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Connecting the Dots:
How IoT is Going to Revolutionize the Digital Marketing Landscape for Millennials

A Thesis
Presented to
The Faculty and the Honors Program
Of the University of San Diego

By
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Business Marketing
2016

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ABSTRACT

The growing phenomenon of the Internet of Things (IoT), which is that any item capable of being connected to the Internet will be, presents an unprecedented opportunity for businesses. Using an extensive literature review, the current research examines the significant shift in marketing strategies that need to take place to target the millennial generation of as they adopt IoT. Most research defines the Millennial generation as those born from the early 1980s to the early 2000s. As individuals in this generation grow older, there are two behavioral implications: 1) their acceptance of technology suggests they will be quick to adopt IoT, and 2) their growing purchasing power and consumer behavior make them an ideal target for marketers. Millennials who adopt IoT offer their data more willingly to marketers and firms, which makes it easier for marketers to collect data and target customers more precisely. Additionally, IoT devices will enable various platforms for content marketing that are significantly different from and more effective than a 30 second TV commercial or a digital banner advertisement. Marketing messages will be more personalized, customized, and targeted to potential customers than ever before. Furthermore, IoT offers unlimited creativity for content creation as well as targeted delivery of content, as opposed to traditional advertising avenues. Not only does this solve many problems for marketers who work in an industry notorious for being unable to completely attribute spend on return, it also opens doors to see that direct return on investment (ROI).

OVERVIEW

In a world where instantaneous video communication is the norm as imagined in the cartoon classic *The Jetsons*, hoverboards are as trendy as predicted by the 1989 film *Back to the Future II*, and self-driving cars like the Batmobile are appearing on the market, one thing is clear: the time has come when what was once science fiction is no longer fiction. We have been riding the wave of technological evolution since the dawn of the Internet. On the horizon are significant advancements in virtual reality, artificial intelligence, and more. The foundation for these technologies and perhaps the most prevalent technological wave we will find ourselves in during the next generation is that of the Internet of Things (IoT). Since it is the root of other technological advancements and a phenomenon considered by many still in its infancy, IoT is extremely pertinent to examine. Current research, for the most part, agrees that IoT is a “network of interconnected objects that not only harvest information from the environment and interact with the physical world, but also use existing Internet standards to provide services for information transfer, analytics, applications, and communications.”¹ Anything that is capable of having Internet connectivity soon will, if not already. This paper predicts that as IoT devices grow in capabilities, so too will their popularity, particularly among Millennials.

The current research focuses on the Millennial generation for several reasons. First and foremost, studies show that Millennials are more receptive to technology than previous generations. They are willing to adopt new technologies quickly and, more importantly, are not as conscious about the concurrent sacrifice of privacy and security. For marketers, this is important because it implies that Millennials are more likely to forfeit data which marketers can

¹ Gubbi, Jayavardhana, Rajkumar Buyya, Slaven Marusic, and Marimuthu Palaniswami. "Internet of Things (IoT): A Vision, Architectural Elements, and Future Directions." *Future Generation Computer Systems* 29.7 (2013): 1645-660. ScienceDirect. Web. 23 Jan. 2016.

then use to facilitate better targeting and tailoring of marketing messages. Additionally, the fact that Millennials are willing to adopt technology means that there are more avenues for marketers to launch campaigns. IoT can be leveraged in creative and meaningful ways to market brands and products. Moreover, Millennials' purchasing power is projected to grow exponentially over the next ten years, making them an ideal target market for many brands looking to capture that revenue.

In this research, the relationship between IoT and Millennials will be examined. With their propensity to adopt technology early, and their simultaneous growing purchasing power, Millennials will be the ones to adopt IoT. Not only does this present marketers with a unique opportunity to collect significantly better data via more direct touch points with their target market, IoT presents an unprecedented opportunity for creativity in marketing efforts that will better engage Millennials. All in all, the predicted increase of the prevalence of IoT connected devices means that there is a digital marketing revolution on the horizon, particularly in messaging targeted towards Millennials. Their propensity to accept technological advances and their increasing purchasing power will define this revolution. The remainder of this paper is organized as follows: First, it examines the evolution of IoT and its role in today's society; Second, the paper examines the Millennial generation and the data that explains their propensity to this technology. Third, there is an extensive discussion of the marketing implications of using increasingly advanced technology to collect data. Finally some of the challenges this new technology presents to both marketers and consumers are evaluated.

THE EVOLUTION OF IoT

IoT is still considered by many in its infancy, though its applications are extremely advanced. To understand a background of IoT, one must first understand the evolution of the Web. The Internet is undoubtedly the “largest transformable-information construct.”² Between smartphones, computers, and other devices, much of today’s society is embedded in and powered by the Internet. However, the evolutionary pattern of the Internet during the past two decades is distinct. Scholars define the various stages of web development as “Web 1.0 as a tool for cognition, 2.0 as a medium for human communication, and 3.0 as networked digital technology that supports human cooperation.”³ Simultaneous to Web 1.0, IoT was birthed as Machine-to-Machine communication (M2M) around 1989. M2M technology is nothing radically new in the way that the Internet is not. For example, airplane communication devices are constant M2M feeds that autonomously send information to one another from ground towers to airborne planes.

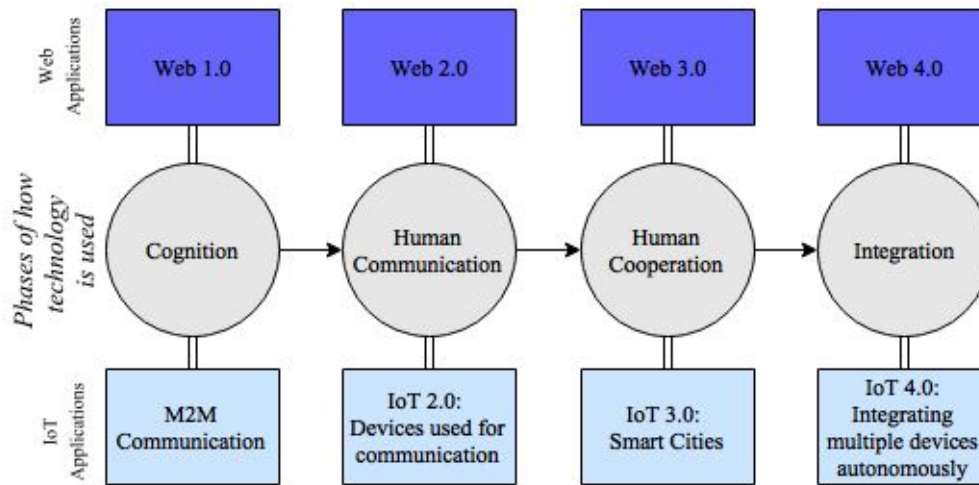
By 2003, the web had developed to Web 2.0 as a medium of “communication, [followed by] 3.0 as a web of co-operation, [then] web 4.0 as a web of integration.”⁴ The trend is that as the Internet becomes more accessible and utilized by more people, devices become interconnected. Like the Web evolution, M2M communication evolved to integrate multiple devices. (See Figure 1).

² Aghaei, Sareh. "Evolution of the World Wide Web : From Web 1.0 to Web 4.0." *International Journal of Web & Semantic Technology IJWesT* 3.1 (2012): 1-10. ProQuest. Web.

³ Fuchs, Christian, Wolfgang Hofkirchner, Matthias Schafranek, Celina Raffl, Marisol Sandoval, and Robert Bichler. "Theoretical Foundations of the Web: Cognition, Communication, and Co-Operation. Towards an Understanding of Web 1.0, 2.0, 3.0." *Future Internet* 2 (2010): 41-59. Multidisciplinary Digital Publishing Institute. Web. 9 Mar. 2016.

⁴ Aghaei, p. 1.

Figure 1: Web and IoT development correlation



Though there is no distinct verification, the term “Internet of Things” was most likely first coined by Kevin Ashton in a presentation he gave to global manufacturer Procter & Gamble (P&G) in 1999.⁵ Originally, he meant to use the term to propose a system of real-time inventory tracking in P&G’s supply chain by leveraging data tracked by the Internet-- exemplifying an IoT 1.0 of cognition, or M2M communication. IoT 2.0 evolved to facilitate human communication manifested in devices such as smartphones. An IoT 3.0 of human cooperation soon followed with efforts such as smart cities in Amsterdam, Barcelona, and New York. These cities capitalize on connected technology to work seamlessly with daily life while bridging the gap between digital and real worlds. IoT devices support everyday efforts such as resolving parking and traffic issues by redirecting traffic information sent to GPS and apps⁶ or even by alerting government services when trash bins need to be disposed before overflowing.⁷

⁵ Ashton, Kevin. "That 'Internet of Things' Thing." RFID Journal. Radio Frequency Identification Journal, 22 June 2009. Web. 07 Feb. 2016.

⁶ "Smart+Connected Parking." Smart+Connected Parking - Cisco. Cisco, n.d. Web. 29 Mar. 2016.

⁷ Henneke, Stephanie. "Smart City Solution for Amsterdam: Intelligent Waste Disposal with M2M - Telekom M2M Blog." Telekom M2M Blog. Telekom, 15 Dec. 2015. Web. 12 Apr. 2016.

Today, IoT refers to “the ability of everyday objects to connect to the Internet and to send and receive data” autonomously.⁸ As Web 4.0 is a web of integration, so too will IoT become an IoT 4.0 of integration. Web 4.0 is used to integrate devices via the Internet, such as smartphones to laptops. IoT will follow the same trend, however it will be much more expansive. An IoT 4.0 will mean that every enabled device that can be integrated, will- the smart thermostat will be connected to the car, to the frying pan, to the smartphone, etc. These complex devices will all interact at once, talking autonomously and working in synchrony. Integrating different devices that work autonomously to support humans' everyday functions and alleviate the need to complete minute tasks. One routine that could be somewhat automated is the average morning routine. A home could be programmed to sense when a person awakens, to open the blinds automatically, and to start a smart coffee pot to brew ten minutes later. Automating these routine tasks would allow the individual to focus on other things. Additionally, a smart car could pull the location of the first meeting of the morning and automatically populate it into a GPS while connecting to a person's preferred music streaming app, allowing individuals to focus on other tasks such as driving rather than routine morning chores.

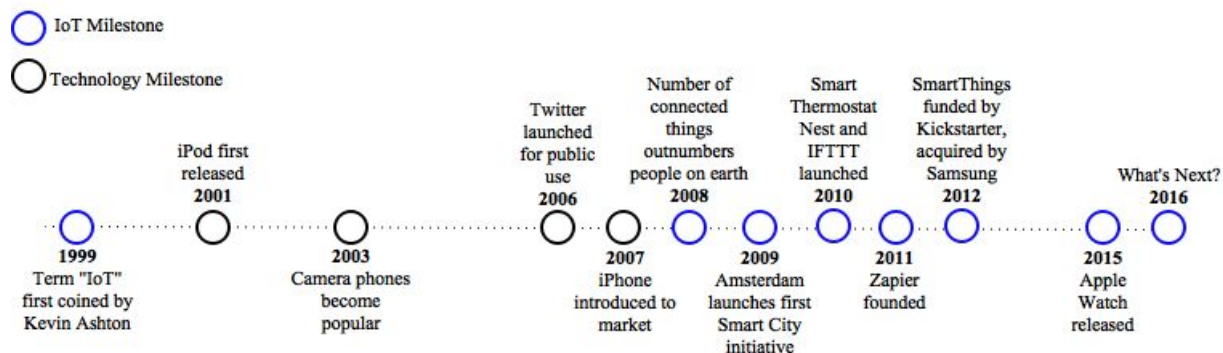
Although there is an abstract correlation between the development of the Web and IoT, these devices and their evolution have a concrete timeline of their own. The contextualization of IoT begins in 1968 when inventor Theodore G. Paraskevakos imagined a way to combine the telephone and computing, later patenting his idea in 1973.⁹ The invention, a caller line

⁸ Internet of Things: Privacy & Security in a Connected World. N.p.: Federal Trade Commission, 2014. Staff Report: November 2014. FTC, Jan. 2015. Web.

⁹ Paraskevakos, Theodore. Apparatus for Generating and Transmitting Digital Information. U.S., assignee. Patent #3,812,296. 21 May 1974. Print.

identification, “was the predecessor to what is now called ID.”¹⁰ Once the potential for IoT was realized, it developed rapidly (See Figure 2). In 2008, “the number of “things” connected to the Internet surpassed the number of people” in the entire world.¹¹ Amsterdam was the first city in the world to pioneer the Smart City initiative in 2009.¹² Soon thereafter, mobile apps for consumers to program specific M2M communication tasks between their own devices were launched, including apps such as If This, Then That (IFTTT) in 2010.¹³ Looking forward, “experts estimate that, at [the end of 2016], there will be 25 billion connected devices, and by 2020, 50 billion.”¹⁴ As IoT continues to evolve, so too will its capabilities. The current research focuses on the IoT as sensors or complex devices with more “smart” needs, such as smart watches or smart homes as opposed to simply desktop computers. The focus on these devices enables a specific analysis of devices particularly well suited for more accurate, instantaneous data collection which will be easier to analyze.

Figure 2: Timeline of IoT and technology milestones



¹⁰ Nayeem Islam, Roy Want, "Smartphones: Past, Present, and Future", IEEE Pervasive Computing, vol.13, no. 4, pp. 89-92, Oct.-Dec. 2014, doi:10.1109/MPRV.2014.74

¹¹ Evans, Dave. *The Internet of Things: How the Next Evolution of the Internet Is Changing Everything*. N.p.: Cisco Internet Business Solutions Group (IBSG), 2011. Cisco Internet Business Solutions Group (IBSG), Apr. 2011. Web. 11 Feb. 2016.

¹² Larson, Selena. "Inside Amsterdam's Efforts to Become a Smart City." The Kernel RSS. The Daily Dot, 4 Jan. 2015. Web. 12 Apr. 2016.

¹³ Alexander, Jesse. "ifttt is alive!" IFTTT Blog. IFTTT, 7 Sept. 2011. Web. 3 Mar. 2016.

¹⁴ Evans, *The Internet of Things: How the Next Evolution of the Internet is Changing Everything*.

HOW IoT ENABLES DATA COLLECTION

IoT is the gold mine of data for marketers because of its ability to silently and unintrusively collect unprecedentedly complex behavioral data. By tracking behaviors, these devices are able to piece it together to create an enhanced situational awareness, thereby providing the marketer sensor driven analytics and patterns of consumer behaviors. This actionable data is what is particularly valuable to marketers.

Tracking Behavior

Utilizing products embedded with sensors allows companies to easily monitor the behavior of persons, things, or data through space and time. IoT enabled devices are inherently sensor-driven and collect data from numerous touch points depending on the architecture of the device including movement, physical activity, communication patterns, and more. Companies that implement IoT in their marketing plans allow for their “business models [to] be fine-tuned to take advantage of this behavioral data.”¹⁵

Enhanced Situational Awareness

Aggregating several of these sensors collecting data from different touch points implies that these devices can become so advanced as to have enhanced situational awareness. Achieving real-time information of the physical environment and how consumers are interacting with it allows for decision makers to understand an environment before taking action. This allows for marketers to triangulate behavior and get a deeper, contextualized understanding of the patterns of consumer behaviors unlike ever before.

¹⁵ Chui, Michael, Markus Loffler, and Roger Roberts. McKinsey Quarterly. Publication. Vol. 2. N.p.: n.p., 2010. The Internet of Things. McKinsey Quarterly, 2010. Web.

Sensor Driven Analytics

Taking all of this data into consideration, analytics can provide more digestible content for marketers. Sensor driven analytics can assist human decision making through deep analysis and data visualization software. Contextualizing the data leads to marketing automation and control unlike ever before, drastically reducing the burden on marketers to segment and find their audience. This allows marketing teams to focus on creating effective content for a few smaller segments rather than chasing a larger target market and hoping content is effective.

THE MILLENNIAL MOTIVATOR

The Millennial generation is the largest in history. According to an extensive study done by Mintel, the generation was “born between 1977 and 1994.”¹⁶ To provide context, “younger Millennials are defined as between the ages of 20 and 27, [and] older Millennials are defined as between the ages of 28 and 37” in 2015.¹⁷ The divide between younger and older Millennials is due to the economic collapse in 2008 of which the older Millennials actively experienced, while younger Millennials simply observed the recession but were too young to understand the economic impact in a similar way. This is important to note because it shapes the consumer behavior for these two groups in very different ways.

A Technological Love Affair

Aside from simply being the largest generation, Millennials motivate this study for a few other reasons. First, they are extremely receptive to new technologies. In the aforementioned study conducted by Mintel, nearly half of Millennials responded that they “like to be one of the

¹⁶ Bonetto, Lauren. "Marketing to Millennials - US - February 2015." Marketing to Millennials - US - February 2015. Mintel Academic, Feb. 2015. Web. 12 Feb. 2016.

¹⁷ Bonetto, “Marketing to Millennials - US - February 2015.”

first people to buy new or trendy products.”¹⁸ Furthermore, 87% of millennials use between two and three technology devices at least once daily.¹⁹ Millennials’ propensity to adopt new technology implies that marketers have significantly more opportunities to collect customers’ data. Likewise, there are infinitely more opportunities to actually market to them by using this technology as a medium. However, “the future is not about three screens or four screens or fourteen screens. It’s about one screen: whichever screen is in front of [the consumer].”²⁰ For marketers, IoT is the data gold rush as it will be made available by these technologies; however, a challenge for these companies is that millennials’ attention is a constantly moving target, and marketers need to adapt immediately.

More Money, More Targeting

Another reason to target Millennials is their growing purchasing power. According to Merrill Lynch, Millennials’ purchasing power is projected to reach \$8.1 Trillion by 2025²¹, as illustrated in Figure 3. Millennials will use their disposable income to purchase new technology and other luxury (non-essential) items. For example, younger millennials are more likely to purchase big-ticket items such as homes, whereas older millennials are more likely to rent.²² Similarly, they may be more willing to purchase a technology-enabled car (i.e., smart car) that firms will be able to equip with IoT features. As such, firms need to be cognizant of the divide within this generation and should alter their products and services in an appropriate manner.

¹⁸ Bonetto, “Marketing to Millennials - US - February 2015.”

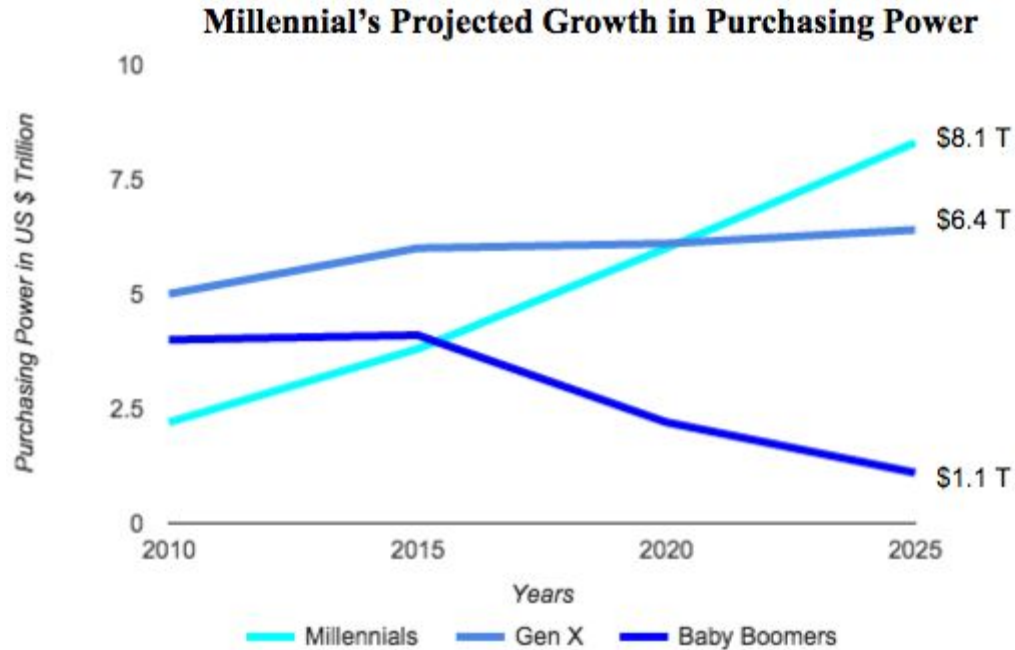
¹⁹ Schawbel, Dan. "10 New Findings About The Millennial Consumer." Forbes. Forbes Magazine, 20 Jan. 2015. Web. 12 Mar. 2016.

²⁰ Joel, Mitch. Ctrl Alt Delete: Reboot Your Business, Reboot Your Life, Your Future Depends on It. New York: Business Plus, 2013. Print.

²¹ Nahal, Sarbjit, Bejjia Ma, and Felix Tran. "Thematic Investing Generation Next - Millennials Primer." Bank of America - Merrill Lynch (2015): n. pag. Originally in Print but Found Online. Merrill Lynch, 8 July 2015. Web. 19 Feb. 2016.

²² Bonetto, “Marketing to Millennials - US - February 2015.”

Figure 3: Millennial's projected purchasing power



“Don’t Advertise to Me!”

Millennials’ consumer behaviors are affected by more than the Great Recession. As the highest educated generation, they respond very differently to marketing efforts compared to previous generations. Traditional advertising efforts such as television or radio advertisements do not influence purchase decisions as they did for past generations. Only 1% of surveyed millennials said that a compelling advertisement would make them trust a brand more.²³ This is because Millennials generally perceive traditional advertising efforts as “spin” and “unauthentic.”²⁴ This is manifested in behaviors such as installing ad blockers on computer browsers or using Tivo to skip commercials regularly.²⁵

²³ Bonetto, “Marketing to Millennials - US - February 2015.”

²⁴ Bonetto, “Marketing to Millennials - US - February 2015.”

²⁵ Schawbel, “10 New Findings About The Millennial Consumer.”

A Solution: Content Marketing

In an effort to solve this problem, marketers have shifted the focus from traditional marketing efforts to content marketing. Content marketing focuses on “creating and distributing relevant and valuable content to attract, acquire, and engage a target audience with the objective of driving profitable customer action.”²⁶ Millennials are savvy content consumers. As previously mentioned, technological advances mean that brands have many different avenues by which to reach their audience, but that can be a double-edged sword. Millennials are keenly aware of how to leverage their attention, and because they are the highest-educated generation, they expect brands to be transparent in their marketing efforts. To effectively target millennials “requires brands to tell stories, create share-worthy content, and foster an experience around a product/service.”²⁷ As such, companies should not attempt to fool Millennials as it will not only backfire in the short term of losing a sale, but deceptive practices (regardless of legitimacy) can damage Millennials’ relationship with a brand, sometimes irreversibly.

IoT MARKETING STRATEGY

IoT and the 4P's

IoT applies to marketing strategy both in theory and in practice. The quintessential concept at the core of marketing theory is the 4 P's. Michigan State University marketing professor E. Jerome McCarthy is the pivotal figure credited with the “ development of marketing thinking, particularly what has come to be known as [...] the concept of the 4 P's (product, price,

²⁶ Pulizzi, Joe. "Content Marketing Definition." Content Marketing Institute. Content Marketing Institute, 06 June 2012. Web. 12 Mar. 2016.

²⁷ Bonetto, “Marketing to Millennials - US - February 2015.”

place, promotion) within the marketing mix.”²⁸ When messaging addresses all four of these fundamental areas, effective marketing strategies can be executed. IoT applies to each one in a unique way.

A clear definition of the product is necessary for consumers to understand what exactly is being offered, and IoT allows for highly customized products. When a consumer is able to enjoy a customized product, that product is able to provide truly unique experiences; something that is highly valued by Millennials.

The placement of a product is typically its channel of distribution, such as whether the product can be purchased in physical stores or online marketplaces. Within a store, placement can be further divided into the physical location such as the checkout line, end aisle displays or back of the store. Placement also applies to marketing messaging, such as advertisements on billboards, television, radio, or digital banners. IoT changes the way consumers interact with marketing messages because the IoT devices enable consumers to be constantly connected to the firm, thus placement is anywhere the consumer is located.

The price of a product needs to be clearly determined as it communicates value to consumers. Like message placement, IoT changes this definition. IoT connected devices allow for dynamic pricing of items based on actual behavior, as opposed to somewhat traditional segmentation based on consumer demographics. For example, Progressive Auto Insurance has a device called the Snapshot that allows the company to collect actual driver information. This allows Progressive to dynamically price insurance based on actual driver behaviors as opposed to blanket pricing across demographics such as age or gender.

²⁸ "E Jerome McCarthy." . . , 2011-01-01. Oxford Reference. 2011-01-01. Date Accessed 30 April. 2016. Web.

Finally, promotion is a crucial part of marketing as it applies to the actual message content that firms deliver. IoT allows for enhanced promotion in a few different ways. Because of the more sophisticated data collection practices, marketers can effectively target individual consumers and accordingly tailor content, in essence creating highly individualized and personalized messages. Additionally, IoT allows marketers to create more effective content based on data and continually test and optimize different messaging.

Taken together, IoT allows firms to more accurately address the four pillars of marketing: product, placement, pricing, and promotion. As consumers continue to adopt IoT, this opens a huge opportunity for marketers which, if executed appropriately, could result in higher ROI.

IoT DATA COLLECTION AND USER EXPERIENCES

There are several examples of how IoT is being used in marketing efforts today. Although the hardware itself is fairly new and many devices have yet to be invented, marketers are currently capitalizing on this technology. Consumers are already adopting IoT enabled devices such as wearables. Sensors embedded in these smart devices harvest data and allow marketing to transform it into actionable patterns and analytics.

Smart Devices

According to Steve Reed, VP of Client Development at Elevation Marketing, “the inherent value of IoT is in connecting devices to the cloud, regardless of an individual’s physical location.”²⁹ Given the projected prevalence of smart devices, marketers will enjoy countless opportunities to market to potential buyers and to precisely target customers and achieve instant

²⁹ Adekoya, Olubukola. "Marketing and the Internet of Things." Hot Sauce. Nurun, 26 Jan. 2016. Web. 14 Mar. 2016.

results. These devices can provide rich and detailed data on daily behaviors such as exercising, energy consumption, and workplace habits. This will enable businesses to develop more informed strategies and, in turn, improve ROI on future marketing initiatives.

Further, IoT allows for better, more consistent user experiences. When smart devices do not perform per expectations or begin to break down, that information is fed back to the supplier, providing an opportunity for immediate modification and improvement. As an example, Tesla cars automatically receive software updates and alert drivers when maintenance is necessary. Companies will go the extra mile when they pair smart devices with sophisticated Customer Relationship Management (CRM) software, so that firms are able to do more for the customer than gather and organize of client data. It will be possible to utilize a CRM for more advanced capabilities and enhanced user experience. This software could go beyond data collection and into robust data analysis, allowing a business to make more informed decisions regarding marketing to its consumer base. This is priceless for marketers, because it “circumvents the need for processing information through a long chain of command,” specifically IT departments.³⁰

As previously stated, with better data collection comes better targeting. When consumers are constantly bombarded with marketing messages, it becomes increasingly necessary to provide exactly the right message to the audience in the most appealing way possible. IoT “helps [marketers] create better customer experiences based on previous interactions with them.”³¹ As it applies to devices themselves, value-added services and products will become even more important. This means that ordinary watches will give way to smartwatches (as we’ve already begun to see), kitchen blenders will be replaced by smart kitchen blenders, and this kind of

³⁰ Olenski, Steve. "How the Internet of Things Will Transform High-Tech Marketing." Forbes. Forbes Magazine, 20 Oct. 2015. Web. 12 Feb. 2016.

³¹ Olenski, "How the Internet of Things Will Transform High-Tech Marketing."

strategy will begin to permeate product development and marketing strategies. The unique and distinctive value provided by such products will differentiate them from the competition, and make them seem far more desirable to the typical consumer.

IoT MARKETING TODAY

In addition to affording incredible means of data collection by using sensors, IoT enabled devices also enable unprecedentedly creative marketing campaigns. Not only can marketers reach consumers directly on these devices precisely when they are being used, but the plethora of IoT enabled devices also implies that there are an infinite number of new avenues for agencies to utilize this technology and leverage it to create compelling, highly engaging campaigns. Creative marketing campaigns today can be empowered by IoT. While these marketing campaigns may be considered innovative today, one day they will be entirely commonplace.

Music and Ridesharing Industry Collaboration

One example of IoT and marketing campaigns which enhance the user experience come from a partnership between Uber (ridesharing) and Spotify (music streaming). The companies partnered to allow users to engage in a unique experience simultaneously provided by both platforms. When a consumer books a ride while using Spotify to listen to music in the background, as long as the car is equipped with the correct technologies, the user can stream their Spotify playlist during their Uber ride. This experience puts both companies at a competitive advantage because it “improves the customer experience and helps retain customers by getting them locked into [both] their product ecosystem[s].”³² This partnership is a

³² Allen, Robert. "7 Examples of the Applications of the Internet of Things Which Are Here Now - Smart Insights Digital Marketing Advice." Smart Insights. Smart Insights, 25 Nov. 2015. Web. 20 Mar. 2016.

particularly creative way to engage with Millennials. As a generation who is completely enthralled by and in love with music³³, as manifested in custom playlists and overnight hits with millions of views on YouTube, and one that is also heavily involved in innovative user experiences like the sharing economy (Uber, Air BnB), the connection between the two companies means that consumers will associate one with the other over time as well. This provides for unprecedented opportunities for firms of all kinds.

Consumer Products

IoT marketing applications are not just limited to technological partnerships. Recently, one company called Appirio experimented with a vending machine powered by tweets. To get a product from the vending machine, users had to interact with it on Twitter.³⁴ This provides a unique user experience geared toward Millennial behaviors of sharing on social media.

Another example is Johnnie Walker whiskey. In 2015, parent company Diageo decided to connect 100,000 bottles to the internet so they could be used to send a personalised, one-to-one digital video messages to dad in honor of Father's Day. Doing this helped Diageo involve Millennials 1) in the process of marketing and 2) generating the content. As a result, Diageo saw a 72% sales uplift leading up to Father's Day, and the cost of the campaign was repaid five times over.³⁵ This campaign also helped to portray Johnnie Walker as innovative, positioned whiskey as the perfect Father's day gift, and created a unique user experience both for the giver and the recipient of the product.

³³ Buckley, Adam. "Turns Out Millennials Have Amazing Musical Attention Spans - Digital Music News." Digital Music News. Digital Music News, 29 Apr. 2016. Web. 12 May 2016.

³⁴ Bonner, Clinton. "The Next Great Social Marketing Opportunity: The Internet of Things." The Next Great Social Marketing Opportunity: The Internet of Things. Convince and Convert, n.d. Web. 24 Apr. 2016.

³⁵ Allen, "7 Examples of the Applications of the Internet of Things Which Are Here Now - Smart Insights Digital Marketing Advice."

PREDICTIONS AND APPLICATIONS

IoT has opened up several possibilities both for consumers and brands. Marketing strategy is going to have to change to adapt to this rapidly evolving technology. Although there are a few unique examples of brands currently leveraging this technology, there are still many possibilities yet to be actualized. Below are some potential applications of IoT that firms may benefit from in the future.

Health and Fitness

Health conscious consumers could purchase an IoT connected cooking pan that analyzes the nutritional value of the food they're cooking. It could be programmed to automatically send that data to a food log app on their smartphone such as MyFitnessPal (powered by Under Armour). This would provide Under Armour with specific demographic information and insight into key behaviors of their consumers. For instance, based on eating habits, Under Armour could discern which of their customers are serious athletes or purchase clothing for "athleisure." With that information, Under Armour could target more effectively with dynamic marketing messages tailored to different segments.

Similarly, connecting that information with mobile apps for grocery stores would be beneficial. Grocers could also use this information to see what customers are actually cooking with their products. They could also send push notifications based on expiration dates to alert consumers when their food is close to spoiling or running out. For a health-oriented generation, this too would be an application we might see sooner rather than later. Additionally, this would help to ensure that grocery stores' inventories are not depleted because they will know ahead of time what products are being consumed and when a customer is likely to make a repeat purchase.

Real Estate

Younger millennials are sooner apt to purchase a home in their lifetime than older millennials, so there is an opportunity to use IoT devices in this industry. Real estate agents could use IoT devices to quickly collect information of those attending an open house so as to follow up with similar listings. Additionally, they could target consumers for other homes by coupling previously collected data with geolocation services to send push notifications to their phone when they are in an area with similar listings that are listed by that agent.

Retail Shopping

Physical store environments actually have a “significant influence on [Millennials’] emotional states, including pleasure and arousal, which in turn influence consumers’ impulse buying behaviors in the store.”³⁶ Brick and mortar store locations can actually plan to the psychology of Millennials of propensity to adopt technology by including it in their actual physical layout. An IoT enabled mirror could be in a fitting room at a retail boutique so a consumer doesn’t have to try on clothes directly- rather, it can scan a consumer’s body and outfit it with clothes based on the consumer’s taste, determined by previously collected data. It could also suggest different outfits based on this data, and continue to market to the customer after he/she has left the store. This will provide a unique user experience that could be tailored to any segment, and could also increase ROI. If the mirror has the ability to advertise similar clothing or accessories, that would up sell other products as well to Millennials, who are known to be impulsive buyers. Moreover, if the consumer had an account from an online store, the mirror

³⁶ Xu, Yingjiao. "Impact of Store Environment on Adult Generation Y Consumers' Impulse Buying." *Journal of Shopping Center Research* 14.1 (2007): 39-56. Web.

could recognize lost sales by tracking items left behind in a cart and push to recover those sales, thus engaging the online shopping experience.

Luxury Hotels

As mentioned previously, Millennials are notorious for loving experiences rather than products, so providing an experience as unique as each client would be an exciting proposition. High end hotels who offer guests unparalleled comfort as their service could replicate a guests' home settings to provide that customized experience. Theoretically, hotels could pull data from a customer's phone to examine what the settings for temperature, lighting, alarms are in their own home to actually duplicate that comfort in a hotel room and provide a unique customer experience. Hilton hotel's new brand Tru which is targeted towards Millennials³⁷ is an ideal place to try out some of these ideas. This will allow a more traditionally perceived brand such as the Hilton hotel group to change their image and position their new hotel towards Millennials.

CHALLENGES WITH IoT

With infinite possibilities of IoT and marketing applications also come a fair share of challenges. Tracking big data, ensuring privacy and security of that data, and the ethics of collecting unnecessary data are among those challenges.

Bigger than Big Data

While it's important for firms to have the means to collect big data, storing that data easily can become an issue. As big data grows to become bigger than big data, the need for storage and the associated costs rise accordingly. Business' storage must be scalable: storing data

³⁷Trejos, Nancy. "Hilton Announces New Affordable Hotel Brand, Tru." USA Today: Hilton Announces New Affordable Hotel Brand, Tru. USA Today, 25 Jan. 2016. Web. 10 May 2016.

in a finite way such as servers or data warehouses means that there is a point at which businesses could run out of space to store data. Additionally, physical servers are cumbersome, expensive, and difficult to maintain. In order for big data to be meaningful, that data must be relatively easy to navigate, analyze, and organized. This allows for easier retrieval and data analysis.

Storage can also be expensive. One alternative to traditional storage such as servers or warehouses is cloud storage. For instance, 200 petabytes of data would be what a company like Yahoo! would need to manage. To put that much data into context, 200 petabytes is the storage equivalent of nearly 800,000 MacBook Pro laptops³⁸ or the data equivalent of 3 trillion emails³⁹. Cloud services would typically charge around \$1 million to support 200 petabytes of data, whereas traditional enterprise data warehouses could multiply the cost 100 times over.⁴⁰

Privacy

In a focus group conducted by the Federal Trade Commission (FTC), participants discussed the issue of privacy while using IoT devices. Participants observed that IoT presents a variety of potential risks that could be exploited to harm consumers. Some of these included unauthorized access and misuse of personal information and creating risks to personal safety. Participants also noted that “privacy risks may flow from the collection of personal information, habits, locations, and physical conditions over time.”⁴¹ It is not outlandish to consider that companies might use this data to make credit, insurance, and employment decisions. It was also noted that “perceived risks to privacy and security, even if not realized, could undermine the

³⁸ Assuming MacBook Pro has 256 gigabytes of storage

³⁹ Assuming the average email size is 75 kilobytes

⁴⁰ Bantleman, John. "The Big Cost Of Big Data." The Big Cost Of Big Data. Forbes, 16 Apr. 2012. Web. 15 Apr. 2016.

⁴¹ Internet of Things: Privacy & Security in a Connected World. N.p.: n.p., 2015. Internet of Things: Privacy & Security in a Connected World. Federal Trade Commission, Jan. 2015. Web.

consumer confidence necessary for the technologies to meet their full potential, and may result in less widespread adoption.”⁴²

Security

Because IoT is still in its infancy and has been somewhat rushed to market, the same standards for security as for other well established technologies such as smartphones do not yet exist. For instance, a recent study by HP showed that 70% of the best selling IoT consumer products lacked adequate security measures.⁴³ Although it is possible for IoT devices to have their software updated automatically to protect consumers and enhance security, that has to be a priority from the supplier. When companies do not “have a scheduled security patch pushed out on a regular basis, they become the weak link in your defense.”⁴⁴ Moreover, hacking into IoT devices may not directly allow for somebody to do some damage, but they can use it to access other technological touch points. IoT can be used as “a pivot point to get into higher value devices with more sensitive information.”⁴⁵ The problem isn’t just applicable to consumers: security issues and compromises are as real for a home as they are for an enterprise, a power grid, a water supply, or a nuclear facility.

Ethical Implications

Furthermore, there are several ethical questions to be considered of companies’ data collection and retention policies. One policy companies ought to consider is data minimization, which is the concept that “companies should limit the data they collect and retain, and dispose of

⁴² Internet of Things: Privacy & Security in a Connected World.

⁴³ "HPE Fortify and the Internet of Things." HPE Fortify and the Internet of Things. Hewlett Packard Enterprise, n.d. Web. 12 Apr. 2016.

⁴⁴ McElwee, Tim. "Expert Advice for Securing The Internet of Things." Treeline Interactive Blog. Treeline, 17 Feb. 2016. Web. 14 Apr. 2016.

⁴⁵ McElwee, "Expert Advice for Securing The Internet of Things."

it once they no longer need it.”⁴⁶ This can protect against two security related risks: first, larger data stores present a more attractive target for data thieves, which in turn increases the potential harm to consumers. Second, if a company collects and retains large amounts of data, there is an increased risk that the data will be used in a way that departs from consumers’ reasonable expectations. Especially when considering Millennials who are fiercely brand loyal, a scandal of misuse of data could ruin a company’s reputation and entire livelihood.

Government Regulation

One example of an internal security issue was with Verizon Wireless. The telecom giant had knowingly been using hidden tracking technology known as “supercookies,” which were used for targeted advertising without customers’ permission.⁴⁷ As the lines of governmental regulation are blurred in the digital world, there can be an expected increase in attention to legal protection of consumers and businesses as it applies to digital practices and data collection specifically.

Taking everything into consideration, there are several challenges with IoT. With the projected prevalence of the adoption of smart devices and Millennials’ propensity to sacrifice privacy and security in favor of being early adopters of these devices, firms are going to have to carefully consider their data collection practices and data protection protocols sooner rather than later. Moreover, since there is little to no government regulation in this area, it is entirely up to firms to work directly with consumers to set reasonable expectations of what data should be collected, how that data should be used, and when data should be permanently destroyed.

⁴⁶ Internet of Things: Privacy & Security in a Connected World.

⁴⁷ Kang, Ceclia. "Verizon Settles With F.C.C. Over Hidden Tracking via ‘Supercookies’." Verizon Settles With F.C.C. Over Hidden Tracking via ‘Supercookies’. The New York Times, 7 Mar. 2016. Web. 14 Mar. 2016.

CONCLUSION

The predicted increase of the prevalence of IoT connected devices means that there is a digital marketing revolution on the horizon, particularly in new products and marketing messaging targeted towards Millennials. The current research explored the intersection between IoT, Millennials, and the unique opportunities and challenges that arise for marketers. Taking into consideration Millennials' love of technology, growing purchasing power, and rejection of traditional advertising, marketers are going to have to tailor campaigns to these consumer preferences in order to generate measurable ROI and grow market share. As Millennial consumers do not respond favorably to traditional forms of advertising, brands should focus on communicating their messaging primarily through content marketing. Leveraging this technology will allow for brands to launch meaningful, innovative campaigns and use targeted content to connect with customers and form that relationship.

Further, firms can work towards creating IoT enabled products and services which would help forge a stronger relationship between consumers and firms. Millennials will be able to focus on experiences rather than be bogged down by daily routines and menial chores, which would be accomplished by IoT connected devices. In turn, firms will be able to gather unprecedented data that they can use in future product creation and marketing messaging.

However, these interactions raise concern for consumer privacy, security and data storage. Firms will have to modify their infrastructure and analytical methods to account for the large amounts of data that will be collected. Further, consumers will have to become more cognizant of the risks associated with willingly sharing their data and become aware of the privacy limitations. Finally, firms and consumers will have to work closely with governmental

agencies to minimize security concerns that will surely arise from these interactions and data exchanges.

For all parties involved, marketers, consumers, and firms; the growing applications for IoT connected devices presents is just scratching the surface of opportunities while raising challenges. It will be interesting watch how this phenomenon will evolve over the next five to ten years and the manner in which both firms and consumers will modify their behavior in response to this evolution.