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Kristin Tucker
*Kennesaw State University*

Jake Bulim
*Kennesaw State University*

Glenn Koch
*Kennesaw State University*

Max M. North
*Kennesaw State University*

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# Internet Industry: A Perspective Review Through Internet of Things and Internet of Everything

**Kristin Tucker, Jake Bulim, Glenn Koch, Max North**
**Trinh Nguyen, Joseph Fox, & Dalton Delay**

*Information Systems Department*
*Coles College of Business*
Kennesaw State University, Kennesaw, GA 30144, USA

**[Abstract]** The objective of this article is to concisely explore the Internet industry through a new perspective and concept of Internet of Things (IoT) and Internet of Everything (IoE). Within this article, a brief description and development of Internet industry are presented; following with competitive strategy within the Internet industry; then value chain and the use of applications in the Internet industry. Followed by effects and benefits; and challenges, legal and ethical issues of IoT and IoE. Finally, a Concise Concluding Statement for Thoughts is stated.

**[Keywords]** internet industry, internet of things, internet of everything

## Introduction

The evolution of the Internet industry virtually has spawned in the last hundred years. When inventions such as the telegraph, radio, telephone, and the computer were first created, they set up the beginning of the Internet revolution (Fowler, 2009; Leiner et al., 1997). The evolution of the Internet industry demonstrates the continuously improving quality of human interaction via computers without the need of a common geographic location, and as well as providing the better benefits along with the successful development of information systems.

## Development of Internet Industry and Business Process

To truly appreciate the effect of the evolution of Internet Industry through perspective and concept of the Internet of Things (IoT) and the Internet of Everything (IoE), we must first understand the limitations we face now and how this new stage will alter not only what we use but how we use them. In short, we need to understand the business process and how it might change with the introduction of the IoT and IoE. The Business Process, simply put, is the common and linked tasks that lead to the finished product or services intended for the consumer ("Business Process Definition", 2017). Currently, the process is quite simple; a product is thought up, designed, engineered, produced, sold, and studied to see what defects occurred after the consumer has bought the product.

However, the IoT and IoE offer a different approach. Instead of spending years understanding how a product performed it would be more efficient if the product itself said what went wrong. With the IoT and IoE, connected devices such as cars, phones, even health monitoring devices can communicate directly to not only to manufacturers but also to the service provider for repairs and parts replacement. Data collection from thousands of users would allow companies to locate common problems, which would result in developing better products and improved customer experience. Moreover, this real-time process would lead to a streamlined Business Process, a better product, and a happier consumer ("How It Works: Internet of Things", 2015; Kalbag and Silverman, 2014).

At present, challenges stand between us and the envisioned future. The Scale and complexity of all devices all intertwined communicating with each other is going to necessitate drastic mobile technology. Current capacities are not able to handle the proposed new network. The 4G LTE networks boasting a connection speed of 5-12Mbps (Stringfellow, 2016) will be outstripped with the magnitude of devices

connecting simultaneously. The 5th Generation network with speeds promised at "4 Gigabits per second" (Villas-Boas, 2017) may be better able to sustain the IOE concept. However, the 5th generation network not only promises greater speed but also a different approach to wireless connections. Instead of having large towers connecting to a single device we will likely see multiple small and perhaps home router size towers (Segan, 2017). This effect will be quite noticeable in self-driving automobiles or "autos", ("Humans Need Not Apply", 2014) which will necessitate very low latency. The 5th Generation technology will be able to offer millisecond latency and the ability to bounce packets of data from point to point, from other self-driving cars and towers located nearby (Segan, 2017). This greater connectivity combined with faster and smarter computers may reduce death by car accidents given how self-driving cars do not blink, get sleepy or easily distracted it is easy to see how we could benefit from such an advance. We also need to consider the effects in industrial and business as well, not only could we replace people driving but we could replace package handlers, or truck drivers, there is little limit to what we could replace with cheaper, safer, and better "Things" in the Internet of Things.

## Internet of Things (IoT) and the Internet of Everything (IoE)

The Internet is comprised of two main categories: The Internet of Things and the Internet of Everything. The Internet of Things (IoT) is a very complex idea. It represents a concept that everyday physical objects are somehow related to the Internet and can connect to other devices through technology ("Internet of Things", n.d.). The Internet of Things is considered a form of communication with the wireless connections, sensors, or coding. It also can connect to its surrounding technologies and databases. "Internet of Things describes a world where just about anything can be connected and communicate in an intelligent fashion" ("Internet of Things", n.d.). Wright (2016) stated the application of Internet of Things devices such as home appliances could be set up to be "smart" to understand human voice, or communicate within the system to make adjustment as we want it to be, and it uses "computer chips and wireless technologies" to perform all configurations.

The Internet of Everything (IoE) is a less complicated term. The Internet of Everything connects consumer products and devices to the Internet with the accessory of digital features. It is an idea that is based on technology's future that is made up of many different types of devices with applications, and appliances that are linked to the global Internet. In the future, data processing will not just be confined to a laptop or a desktop, or tablets; machines will be smarter and connected. Everything will be more intelligent and better connected for more efficient work. The IoE will follow the idea of an input and output framework. Techopedia has the best description of how the input and output feature work. The input will be outside data that is placed into a piece of hardware and the output will be pieces of hardware that will be placed back into the Internet ("Internet of Everything", n.d.). The Internet industry has had many changes, challenges, legal and ethical issues, but still manages to be the primary way that the world operates. Without the Internet industry, there would be minimal forms of communication, travel, and the world would be a completely different place.

Humanity has always had an information problem. With distance, time, geography, and political restrictions information has always moved slowly, only as fast as a person could write, walk, translate and copy. This all changed with the Printing press. What took months to write, now took hours, and the cost of information drastically reduced even the poor could then afford to become literate. This led to drastic changes in society no longer did a few individuals have the power of information at their hands, no longer did the common man must rely on being told what those lines say, today information is now freely given, traveling at the speed of light from all the sides of the earth and society has changed drastically. Ideas are now global; technology development can benefit everyone in a short time. Now let's ask ourselves this. What happens when things can communicate with each other? We are now on the cusp of a new informational revolution: The Age of the Internet of Things.

## Competitive Strategy within the Internet Industry

Internet industry has a significant impact on the way we do business in our society; the Internet allows companies to reach a greater target audience with a fraction of the cost and resources to do so. However, the problem with that aspect of using technology as an advantage is the disadvantage that other companies can do the same. Google got over 100 billion searches in 2015 that was a significant advantage for corporations and businesses. The Internet has become a new expense for these companies by spending thousands every year on advertisement, development, and space on the web as well as costs to Google in other browsers to put their searches on the top of the list. The conflict with the companies is that it is a battle to get their page viewed first to get to in the search results.

This is also an advantage for web companies to earn revenue as well ("2017 Marketing Statistics, Trends & Data - The Ultimate List of Marketing Stats", n.d.). With millions of users always searching and using the web, the cost for companies can be extreme, however; the benefits from a great web presence can be insurmountable. Take for example Wendy's, (Gould-Bourn, 2017) who has used a social media platform and gained a massive following by merely being sassy and humorous. On the other hand, so much exposure can be disastrous even if it was well intended. Pepsi (Perez, 2017) knows this too well, after a disastrous add called by critics as tone deaf and jokes on many social platforms. Not too long ago such a misstep would have made a few news articles and perhaps some angry letters, but online it has persisted morphed into constant jokes and generally been a PR nightmare. This presents a real risk that any misstep could lead to a major crisis.

## Value Chain of the Internet Industry

The Internet Industry's value chain has grown from $1239 trillion in 2008 to $3463 trillion in 2015 and is expected to be at $5849 trillion by 2020. Pigliapoco and Bogliolo (2011) proposed a stimulating, but a direct question: "Does the network generate enough value to sustain its own development?" Concisely, they postulate a positive benefit from the exponential trend of Internet traffic. Furthermore, they state the prominent segment of the Internet Industry's value chain to consist of Content rights, Online services, Enabling Technology services, Connectivity and User Interface. Table 1 briefly shows the prominent segments of the Internet value chain in more detail (Page & Frith, 2010a, 2010b).

*Table 1*
*Overview of the Prominent Segments of the Internet Value Chain*

| Content Rights | Online Services | Establishing Technology Services | Connectivity | User Interface |
|---|---|---|---|---|
| **Media rights owners**<br>• Video<br>• Audio<br>• Books<br>• Gaming<br>• Adult content<br>• Editorial content | **Communications**<br>• Skype<br>• Facebook<br>• Others | **Support technology**<br>• Web-hosting<br>• Web-design/development<br>• Content management | **Core network**<br>• AT&T<br>• NTT<br>• British Telecom<br>• France Telecom | **Applications**<br>• Software<br>• Media players<br>• Internet browsers |
| **User-generated content**<br>• Text<br>• Images<br>• Voice<br>• Video | **General/Vertical content**<br>• Yahoo<br>• Wikipedia<br>• Others | **Billing and Payment**<br>• Online system providers | **Interchange**<br>• Level 3 communications<br>• XO Communications | **Devices**<br>• PCs<br>• Smartphones<br>• Game consoles<br>• Other Internet access hardware<br>• Operating systems |
| | **Search**<br>• Google<br>• Bing<br>• Ask.com<br>• AOL.com<br>• Baidu<br>• WolframAlpha<br>• DuckDuckGo<br>• Interactive Archive<br>• ChaCha.com | **Advertising (AD)**<br>• Online AD agencies<br>• Online AD networks/exchanges<br>• Third party AD services<br>• Rating services | **Retail Internet access**<br>• AT&T<br>• Vodafone<br>• Free<br>• SingTel<br>• Tiscali<br>• Road Runner<br>• NTT<br>• United Internet<br>• Others | |
| | **Entertainment**<br>• YouTube<br>• iTunes<br>• Others | | | |
| | **Transactions**<br>• Amazon<br>• eBay<br>• Expedia<br>• Others | | | |

Content rights protect media rights owners, such as Warner Brothers, that have videos, books, gaming programs, adult and editorial content, and audio placed on the Internet to follow through with copyright laws. Content rights also protect user-generated content such as video, images, voice, and text. Online services offer their services to any Internet users through communication, such as Skype and Facebook, general content like Yahoo! And Wikipedia, search engines like Google or Bing, and entertainment and transaction sites, such as YouTube, iTunes, eBay, and Amazon. The third value chain is Enabling Technology services that deliver web content and generate revenue through support technology, billing and payments, and advertising. Support technology delivers services for web design, content management, and

web developers when creating new sites. Billing and payments are sites that use secure systems to ensure that card information is not stolen when an online purchase is being made, sites such as PayPal and Google Checkout. Advertising services are essential for creating revenue.

Advertising for sites is done by advertising agencies, dedicated online advertising, third-party ad serving providers, and ratings and analytics service providers. Connectivity, the fourth value chain, is gained by Internet access providers. An example of a core network Internet provider would be AT&T that provides fast, efficient Internet. Interchange Internet providers are developed through Level 3 Communications and XO Communications. Retail Internet access connectivity comes from providers such as Vodafone, United Internet, and Road Runner. The final value chain is User Interface. User Interface is a critical part of the Internet Industry's value chain that works through applications and devices. Applications are run by software, media players, and Internet browsers, like McAfee and Firefox, that run the program to the best of its ability to where it does not generate viruses on the computer. Devices such as PCs, smartphones, operating systems, gaming devices, and other Internet hardware are run by providers like Microsoft, Apple, and Nintendo. These providers operate the devices and allow specific applications to be included on the device. The Internet Industry's value chains are the same now as they will be in the future, the only expectation of what is to come in the future is new Internet providers and sites, new devices, and more ways to connect to the Internet. The Internet's worth is a growing industry that will continue to grow as more technology is produced in the future.

## The Use of Applications in the Internet Industry

Briefly, the most prominent applications in the Internet industry is mobile applications that have also defined the way we do business within the Internet industry. Because of mobile applications, companies have an even greater means to reach their target audience as well as making access to the company easier. Features with applications also make it possible for the user to interact more with the company as well.  How is the Internet industry being assisted now? Companies can take advantage of this and make it possible to produce advertisements on various apps to promote their company and network also to creating interactive ways and extra paid application features to generate additional revenue. The power of applications has influenced our way of marketing making it even more comfortable than before to become tied to everyday things in our lives such as shopping, banking, and entertainment. Companies must keep up and ahead of staying one step ahead of competitors in making more user-friendly and innovative applications ("2017 Marketing Statistics, Trends & Data - The Ultimate List of Marketing Stats", n.d.).

## Effects and Benefits of IoT and IoE

Internet has become the primary communication method in the modern world, but as technology advances so too does our culture. However, Internet has brought a big change to the world since it has been created. The global society has drastically changed since the advent of the Internet, so too as each new Internet cable is drawn the world and her inhabitants become more intertwined, we see each other less by our labels and more as another person. The Internet can provide any information that we need via its search engines from various developers. Google is the most popular engine among that. Recently, Google just announces a new search engine called "Google for Jobs" which allows employer and job seeker can interact better; moreover, it provides all kinds of professional services from primary to top levels of professional jobs (Perez, 2017). Also, the data can be collected within the circulation in the fastest way that helps us save time and cost as compared to the physical exchange of information (Manyika et al., 2015). Hence, we stand at a crossroad, and our choices now will affect every generation after us.

Furthermore, Internet of Things and Internet of Everything are two crucial parts of the Internet industry. However, the changes that the Internet has had on not only society but our daily lives, now the Internet of Things gives an even more drastic change. Firstly, the applications of Internet of Things to our family, including our home and healthy habits in our daily life, are said to be the most useful in that it

contributes to human life. Its appliance is further reaching, for instance, Fitbit – one of the most popular activity trackers, which can track all our physical measures such as steps, heart rate, distance walked, calories burnt, etc., and then sync with or smart devices like mobile phone or tablets so we can keep us on track for a healthy body.

Furthermore, there are unlimited benefits that IoT can contribute to our world such as GPS showing us a smart map and "fundamentally change the way we drive, making journeys safer and less stressful" (Wright, 2016); or instead of going to the stores as we always do, it provides a quick and convenient way to shop by just one-click at home, you can have your stuff delivered right to the front door.

Additionally, with the evolution of Internet of Things becoming more intertwined in our lives, IOT supporting products are getting faster, cheaper, and better. People can connect to public transportation system or call a taxi much faster than before. Communication between managers and the employees is more effecient as they can work from home or anywhere, but a video call can make them attend a conference in a company easily. Subsequently, production will cost less, and the expenses can be decreased which is every necessary in every business (Johansson, 2016). Internet empowering has a great impact on not only major businesses in a country, but also affect individual consumers. Among them, entrepreneurs seem to be the best beneficiaries.

There are individuals with the brilliant ideas who have already become millionaires, or even billionaires recently, and cities now have sprouted in the desert for the nova rich. Internet is also being applied to healthcare and fitness industry, allowing patients to be connected to their doctors monitoring system from the comfort of their home. Construction industry is also using the technology to their advantage. More than 150 cases have been studied where organizations utilized health monitoring devices that use sensors to "optimize the maintenance of equipment and protect the safety of workers" (Manyika et al., 2015). As can be seen, Internet and its applications play a very important part in our life and our society.

## Legal and Ethical Issues of IoT and IoE

Where the benefits of the Internet are clear, the drawbacks are blatant as well. An entire underground market trading everything from drugs to slavery, to criminals stealing personal information for nefarious purposes or using technology destructively. In some cases human rights are being trampled on by governmental bodies in the name of national security. Perhaps the greatest issue is the willingness of people to give away their privacy to the growing "big data complex", these undoubted problems will grow, and new issues will arise (Mark & Sanyin, 1999). Among them, security, privacy, transparency and data ownership are considered as the top concerns within between providers and users. The latest ransomware attack caused a global damage, and hundreds of thousands of accounts has been threatened or hacked. That attack raises a big question to the system, which is said to be one of the most secure systems in the world – National Security Agency. The cyber-attack would be one of the upcoming problems that we might have to face in the future.

The ethical issues might range from gender, religion, to the race, and even bigger aspect – nation. In other words, we can illustrate the problem between a rich and a poor family both want to purchase a new technology device, and it will somehow "decrease the efficiencies in higher socio-economical classes" ("The Internet of Things", n.d.), and cost the lower ones more to get it. This will cause the discrimination rate that we are trying to lower in our modern world.

In 2014, smart fridges were introduced as the "brave new world of the Internet of Things" (McCallum & McOwan, 2014). These smart refrigerators could display information of temperature, announce us when some items are out and able to perform an online order. That was a huge invention at that time, and millions of consumers all tried to get one. The ideas of having a smarter fridge pushed the supplier to work even harder. McCallum and McOwan (2014) pointed out the demand of a superintelligence generation of

machines that it can "learn where the best clusters are and can even move the boundaries as more data becomes available", and stated some arising ethical issues of personal privacy as well as whether it can be appropriate to use in every home without any limits. They would like to call them "the fridge attack" if they act more human like us. What will be able to happen then?

## Challenges of IoT and IoE

After all the advantages and usefullness that Internet brings to us, there are drawbacks, and there are challenges that we are having with both Internet of Things and Everything now. The smarter Internet of Things become, the more privacy concerns are raising, and we are now having more cyber or Internet attack than before. Most of our daily devices such as mobile phone, television, mobile speaker, that we use every day now can sync to each other, so we can easily track out activities everywhere with the fastest speed. However, it will give the best opportunity for anyone who wants to hack our devices or even our company system whenever they want. As all the data will be saved in one place, it will be easier to lose, either.

On the other hand, the Internet of Things can also directly change or track our habit and make a profit for some marketing or shopping companies. As the marketers or device's suppliers collect the information from their customers, it can be either analyzed or sold as all providers now have their data sharing agreement. So, fully detailed metrics, as well as shopping habits, will be known, and they will know what and how to make the customer purchase next time. This will be considered as an invasive concern for everyone. The challenge for users to protect their personal information, and providers need to make sure their customers' data is safe are the most important question nowadays.

## Specific Examples of Successful Internet Companies

In today's world, we are so unbelievably spoiled with technology. With the smartphones that we have today, we can search anything imaginable with just a couple taps on our phones from almost anywhere. Although there are many various successful Internet companies to present in this section, it seems to be more appropriate to explore and discuss a few leading edge and successful companies within the telecommunication/networking sector.

In the core of the today's telecommunication is smartphones that currently operate using 4G mobile telecommunication technology. This allows users to access the IoT and IoE from almost anywhere within seconds. However, with companies striving to make things faster and more accessible, the next best thing has already been in the works. 5G is the next best thing, and it will allow users to be faster and more efficient when accessing the IoT and IoE on the go ("What is 5G", 2015; Reddy, 2016). Not only will it help the everyday users that search Google for a word they do not know, but it will also help businesses across the world communicate faster and with little effort.

For instance, Project Skybender is a new project that Google is working on to deliver 5G Internet through a system of solar-powered drones. Google is currently experimenting with millimeter waves, which are believed to be capable of transmitting data 40 times faster than LTE," (McCallum & McOwan, 2014). This technology is a huge advantage because it will allow them to reach a new spectrum. However, they have also discovered that these same millimeter waves do not last as long. One of the problems that Google has faced is that millimeter waves "fade after a short distance," (McCallum & McOwan, 2014; Moon, 2016). Google and its researchers should find a way for the millimeter waves to travel longer distances for this technology to succeed. The solar-powered drones that Google has chosen for Project Skybender are called Solara 50. Also, Google has been granted permission from the FCC to test these drones until the end of July 2019. This technology is essentially going to give Google the ability to beam the Internet from the sky. The experiments are still taking place, but further updates on the progress of the technology will be updated on www.google.com.

Another example is Samsung which has been a leader in the telecommunications field for quite some time now. They now have their eyes set on the 5G networks. Samsung Electronics has been working on 5G advancements since 2012, and they plan to roll out their new network sometime in 2018. The connection will be done by "broadcasting the 5G signal from light poles and other fixed infrastructures and beaming it to the Samsung 5G routers placed in the windows of people's residences," (Sag, 2017). This particular connectivity will be accessible from home, but Samsung is also working in the mobile side of the 5G network. They have paired with companies and research teams all over the world to be able to perfect them. The biggest problem that they have faced is the multi-cell mobile handover. This is the technology that allows you to stay connected when on the go. With the commitment of www.samsung.com, it will likely be the first to launch a 5G network.

With all the major carriers in the U.S. racing to be the first, Verizon is making tremendous progress. With tests that have been taking place for about a year now, Verizon is set to have a series of trials of the 5G network in 5 major U.S. cities. Like Google, Verizon is using the millimeter wave technology to make this network run (Trefis Team, 2017). Also, the company has made several substantial purchases of optical fibers. With new technology, Verizon will be able to "put a 5G transmitter in street light," (Pressman, 2017). With this ability, Verizon will be able to minimize the need for multiple cell towers in certain areas. Also, Verizon has been working with Samsung and their quest to launch a 5G network so the connection from the Samsung routers to the Verizon transmitters will be smooth and efficient. The only problem that Verizon faces is being able to supply this technology to all their customers. Even with buying millions of miles of optic fibers, the company still faces the issue of connecting everyone. Remember, they are using the same millimeter waves that Google is and face the same problems of distance. Without the ability to transmit the millimeter waves over long distances, the technology will only be useful in the same neighborhood as another 5G user. With the trials still underway, Verizon is believed to release the results of the trials and further plans and improvements.

## Concise Concluding Statements for Thoughts

Society has changed so much, thanks to the innovation of greater communicative capacities. Often, the future is as either a bright and exciting place or as a dark dystopian society, the only difference between those worlds is what is done now. ("Dystopian Literature Primer", n.d.) It must be recognized that the issues are growing now and need to be addressed, there must be a balance between liberty and security, between comfort and privacy, and we must be aware that we may not always do the right thing and that we need to be willing to correct it. The Internet of Things and the Internet of Everything are proliferating every year. Within the next few decades, technology will be completely different and highly advanced; and will be used entirely in different ways. As technology grows, the world grows and will always be changing.

## Acknowledgment

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