶⁸ “Luxury travelers continue to have an appetite for over-the-top experiences, so high-end hotels must continuously come up with creative and innovative offerings to wow their guests,” warns Hollander.⁶⁸

As Kahle states, eventually we’re going to set a time frame on the sales funnel that never expires.³⁶⁹ From the moment of first contact, when the hotel’s

systems capture an IP Address, through capturing the social ID, to understanding the social activity, all the way through to the patron card sign up process so that the hotelier can understand gaming and commerce behavior. The only thing remaining is to capture post-transaction information when it comes in.

Once all of this data is captured, geofencing, location-based services, and location-based advertising offer some unique ways to reach consumers when they are in the all-important “decision mode.” A hotel operator able to offer highly specific advertisements to customers who might just need a little extra nudge to make that purchase should find an investment in geofencing applications very profitable.

In *The A.I. Hotelier*, a patron can sign into the hotel’s WeChat account or on a standard hotelier-branded app and he or she will be able to pull up his player card points balance as well as all kinds of information about what is happening in the hotel. The patron will be able to receive and use coupons at onsite restaurants and bars. By giving customers instant access to the information they need when they need it most, a hotel can enhance their patron’s on-property experience.

As previously mentioned, perhaps one of the best uses of location-based services is in the MICE space. The massive size of some exhibition halls can make finding a booth or floor section a daunting proposition. Indoor mobile communication technology with location awareness technology can help conference-goers navigate a vast conference floor.³²⁹

Before arriving at a conference, a mobile user would be able to register his personal preferences and, once he enters the exhibition hall, a route map would be sent to his mobile phone. Vendor appointments could even be set up so that they are located near each other so that the conference-goer wouldn’t have to run around frantically trying to make meetings that are spread out all over the convention floor.³²⁹

In their paper *Marketing Analytics for Data-Rich Environments*¹⁹⁹, Wedel and Kannan, argue that there are many promising areas of research that businesses should keep on their radar. The technological developments of tomorrow might just be some of the ones discussed in Table 26.

At the beginning of the book, I quoted Ramsbotham et al., who stated that, “Genuine success with AI — over time — depends on generating revenue, reimagining organizational alignment, and investing in the organization’s ability to actually use AI across the enterprise.”⁷

DATA	DETAILS
Structured data	<ul style="list-style-type: none"> Behavioral targeting with cross-device data; mobile, location-based, and social analytics. Fusing data generated within the firm with data generated outside the firm; integrating “small stats”. Combining machine learning approaches with econometric and theory-based methods for big data applications; computational solutions to marketing models for big data.
Unstructured data	<ul style="list-style-type: none"> Development of diagnostic, predictive, and prescriptive approaches for analysis of large-scale unstructured data. Approaches to analyze unstructured social, geo-spatial, mobile data and combining them with structured data in big data contexts. Using, evaluating, and extending deep learning methods and cognitive computing to analyze unstructured marketing data.
Marketing-mix modeling	<ul style="list-style-type: none"> Aligning analysis of disaggregate data with that of aggregate data and including unstructured data in the analysis of the marketing mix. New techniques and methods to accurately measure the impact of marketing instruments and their carryover and spillover across media and devices using integrated path-to-purchase data. Dynamic, multi-time period and cross-category optimization of the marketing mix. Approaches to incorporate different planning cycles for different marketing instruments in media-mix models.
Personalization	<ul style="list-style-type: none"> Automated closed-loop marketing solutions for digital environments; fully automated marketing solutions. Personalization and customization techniques using cognitive systems, general artificial intelligence, and automated attention analysis; personalization of content. Mobile, location-based personalization of the marketing mix.
Security and privacy	<ul style="list-style-type: none"> Methods to produce and handle data minimization and data anonymization in assessing marketing-mix effectiveness and personalization. Distributed data solutions to enhance data security and privacy while maximizing personalized marketing opportunities.

Table 26: Area of Focus Promising and Important Issues for Research

Source: Wedel and Kannan, *Marketing Analytics for Data-Rich Environments*

In Greek mythology, once Pandora opened the box and let out all the evils of the world, the one thing remaining inside was hope. I wrote this book hoping that it would help clients and potential clients discover the treasures that are hidden in their data. I also hope it will show how hotel executives can use technology to ensure that every customer interaction becomes a personalized adventure that will make that customer want to return again and again. This, hopefully, brings a smile to every hotel executive's face, as well as a healthy return on investment to the hotel's coffers.

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ANDREW PEARSON was born in Pakistan, grew up in Singapore, and was educated in both England and America. With a degree in psychology from UCLA, Pearson has had a varied career in IT, marketing, mobile technology, social media, and entertainment.

In 2011, Pearson relocated from Los Angeles to Hong Kong to open Qualex Asia Limited, bringing its parent company's software consulting experience into the ASEAN region.

In 2016, Pearson founded his own consulting company, Intelligencia Limited, and he is currently the managing director, overseeing worldwide operations, with clients in the ASEAN region, the Middle East, North America, Australia, and Eastern Europe.

Intelligencia is a leading analytics, AI, BI, CX, digital marketing and social media company, implementing complex customer experience and personalization solutions for clients like The Venetian Macau, Galaxy Macau, Genting HK, Tatts Lottery, Tabcorp, Resorts World hotelier NY, Mexico's Logrand Group, Jungle Games, and Macau Slot.

In 2010, Pearson published *The Mobile Revolution*, and, in 2013, Pearson was invited to write a chapter in *Global Mobile: Applications and Innovations for the Worldwide Mobile Ecosystem*, a book on mobile technology that was co-authored by several of the mobile industry's leading figures.

The first in the *Predictive* series — *The Predictive hotelier* — was published in 2017, while *The Predictive Sports Book*, *The Predictive hotelier*, and *The Predictive Airliner* followed in 2018. *The A.I. Marketer* and *The A.I. Hotelier* started a completely new series.

Pearson is also a noted columnist, authoring articles on such topics as analytics, AI, smart technology, Chinese social media, esports, and cloud technology. Pearson has written for such publications as *ComputerWorld HK*, *The Mobile Marketer*, and *The Journal of Digital and Social Media Marketing*, where he is also a contributing editor. Pearson is the president of the *Advanced Analytics Association of Macau* and one of the founders of *Grow uP eSports*, a Macau association that promotes esports throughout the world, including the GirlGamer Festival.

An avid traveler, Pearson is a sought-after speaker on such disparate topics as AI and machine learning, data privacy, analytics, gaming, social media, and esports. In 2019, he spoke at G2E Asia, at Forbes Middle East's Digital Trends and Big Data Big Trends events in Dubai, as well as Travel Tech in Dubai. 2020 will see him

back in Dubai for AI in Gaming, in Jeddah for Travel Tech, and in Latvia for the hotelier Operations Summit

If Pearson's not pounding the pavements of Hollywood, he's probably wandering the labyrinthine streets of Hong Kong's Lang Kwai Fong, or tearing up useless betting slips at Happy Valley (perhaps the most perfectly named racecourse in the world (for some)), or haggling in a Hyderabad street market, or dining at a hawker center in Singapore, or marveling at the historical importance of Moscow's Red Square, or grabbing a Denny's Grand Slam breakfast as the sun sets over the Birj Khalifa in Dubai, or doubling down at the gaming tables in Macau. Basically, Pearson's out there trying to find the next great story that the world doesn't yet know that it desperately wants to see...

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INDEX

- Activity tracing*, 189
- Adobe*, 49, 56, 71, 235, 238, 270, 271, 272
 - Auto Crop, 237
 - Auto Tag, 390
 - Deep Cutout, 237
- Adobe Advertising Cloud*, 178, 180, 240
- Adobe Enterprise Content*, 238, 239
- Adobe Experience Cloud*, 55, 236, 389
- Adobe Sensei*, 14, 15, 56, 235, 236, 237, 238, 390
 - Auto tagging, 237
- Adobe Sensei Team*, 400, 401
- Advertising*
 - banner ads, 186
- Affdex*, 221, 222, 223, 224, 226
- Affectiva*, 220, 222, 223, 224, 225, 226
- Affective Computing*, 220
- AI*, 10, 50
- AI dilemma*, 305
- AI-generated content*, 77
- AI-powered search*, 99
- Amazon*, 51, 99, 228, 391
- Amazon Comprehend*, 380
- Amazon Transcribe*, 380
- Analytics*
 - descriptive analytics, 17, 19
 - Descriptive analytics, 128
 - diagnostic analytics, 17, 19, 129
 - edge analytics, 18, 360, 374
 - predictive analytics, 14, 17, 19, 39, 80, 82, 87, 107, 114, 127, 128, 129, 130, 147, 283
 - prescriptive analytics, 17, 19, 128, 131, 360
 - Propensity models, 79
 - Text analytics, 75, 115
- Apple*, 192
- Artificial Intelligence*, 119
- Ashton, Kevin*, 21, 44
- Astra beer*, 219
- Attribution analysis*, 57, 87, 88
- Augmented reality*, 15, 50, 354, 355, 356, 358, 374
 - wearable, 355
- Augmented search*, 385
- Backlinks*, 228
- Baidu*, 227
- Behavioral information*, 83, 130
- Behavioral patterns*, 81
- Big Data*, 1
- Blogs*, 35, 269
- Bluetooth*, 192
 - advertising, 411
- Brand management*
 - Apostles, 65, 85, 418
- BT Group*, 195
- Caesars*, 39, 46, 270, 271, 272
- Cambridge Analytica*, 52, 214, 215, 241
- Capacity Management*, 36, 315
- Casino Engagement and Loyalty Platform*, 88
- Chatbots*, 79, 80, 285, 379, 380, 381, 382, 383, 385, 392
- Chauhan, Alok S.*, 143
- Cialdini, Robert*, 207, 208, 209
- Cisco*, 292
- clickstream*, 23, 105, 114, 115, 129, 168, 169, 172, 189, 192
- Clickstream analysis*, 25, 57, 168
- Click-thrus*, 186
- Cloud computing*, 187
- Cluetrain Manifesto, The*, 292, 349
- Collaborative projects*, 35
- Common Short Codes*, 192
- Content communities*, 35
- CRM*, 17, 22, 23, 25, 31, 44, 45, 47, 57, 60, 61, 62, 63, 65, 66, 72, 76, 81, 86, 91, 102, 130, 269, 352
- CrowdOptic*, 354
- CSC*, 30, 192
- Cultural exchanges*, 190
- Customer acquisition*, 57
- Customer Acquisition Model*, 148
- Customer analytics*, 28, 72, 73, 74, 75, 105, 106, 108, 109, 110, 111, 112,

- 113, 114, 115, 188, 274, 280 302, 403
- Customer behavior, 22, 23, 29, 111, 188, 403
- Customer Centric Relationship Management, 65
- Customer churn, 23, 25, 57, 64, 65, 73, 105, 112, 114, 164, 171, 281
- Customer Churn Model, 164
- Customer Conversion Model, 151
- Customer dissatisfaction, 85
- Customer journey, 76
- Customer loyalty, 22, 24, 63, 67, 72, 84, 85, 87, 111, 114, 172
- Customer satisfaction, 85
- Customer segmentation, 106, 147
- Customer's Psychological Profile, 212
- Das Magazin, 212, 215
- Data catalog, 309, 310, 311, 312, 314
- Data governance, 305, 308, 309, 310, 311, 312, 313, 314
- Data lake, 18, 23
- Data profiling, 310
- Databricks, 305
- Decision tree
construction of, 133
- Deighton, John A., 187, 189, 190
- Dell, 292
- Deloitte, 355, 356, 374
- Digital Interactive Marketing: The Five Paradigms, 189
- Disney, 219
- Dushinski, Kim, 191
- eBay, 95
- Eckerson, Wayne, 83, 130
- Emarsys, 31, 45
- Facebook, 1, 18, 23, 32, 34, 35, 52, 57, 62, 64, 75, 80, 86, 88, 98, 114, 115, 177, 178, 188, 191, 211, 212, 213, 214, 215, 216, 218, 220, 226, 228, 240, 241, 242, 246, 269, 270, 271, 283, 292, 293, 301, 381, 382, 383, 384, 387, 415, 418
- Facial Action Coding System, 222
- Facial recognition, 217, 218, 219, 263, 386, 387
- Fitbit, 226
- Forrester Research, 29, 30
- Foursquare, 89, 242, 243, 246, 281, 352
- Gartner, 44, 355, 358, 359, 373, 374
- Geofencing, 242, 243, 265
- Giaglis, George, 243
- Global Trust in Advertising, 86
- Google, 51, 98, 177, 188, 189, 192, 227, 228, 229, 245, 387, 419
- Google Answer Box, 397, 398
- Google Assistant, 51
- Google Cloud Natural Language, 285
- Google Home, 11
- Google search, 228
- Greenberg, Paul, 61
- Gulbransen, Scott, 292
- Hadoop, 24, 44, 75, 88, 114, 115, 121, 293, 305, 353
- Hexum, 34
- High rollers, 82
- Hitachi, 83, 386
- IBM, 1, 42, 71, 88, 106, 110, 111, 114, 131, 172, 225, 265, 284, 293, 294, 295, 304, 306, 307, 363, 370
- IBM Watson, 285
- IBM Watson Analytics, 385
- Image search, 389, 391
- InfiniteInsights, 88
- Influence
The Psychology of Persuasion, 207
- Instagram, 57, 89, 206, 240, 246, 389, 411
- Internet, 189
- Internet of Things, 20, 22, 358
- Intracomercials, 187
- IoT, 22, 26, 50, 127, 225, 306, 311, 358, 359, 360, 361, 362, 363, 374
- Jiebang, 34, 243
- Jones, Thomas, 64, 85
- Kaliouby, Rana el, 220, 221, 222, 223, 224, 225, 227
- k-nearest neighbors, 137
- Knowing What to Sell, When, and to Whom, 81
- Kornfeld, Leora, 187, 189, 190
- Kosinski, Michal, 212, 213, 214, 215
- Ku6, 34
- Kumar, R., 81
- Lift and gains charts, 83, 130
- Lighthouse Signal Systems, 244
- Link building process, 385
- LinkedIn, 32, 62, 75, 114, 115

- Location-based services*, 245, 411, 451
 - advertising, 411, 451
- Lovelock, Christopher*, 60, 61
- Loyalty*, 31, 47, 63, 64, 65, 66, 75, 81, 84, 85, 88, 91, 108, 109, 111, 114, 115, 127, 168, 217, 242, 244, 270, 293, 302, 417, 418, 422, 436, 437
- Machine learning*, 1, 15, 50, 55, 60, 78, 79, 80, 81, 96, 98, 99, 119, 143, 174, 215, 220, 222, 229, 231, 235, 237, 238, 239, 240, 272, 309, 313, 380, 381, 382, 385, 392, 403
- Macy's*, 391
- MapReduce*, 88
- Market segmentation*, 66, 67, 69, 146
- Marketing campaigns*, 29, 83, 106, 130, 188, 403
 - automating campaigns, 82, 413
- Marketing promotions*, 22, 23
- Marr, Bernard*, 20, 421
- Marriott*
 - Marriott Rewards, 91
- Micro-blog*, 35
- Microsoft*, 14, 51, 71
- Microsoft Text Analytics*, 285
- Millward Brown*, 222, 223
- MMS*, 30, 245
- Mobile*
 - digital advertising, 186
- Mobile advertising*
 - broad-based brand advertising campaign, 187
 - campaigns, 187
 - Interactive, direct response campaign, 187
 - targeted search advertising, 187
- Mobile Advertising, the book*, 186, 187, 188, 353
- Mobile analytics*, 106
- Mobile commerce*
 - personalization, 29, 47
- Mobile coupons*, 418
- Mobile marketing*
 - advantages, 191
 - location-specific marketing messages, 192
 - marketing campaigns, 192
 - mobile advertising, 192
 - mobile publicity, 192
 - mobile search, 192
 - mobile web, 192
 - opting-in, 191
 - persona planning, 417
 - privacy, 411
 - proximity marketing, 192
 - push media model, 191
 - social networking, 192
 - text messaging, 192
 - types of advertising campaigns, 191
 - voice, 191
- Mobile Marketing*, 186, 191, 228, 261
 - Digital Interactive Marketing: The Five Paradigms, 189
- Mobile Marketing Handbook, The*, 191
- Mobile positioning technology*
 - kinds of, 243
- Mobile search*, 228
- Mobile value chain*, 186
- MyPersonality*, 213
- MySpace*, 114, 188
- Napster*, 190
- Natural Language Processing*, 11, 94, 97
- Neural networks*
 - types of training, 143
- Neural Networks in Data Mining*, 143
- Nike FuelBand*, 226
- Ocean Method*, 212, 213
- Omni-commerce*, 30
- Optimizing Offers*, 164
- Oracle*, 14, 71
- OTT*, 28, 30, 192, 245, 415, 418
- Pandora*, 78
- Patron Worth Model*, 152
- Personalization*, 1, 47, 49, 52, 53, 54, 55, 56, 59, 79, 81, 177, 193, 198, 207, 215, 231, 232, 233, 238, 242, 257, 380, 393, 459
- Pinterest*, 220, 270, 289, 415
- Pokémon Go*, 358
- Post-roll video*, 187
- Predictive analytics*
 - k-Means cluster, 134
 - k-nearest neighbors, 136
- Predictive analytics*
 - Decision Trees, 132
- Predictive analytics*

- Logistic Regression, 138
- Predictive analytics*
 - A/B Testing, 140
 - Predictive analytics*
 - Time Series Model, 142
 - Predictive analytics*
 - Neural networks, 143
 - Predictive analytics*
 - Discriminant Analysis, 145
 - Predictive analytics*
 - Survival or Duration Analysis, 146
 - Predictive asset maintenance*, 120, 361
 - Predictive modeling*, 82, 84, 131
 - predictive models, 83, 130
 - segmentation methods, 83, 130
 - Predictive models*
 - six steps of creating them, 83, 131
- Procter & Gamble*, 186
- Programmatic advertising*, 9, 78, 177, 178, 180, 400
- Programmatic Media buying*, 78
- Propensity to Respond Model*, 150
- Property exchanges*, 190
- Proximity marketing*, 192
- Psychographics*, 52
- Psychology of personalization*
 - acquiescence effect, 199
 - availability heuristic, 199, 204
 - buffer effect, 199, 204
 - conformity and social influence, 199, 202
 - consistency principle, 199, 200
 - decoy effect, 199, 203
 - endowment effect, 199, 200
 - foot-in-the-door technique, 199
 - framing effect, 199, 201
 - informational social influence, 199
 - loss aversion, 199, 202
 - mere exposure effect, 199, 203
 - propinquity effect, 199, 204
 - reciprocity, 199, 208
 - scarcity principle, 200
- Psychometrics*, 212
- Push technology*, 31
- Python*, 19, 88, 121
- Qantas*, 387, 388
- Qieke*, 34
- QQ*, 34
- QR codes*, 28, 30, 187
- RACE framework*, 79
- RACI Model*, 312
- Real-time marketing*, 24, 349
- Reichheld, Frederick*, 84
- Reinartz, V.K.*, 81
- Reinforcement learning*, 120
- Revenue Management*, 26, 27, 28, 44, 45, 422, 424, 428, 432, 436, 437, 457, 458
- RFM Models*, 148
- Roku*, 178, 258
- Salesforce.com*, 71
- Samsung*, 226, 391
- SAP*, 14, 71, 88, 383
- SAS*, 2, 42, 88, 117, 118, 121, 131, 172, 173, 176, 352
- Sasser, W. Earl*, 64, 84, 85, 418
- SCRM*, 47, 61, 81, 86, 91
- Search engine*, 13, 214, 227, 228, 229, 404
- Sentiment analysis*, 280, 281, 304
- SEO*, 232, 385
- Sharma, Chetan*, 186
- Short Message Service*, 192
- Singh, Dr. Yashpal*, 143
- Siri*, 192
- SMS*, 30, 32, 192, 242, 245, 418
- Snapchat*, 218, 220, 387
- Social exchanges*, 190
- Social media*, 192
 - The six types of, 35
- Social media analytics*, 272, 273, 293
- Social media monitoring*, 62, 291
- Social media monitoring Tools*, 286
- Social media uses*
 - Discover Important Brand Trends, 186
- Social network analysis*, 272
- Social networking*, 192
- Social networking sites*, 35, 192
- Social proof*, 207, 413
 - wisdom of the crowds, 210
- Spark*, 121
- SPSS*, 88
- Starbucks*, 35, 242, 273
- Stodder, David*, 106, 110, 111, 283
- Stream Processing*, 24, 44, 353
- Streaming Analytics*, 349, 353
- Supervised learning*, 120
- Sutton, Scott*, 127, 140, 150, 152, 153,

- 164, 165, 173
Tableau, 131
Talend, 308, 309, 310, 311, 312, 313, 314
Taobao, 94, 97, 98
 Rebate-for-Feedback, 97
TDWI Research, 73, 280
Text analytics, 281
Thought tracing, 189
Toyota, 281, 304
Tracinski, Rob, 40, 46
Trust index, 310
Twitter, 32, 34, 62, 64, 75, 86, 100, 114, 115, 211, 244, 269, 283, 292, 415, 418, 419, 460
Twitter Revolution, 33
Uber, 258
Unsupervised learning, 120
Ushi, 34
VanBoskirk, Shar, 417
Venkatesan, Rajkumar, 81
Verizon, 225
Video advertising, 392
Video pre-rolls, 187
Virtual game worlds, 35
Virtual Reality, 354
Virtual social worlds, 35
Vlogs, 269
Voice Activated Internet, 396
Voice recognition, 239, 394, 395
Voice Search, 228, 397
Wähler, Kai, 24, 44, 353, 354
Wearables, 362, 363
Webopedia, 354
Website Morphing, 192, 193
WeChat, 18, 23, 32, 34, 49, 57, 64, 75, 89, 114, 169, 218, 220, 240, 242, 246, 352, 387, 415, 418, 451
Weibo, 18, 23, 34, 62, 64, 75, 114, 273, 293, 418
WhatsApp, 32, 57
Wheel of Loyalty, 63, 404
Wikipedia, 188, 349
Wirtz, Jochen, 60, 61, 63, 404
Woods, Dan, 13, 177, 349, 404
Xbox One, 226
Yahoo!, 186
Youku, 32, 34
YouKu, 23
YouTube, 23, 32, 188, 191, 292, 293
YY.com, 34
Zone of affection, 64, 85, 418
Zone of defection, 64
Zone of indifference, 85