The Internet of Things

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# **Introduction**

According to Technopedia, the definition of the Internet of things (IoT) is:

“A computing concept that describes a future where everyday physical objects will be connected to the Internet and be able to identify themselves to other devices.” (Technopedia, 2015)

The phrase “Internet of Things” is commonly thought to have been originated by Kevin Ashton the cofounder of the Auto-ID Center, a research group studying RFID and similar emerging sensor technologies. The phrase was the title of a presentation Ashton gave at Procter & Gamble (P&G) in 1999, at this talk he described how the new idea of RFID technology could be used to link P&G’s supply chain to the internet to increase efficiency. (Ashton, 2009)

This summary report seeks to provide an overview of the current state of the Internet of Things in two primary areas; the Consumer and Industry. It will look at where these two areas stand today, as well as provide insight into where it is predicted to be in the near future.

# **Current State of the Internet of Things and Future Prospects**

The concept of the Internet of Things has grown greatly in ambition since 1999 however, the applications outlined in the book “Enabling Things to Talk” highlights some of these ambitions. An example of an application outlined in this book is the concept of a “Smart City”, upgrading common city infrastructure such as traffic lights, signage, parking sensors etc. with IoT connectivity would allow a more responsive approach in areas such as traffic and public transport among many others.

One of the primary benefits provided by the concept of a “Smart City” is that it would enable vehicles the ability to communicate with city infrastructure. This would enable city administrators the ability to provide drivers with information such as speed limits, road works, stop lights etc. automatically providing the driver more information about the road.

This is just one of numerous potential use cases for the Internet of Things, others include Smart Homes, Factories, and Hospitals. In each of these instances, IoT capability allows for a much greater level of autonomy in systems and lessens the need for Human intervention which in turn alleviates stresses on these systems. There are already some existing elements of an IoT network present in cities today, features such as Bus time estimates, public Bike sharing, Parking Lot usage numbers and public wifi hubs are all elements of an IoT network presently in Dublin City.

This technology is currently in its infancy, in 2009 the Internet of Things install base was made up of approximately 0.9 Billion units, estimates from the research company Gartner Inc. show a 30-fold increase to 26 Billion units in 2020 (Gartner, 2013). The CEO of Cisco Systems John Chambers, stated that his company estimates the Internet of Things will contribute as much as 19 Trillion US Dollars to the Global Economy over the next decade. These figures highlight that while currently the Internet of Things is not widely adopted, it is growing at an exponential rate, meaning that soon it will become ubiquitous.

# **Internet of Things Current Uptake Industry & Consumer**

The Internet of Things is already having a large impact of manufacturing, logistics and healthcare industries. According to a report by Lopez Research, 82% of manufacturers who have implemented IoT based “Smart Manufacturing” said that they experienced an increase in efficiency, 49% experienced fewer product defects and 45% experienced increased customer satisfaction. This same report cites the German Manufacturer Bosch as referring to the Internet of Things as the “fourth industrial revolution”. (Lopez Research, 2014)

While the impact to Industry has been quite profound, hasn’t become very obvious to the average consumer according to a 2014 survey of 2,000 consumers 87% hadn’t heard of the term “Internet of Things” despite studies forecasting mass adoption in the near future. The same survey showed that 64% of Customers did not purchase an IoT device because they were unaware smart devices were available for purchase. This lack of awareness and value perception is the largest barrier to mass-adoption of the technology.

This survey highlights that these are not the only barriers to the consumer adoption of the Internet of Things another large issue is concerns over privacy and information security. According to the survey 26% of Consumers expressed concerns over privacy.

Despite these barriers, there has been a steady increase in the adoption rate of both wearable devices such as Smart Watches and Fitness devices as well as in the Home with devices such as Smart Thermostats, Lights and Fridges. According to the same Accenture Survey two-thirds of those surveyed said they planned to purchase an in-home smart device in the next 5 years and 33% stated they would purchase a wearable device in the next five years.

Alongside the in-home smart devices and wearable devices, one of the main areas which has seen a noticeable and ongoing integration into the Internet of Things is the Motor Vehicle industry. According to an Article in the IEEE Internet of Things Journal the “percentage of Internet-integrated vehicle services will jump from 10% today to 90% by 2020” (Lu, et al., 2014).

# **Conclusion**

This summary report highlighted the current state of the Internet of Things, as well as the future prospects of the technology. The report showed how it was being utilized by Industry; improving efficiency and cutting down on costs, as well as how influential manufacturers were making use of it.

It also demonstrated the current lack of consumer awareness of the technology and the reasons behind it, while also showing that despite this, estimates project a widespread level of consumer adoption in the next 5 to 10 years.

As part of the analysis of the Consumer aspect of the Internet of Things this report detailed some current areas the technology has successfully integrated itself into, most notably the automotive industry and the wearable fitness market.

If this report has highlighted it anything, it’s that the Internet of Things presents a great opportunity to revolutionize the way we live our lives at a fundamental level, it is the most significant development in this regard since the widespread adoption of the Internet.

# **References**

## Web:

Ashton, K., 2009. *That 'Internet of Things' Thing.* [Online]   
Available at: <http://www.rfidjournal.com/articles/view?4986>  
[Accessed 13 October 2015].

**Ratings:** **Authority:** **5,** **Currency: 3, Relevance: 6, Independence: 3, Originality: 6**

**Reasoning:** I gave this reference a low rating as it is mostly a first person perspective recalling an event from 10 years ago. It’s also written 6 years ago, from a source heavily invested in the topic.

Technopedia, 2015. *Internet of things (IoT.* [Online]   
Available at: <https://www.techopedia.com/definition/28247/internet-of-things-iot>  
[Accessed 12 October 2015].

**Ratings: Authority:** **5,** **Currency: 10, Relevance: 10, Independence: 5, Originality: 6**

**Reasoning:** This reference was used as it is a definition which I could verify elsewhere. The primary shortcoming was that I could not verify the authority or independence of Technopedia itself.

Accenture, 2014. *The Internet of Things: The Future of Consumer Adoption.* [Online]   
Available at: <https://www.accenture.com/us-en/insight-internet-things-future-consumer-adoption.aspx>  
[Accessed 15 October 2015].

**Ratings: Authority:** **5,** **Currency: 8, Relevance: 10, Independence: 3, Originality: 8**

**Reasoning:** I found the statistics in this survey to be very useful, it’s relatively recent, quite original and relevant to the topic. The issue I have with this is that Accenture is very close to this topic and has an interest in a positive perception of IoT. This could lead to some level of bias.

John Chambers, 2014. *Are you ready for the Internet of everything.* [Online]   
Available at: <https://agenda.weforum.org/2014/01/are-you-ready-for-the-internet-of-everything/>  
[Accessed 12 October 2015].

**Ratings: Authority:** **4,** **Currency: 8, Relevance: 10, Independence: 3, Originality: 8**

**Reasoning:** This article is not entirely reliable as it is the perspective of one man, Cisco also has a vested interest in the success of IoT so there could be bias involved. It is relevant however, and recent.

Lopez Research, 2014. *“Building Smarter Manufacturing With The Internet of Things",* San Francisco: Lopez Research.

**Ratings: Authority:** **9,** **Currency: 8, Relevance: 10, Independence: 7, Originality: 9**

**Reasoning:** I found this report to be very useful as it is relevant to the topic, it is recent and comes from an established independent third party. It was however, commissioned by Cisco which have a vested interest in IoT as mentioned previously**.**

## Book:

Bassi, A. et al., 2013. *Enabling Things to Talk.* 1st ed. New York: Springer Open.

**Ratings: Authority:** **7,** **Currency: 6, Relevance: 10, Independence: 7, Originality: 10**

**Reasoning:** This reference is relatively recent, independent of outside sources, and has an original take on the topic. The only shortcoming I have with this reference, would be that it’s not clear whether they’re from a trusted authority.

## Journal:

Lu, N. et al., 2014. Connected Vehicles: Solutions and Challenges. *Internet of Things Journal, IEEE,* pp. 289 - 299.

**Ratings: Authority:** **7,** **Currency: 8, Relevance: 10, Independence: 7, Originality: 9**

**Reasoning:**  I found this reference to be very helpful, it’s current, independent, and focuses on one area well. The only issue I have is that the journal it’s published in is relatively recent, and therefore not as much of an authority on the topic.

## White Paper:

Cisco, 2011. *The Internet of Things - How the Next Evolution of the Internet is Changing Everything,* s.l.: Cisco.

**Ratings: Authority:** **5,** **Currency: 3, Relevance: 6, Independence: 3, Originality: 6**

**Reasoning:** While this Whitepaper is quite relevant to the topic at hand, it is 4 years old and published by a Cisco who stand to gain a great deal from IoT and therefore cannot be entirely trusted to have a non-skewed perspective.

## News Article:

Gartner, 2013. *Gartner Says the Internet of Things Installed Base Will Grow to 26 Billion Units By 2020.* [Online]   
Available at: <http://www.gartner.com/newsroom/id/2636073>   
[Accessed 12 October 2015].

**Ratings: Authority: 7, Currency: 8, Relevance: 10, Independence: 8, Originality: 8**

**Reasoning:** This news article details a study published by Gartner In 2013, for this reason I find it very relevant. Gartner itself is a trusted analysis authority in the industry. The main drawback is that since this is a news article it is an interpretation of the results and statistics, rather than the original results and statistics themselves.

# **References Review**

The references I found most useful for this topic the News Article from Gartner, the Journal article *“Connected Vehicles: Solutions and Challenges”* and the book *“Enabling Things to Talk”.*

I found the News Article useful for it’s the very relevant statistics it provided, I felt comfortable using this source as it comes from a trusted authority and due to its currency. The Journal entry was helpful as it helped me come to an understanding of IoT enabled vehicles, it also provided statistics which made for interesting reading. Finally, *“Enabling Things to Talk”* was extremely valuable for the interesting use cases it outlined for IoT, it helped me come to an understanding of the potential IoT has in store.