# The Internet of Things: Illusion or Confirmatory element to consider in the 21st century

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*Abstract*— The 21st century is full of innovations, among many; the internet of things becomes a reality within the degeneration and reformation of computers. Abundant papers and business articles written recently, talk more about the rapidity at which technology is restructuring any industry background, which is a tangible proof of what our century holds.

This paper dialogs on the huge pace of changes created by the revolution of technology through computers with a particular focus on the internet of things been a confirmatory detail. We found tangible ground of rocks to argue on the Internet of thing been a confirmatory element of our century, and we have proved it with statistics and examples in this paper.

Index Terms—Internet, revolution, computer, space.

#### I. INTRODUCTION

Historically, computers were taking up huge spaces, not being accessible to many people while requiring dedicated training to operate them. They started their journey in our small offices and desks, as well as in our homes and are now simple enough for everyone to become proficient in their use within a few days. Here and now, computers themselves are declining. As a result, computers are gradually moving into the internet of Things, into no-touch interfaces and into our daily lives.

While we have long left behind schedule loading disks into slots to get our computers to work and become used to software as a service (SaaS) – Mobility as a Service (MaaS) is right around the corner as well. Despite the fact that the question remains debatable in the sense of establishing measurable evidences, technology corporations are becoming more and more consumer driven, capitalising in things like native content to get us committed to their platforms, from which we will sign onto enormously online services to entertain and educate ourselves.

The Internet of things is breaking the conventional rules that control the way we live our lives. From business to home, and from entertainment to government, we have by this time experienced the far-reaching paraphernalia of a technology that bonds or links us in extraordinary ways, this to underscore the predictions of the analyst firm Gartner saying that by 2020, 50 billion devices will be connected to the web, from cars and doorbells to your pet dog's collar and the kitchen stove (Pallister, 2015). That is many connections (some even estimate this number to be much higher, over 100 billion). The IoT is a giant network of connected "things" (which also includes people). The relationship will be between people-people, people-things, and things-things (Morgan, 2014). Everyday household objects increasingly hold the potential to become, in techno parlance, 'a gateway to an estuary of services'.

An anticipated development of the Internet in which everyday matters have network connectivity, allowing them to send and receive data, as well as the trends and development of the inter- connected world in transforming the way we live and work today have captured our attention to determine whether or not the web of things is an illusion or an affirmative fact which requires a deep look from every single human of our society. This is to underline also the circumstance that the pace of change in information technology today is greater than ever.

"If one thing can prevent the Internet of things from transforming the way we live and work, it will be a breakdown in security". While our always on, always connected world has fundamentally changed how human being operate every day, communicate with peers, and cloud computing becoming a common jargon in the mouth of many people, even when they do not understand the concept at all, the truth is: the Internet of Things (IoT) puts a big question mark in the minds of product developers and managers everywhere. And this is currently happening whether we like it or not.

Consequently, the big question remains on the issue on how does one cross the gap between the promise of IoT and actually delivering accurate life's values for both human and businesses? Beyond all considerations, the problem is and remains, people have limited time and attention to disruptive dynamics of their lives. Although many people are becoming familiar with the acronym "IoT" and understand it to mean the internet of things; for the authors, this is a catch-all stint for our flora and fauna of cloud grounded information and smart connected devices.

Authors are blindly calling it an illusion for a simple reason that some business owners are still ignorant of structural transformations brought by the Web of things in their everyday lives. Implicit in others authors early work, and explicit in this paper, the focus remains on the web of things been an affirmative dynamic of the  $21^{\text{st}}$  century.

To support and sustain our opinion, we share Pallister (2015) statements in which he argues on a clear comparison between idealists and defeatists. Pallister (2015) underscores on one hand the fact that optimists would have us believe that the IoT will free us from the mundanities of running a household; while Pessimists on the other hand, sell us a dystopian hallucination of an insecure and frightening world where everything can be hacked—by governments, corporations or other people—including our car, our burglar alarms or even our pacemaker.

At the end, how will this transformation play out in our homes? How will it affect our relationships; make us think, feel and act? This paper does not intend to clarify the opinion of the majority about these questions, instead it tries to firmly conclude that the internet of thing is an affirmative detail to consider now.

The internet of things (or as it's also known, IoT) isn't new: technological companies and pundits have been discussing the idea for decades, and the first internet-connected toaster was unveiled at a conference in 1989 said Kobie (2015).

# II. LITERATURE REVIEW

Our clear observation on the outset of the world after midnight is that, when people talk about "the next big thing," they do not constantly think out of the box or big enough. It's not a lack of imagination but a lack of observation because the future is always within the ability to see. So why on earth people have to stress on the web of things?

The "Internet of things" (IoT) is becoming an increasingly growing topic of conversation both in the workplace and outside of it. It's a concept that not only has the potential to impact how we live but also how we work (Morgan, 2014).

Among its many other cultural and economic assets truly speaking, Google is mounting up a rather comprehensive record of what is worrying us, from asking the search engine to diagnose our disease symptoms to whether we will ever find true love (Kobie, 2015). It seems expected, then, to turn to Google to decrypt anything including the latest piece of technical jargon, "the internet of things".

Although the concept was not baptised until 1999 before Kevin Ashton, cofounder and executive director of the Auto-ID Centre at MIT, first bring up the Internet of Things in a presentation he made to Procter & Gamble the same year; the Internet of Things has been in progress for decades. The first internet contrivance, for example, was a Coke machine at Carnegie Melon University in the early 1980s. The programmers could connect to the machine over the internet, check the status of the machine and conclude whether or not there would be a cold drink awaiting them, should they decide to make the trip down to the machine (Rouse, 2016).

The Internet of Things revolves around improved machine-to-machine communication; it is setting together on cloud computing and networks of data-gathering sensors; it is mobile, virtual, and on the spot connection; and they say it is going to make everything in our lives from streetlights to seaports "smart" (Burrus, 2014). On the other hand, the burden to meet the expectations of highly connected, digitally well-informed customers is driving significant changes across all industries. IoT can enable countless improvements to products and services, and will significantly affect the way businesses engage with customers and employees.

Our observation at Natura in Brazil has convinced us to look at this with more attention than before. How will the internet of things affect business and work like mentioned above? Our firm answer is simple and straightforward because of endless examples we could consider to display on how IoT is real and taking more space in our lives today. Above all, allow us to say that all depends on your industry: manufacturing is perhaps the furthest ahead in terms of IoT, as it is useful for organising tools, machines and people, and tracking where they are. The author's visit to Natura as mentioned earlier on set the truth and tone of the manufacturing industry in particular in this company's warehouse.

The reality today is that: broadband Web is turn out to be more extensively available, the asking price of connecting is diminishing, more devices are being produced with Wi-Fi aptitudes and measuring device built into them, technology overheads are going down, and smartphone dissemination is sky-rocketing. All of these things are crafting an "impeccable storm" for the IoT. Despite a growing number of definitions about IoT, few of them will be used for the sake of this paper, we will consider the following definition from Tech Target (2016) for now, which is underlined:

"The Internet of Things (IoT) is a system of interrelated computing devices, mechanical and digital machines, objects, animals or people that are provided with unique identifiers and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction".

For us, the IoT does not just mean that a thing is connected to the Internet and propels some data back and forth, which are by design displayed here and there. IoT is also describes as an international effort to bring everything that was not internet within the purview of the techno-elite that currently dominates the internet; to date argue Pallister (2015), the debate about the impact of IoT has focussed predominantly on these techno-legal-political narratives. But what about us? What will it be like to live in this hyper-connected world?

IoT is more than smart homes and connected appliances, however. It weighbridges up to include smart cities – think of connected traffic signals that monitor utility use, or smart bins that signal when they need to be emptied – and industry, with connected sensors for everything from tracking parts to monitoring crops (Kobie, 2015).

The reason behind our statement of people not thinking out of the box is that: a thing in the Internet of Things can be any thinkable items a human being can imagine. It could be a person with a heart monitor implant, a farm animal with a biochip transponder; an automobile that has built-in sensors to alert the driver when tire pressure is low, the case of a Mercedes Benz. This could also be any other natural or manufactured object with IP assignment's capabilities with the ability to transfer data over a network. Practical applications of IoT technology can be found in many industries today, including precision agriculture, building management, healthcare, energy and transportation (Rouse, 2016).

The reality is that the IoT permits for virtually endless prospects and networks to take place, many of which we cannot even think of or copiously comprehend the influence of today. It's not hard to see how and why the IoT is such a hot topic today; it unquestionably opens the door to a lot of breaks but also to many encounters. The truth above all is that discussions about the IoT are (and have been for several years) taking place all over the world as we seek out to comprehend how this will impact our lives.

The new rule for the yet to come underscores Morgan (2014) is going to be, "*Anything that can be connected, will be connected.*" But why on earth would one wants so many connected devices talking to each other? There are many examples for what this might look like or what the prospective value might be. Give or take for example, you are on your way to a meeting; your car may perhaps have right to use your

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calendar and already know the best route to take. If the traffic is heavy, your car might send a text to the other party acquainting them that you will be late (Morgan, 2014).

All we can predict from our conscience's observation is that, connected devices will likely move stealthily into most businesses, just the way computers and the web have. The truth behind this statement of ours is that: as bits and pieces embedded with sensors gain the ability to communicate, the new information networks promise to create new business models, improve business processes, and reduce costs and risks (Chui, Löffler, & Roberts, 2010).

The widespread adoption of the Internet of Things might take time, but the time line is moving forward thanks to improvements in underlying technologies. Advances in wireless networking technology and the greater standardisation of communications protocols make it possible to collect data from these manufactured bits and pieces embedded with sensors almost anywhere at any time (Chui, Löffler, & Roberts, 2010)The IoT refers to the connection of devices (other than typical fare such as computers and smartphones) to the Internet.

Our belief beyond the confusion and adoption of the Internet of Things is to underscore three basic definitions judged useful to paint a silhouette that foster better understanding. Below are them:

- **Internet of Things**: A network of internet-connected bits and pieces able to collect and exchange data using embedded sensors.
- **Internet of Things device**: Any stand-alone internet-connected device that can be monitored and, or controlled from a remote location.
- Internet of Things ecosystem: All the components that enable businesses, governments, and consumers to connect to their IoT devices, including remotes, dashboards, networks, gateways, analytics, data storage, and security.

This ecosystem illustrated in figure 1. Shows the analysts at Business insider Intelligence through all the data to create a report that discusses all of the components of the IoT ecosystem, including its devices, analytics, networks, and security. It also forecasts the emerging IoT market, including megatrends, device growth, amount invested and potential return on investment (Greenough & Camhi, 2016).



# The Internet of Things Ecosystem

Figure 1: The internet of things ecosystem (Greenough & Camhi, 2016)

In talking about what comes next say Chui, Löffler, & Roberts (2010), The Internet of Things has great promise, yet business, policy, and technical challenges must be undertaken before these systems are widely incorporated. Early adopters will need to prove that the new sensor-driven business models create superior value. Industry groups and government regulators should study rules on data privacy and data security, particularly for uses that touch on sensitive consumer information.

# III. IS THE INTERNET OF THINGS AN "ILLUSION"?

No, the internet of things is not an illusion; it is instead, a term that internet users have been peppering the questions about with the search engine. At its core, IoT is simple: it is about connecting devices over the internet, letting them talk to applications, each other, and us. Even at this level, there is confusion brought by this notion called "Internet of Things". We have realised that Internet technology has made this mad dialogue possible. Many advocates have claimed that searching on the internet has created an illusion of knowledge (Jacobs, 2015). Yet, there are so many more factors to consider as we seek to discern the future. The internet of things in our opinion cannot be an illusion neither something closer to it.

It is not because the internet surpasses any person in accessibility, speed, and breadth of knowledge, now the internet of things is an illusion. Yes, the internet has become an all-knowing expert transactive memory partner; but this is far to describe an internet of things as an illusion. Because the internet of things is not about searching on the internet or web answers to ambiguous questions, IoT is not an illusion; it is more about living in a very well connected environment where programmed devices help you on a daily basis with different tasks.

However, the internet of things in others words, is this just another way in which life is becoming more and more automated? Most people embrace the automation of day-to-day tasks including shopping as it saves them both time and money. We think however, the illusion lies somewhere else in the use of connected devices not directly to the notion of IoT.

When many thinkers, writers and business leaders all agree on something, it does not matter when or where, it is worth paying attention. An important component of internet of things, and a key element in the fears it engenders, is the ability of the so-called "smart devices" to take action on their own without human intervention. This could take the form of a computer reprogramming itself in the face of an obstacle or restriction. In other words, a device to think for itself and to take action accordingly.

In the age of the Internet of Things (IoT), we should admit the fact that it is difficult for to eradicate the notion of illusion as it encompasses our daily lives. However, it is noteworthy to elucidate the fact that IoT is different from the internet technology itself. Our responsibility lies on the fact that users are confused and are not educated enough to realise the change occurring around them. Most people who use Google for instance (and that is a large percentage of the world's population today) usually do not notice when something has changed or a test has recently been implemented.

The Internet of Things (IoT) is arguably the most hyped concept since the pre-crash dot-com euphoria (Pallister,

2015). Many users may recall some of the phrases from back then such as "the new economy," "new paradigm," "get large or get lost," "consumer-driven navigation," "tailored web experience," "it's different now," among countless other business fabrications (Burrus, 2014).

While we acknowledge the concerns about the internet of things, at the same time, we cannot allow users to qualify IoT as an illusion. We are arguing on the fact that something tangible is not an illusion. In what we called the Internet of Things, sensors and actuators embedded in physical bits and pieces through wired and wireless networks, often using the same Internet Protocol (IP) that connects the Internet (Chui, Löffler, & Roberts, 2010).

Definitely, the single-most important boost for the internet of things has been the proliferation of internet-enabled smartphones. Mobiles day are internet-connected mini-computers that are more powerful than the average PC of a decade ago. Another enabling factor is our ability to store vastly greater amounts of data remotely in the so-called cloud. Can this be an illusion?

# IV. IS THE INTERNET OF THINGS A "CONFIRMATORY DETAIL"?

Surprisingly, it is easy to answer. Although technology is full of marketing and exaggerate, that is often difficult to decide early on whether an innovation is truly breakthrough or not; the internet of things is one of those wider ideas that is not dependent on a single project or product (Kobie, 2015). The success is tangible, and predications have proved many people wrong.

The Internet of Things (IoT) is disrupting businesses, governments, and consumers and transforming how they interact with the world. Companies are going to spend hugely on the IoT in the next few years because the proliferation of connected devices and massive increase in data has started an analytical revolution (Newman, 2017).

# A. Horizontal versus Vertical

One of the best ways to understand the business potential of the internet of things is to look at examples (Chui, Löffler, & Roberts, 2010). At the sector level, it is likely there will be first-order, "horizontal" and second-order, "vertical" implications.

Horizontal beneficiaries are the companies that make the various key physical components that make the internet of things possible. Examples of these are the low-cost, semiconductor-based, micro-electromechanical-system sensors that pick up the data that connected things send out. Vertical beneficiaries comprise second-order winners that are benefiting from applications that are specific to their industry

and that ultimately serve to boost output efficiency or service quality.

While we found many opportunities in both spheres, the opportunities in vertical sectors are likely to be broader owing to the greater diversity of potential industry applications, some of which are likely to be game-changers. The key reason why there are probably fewer opportunities in horizontal sectors is that hardware forms part of commodities (Fidelity International, 2015).

# B. Connected Everything

One of the common examples of IOT devices is a programmable thermostat like the Nest, which enables the user to put together a program that optimizes the temperature within their house, turn it up and down remotely and track those temperatures over time.

Smartphones are another example of IOT underscores Larson (2015). Smartphones are constantly collecting data about location, apps used and websites visited, and then uploading it to your service provider, phone manufacturer, operating system provider (Google for Android phones and Apple for iPhones) or the app vendor.

The original intention of Location tracking of phones was for 911 location of phones in emergencies, today applications as Google Maps uses it to determine traffic congestion and in many other programs to feed advertising to the phone user based on the user's location and travel patterns. (Larson, 2015).

# C. Business Survival of the Century

Over the last three decades, organisations have had to reinvent themselves every three to seven years to keep up with the pace of change. Companies that missed one technology transition might scramble to catch up, but missing two meant a slow fade to obscurity, irrelevance, and death.

We constantly request observation from every user to think about the rapid evolution from records, to cassettes, to CDs. A close comparison to horizontal versus vertical indicates that: with this rapid evolution, each transition created new winners and losers. Today, the evolution has come full circle as digital streaming services have made any kind of physical media obsolete.

# D. Charting the growth

The graphs below show estimated unit shipments and the resulting installed base of IoT devices. Most market estimates out there tend to show the growth of the IoT in terms of installed bases, growing to many billions by 2020 (Pallister, 2015).



Figure 2. Forecast of billions devices by 2020. (Flibidi, 2014)

To gain insight into this emerging trend, Business Insider Intelligence conducted an exclusive Global IoT Executive Survey on the impact of the IoT on companies around the world. The study included over 500 respondents from a wide array of industries, including manufacturing, technology, and finance, with significant numbers of C-suite and director-level respondents.

They size the IoT market in terms of device installations and investment through 2021. They examine the importance and challenges faced by IoT providers; what do they do with the collected data. Finally, they looked at the opportunities, challenges, and barriers related to mass adoption of IoT devices among consumers, governments, and enterprises as illustrated in figure 3.

#### FORECAST: IoT Device Installation Base Global, 2016-2021



Figure 3. IoT device Installation forecast (Newman, 2017)

New connections to the Internet of Things (IoT) will grow from about 1.7B in 2015 to nearly 3.1B in 2019. IoT applications will also fuel strong sales growth in optoelectronics, sensors/actuators, and discrete semiconductors, which in projection are set to reach \$11.6B in 2019, attaining a Compound Annual Growth Rate (CAGR) of 26% during the forecast period as shown in figure 4.



With the potential to streamline and deliver, greater time and cost savings to a broad spectrum of enterprise tasks said Columbus (2016), opportunities for Internet of Things (IoT) adoption are blooming. It is heartening to see so many industry-leading manufacturers, service providers, software and systems developers getting down to the hard work of making the vision IoT investments pay off.

McKinsey estimates that the IoT has a total potential economic impact of \$3.9 trillion to \$11.1 trillion a year by 2025. At the top end, that level of value—including the consumer surplus would be equivalent to about 11 percent of the world economy as indicated in figure 5 (Manyika, et al., 2015).

For Manyika, et al. (2015), realising this kind of impact would require certain conditions to be in place, notably overcoming the technical, organisational, and regulatory steeplechases. In particular, companies that use IoT technology will play a critical role in developing the right systems and processes to maximize its value.

According to McKinsey, their central finding is that the hype may actually minimise the full potential—but that

apprehending it will require an understanding of where real value can be created and a successful effort to address a set of systems issues, including interoperability.

Manyika, et al.(2015), argue that Interoperability between IoT systems is critical. Of the total potential economic value the IoT enables, interoperability is required for 40 percent on average and for nearly 60 percent in some settings as display below.

Potential economic impact of IoT in 2025, including consumer surplus, is \$3.9 trillion to \$11.1 trillion



Includes sized applications only.
NOTE: Numbers may not sum due to rounding.

SOURCE: McKinsey Global Institute analysis

Figure 5. Potential economic impact of IoT in 2025. (Manyika, et al., 2015)

### V. DISCUSSION

This paper is not about a confirmatory data analysis process; it is more about argument with endless examples to support our view of IoT not been an illusion but a valuable element to consider in the 21<sup>st</sup> century because of its impact on many areas of our lives. A lot writings has been taking place about the speed at which technology is reshaping the business landscape today. Except that is not quite phrasing it correctly. It is more like it is leaving the traditional business world behind.

For us, the pathway of the internet of things is clearly marked when thinking of the trends we have seen emerge in recent years. Our awareness set us aside from the native group of technology followers as our observation proves to be sustainable. Why do we believe in IoT been a confirmatory element to consider in the 21<sup>st</sup> century rather than to entertain the confusion which gave birth to illusion?

We believe above all, as the emerging technologies turn out to be more powerful and sophisticated, they will progressively overlap. Our fine observation is that: although the peculiarities between drones, autonomous vehicles, smart cities and robotics are already making confusion, the outset of this conjunction, which proliferates the strengths of each technology, makes artificial intelligence not just desirable but inevitable. In our opinion, this is one argument among many that set the tone of consideration of IoT in the  $21^{st}$  century.

The trend of abundant computing and hyperactive connectivity, which exponentially increase the flow of data between people and devices and among devices themselves. Increasingly complex sensors, systems architectures, and software can collect, store, manage, and analyse hugely more data in far less time with much greater sophistication (Columbus, 2016; Greenough & Camhi, 2016; Kobie, 2015). Artificial intelligence, in which algorithms become increasingly capable of making decisions based on past performance and desired results (Burrus, 2014).

Sensors and actuators connected by webs to computing systems has established enormous attention over the past five years (Manyika, et al., 2015). None of this is news to technology companies and those on the frontier of adoption. However, as these technologies developed, the range of corporate deployments will definitely increase (Chui, Löffler, & Roberts, 2010). These changes born from the internet of things cannot take place without consideration.

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Now it is all up to executives and business leaders across all industries to structure their thoughts about the potential impact and opportunities expected to emerge from the Internet of Things (Chui, Löffler, & Roberts, 2010). Moreover, because this topic has been changing many things in our lives, we strongly believe in IoT been a confirmatory detail to look at in this century. Our argument sustains against all odds because of proof shared in this paper. In addition to the litany of examples, our findings have sufficiently proved how we edge into the territory of artificial intelligence today. If Artificial intelligence is shaping up as the next industrial revolution like many researchers advocate, then what is the enabler? How can it rapidly reinvent business, the global economy and how people work and interact with each other without links or connections? We deliberate that: one cannot talk about artificial intelligence without thinking about the means of communication between different components.

As a result, there is a rapidly expanding gap between what the technology world is implementing on and what the enterprise can deliver. However, these days technology advancements, the smart cities of endless connected devices and new digital markets are often the key to a future. A few examples will suffice - the endless and seemingly real-time flow of useful and highly innovative new mobile and Web apps for managing travel, money, news, communication, productivity, and countless other key functions constitute the tangible fact that IoT must be taken into consideration today or you die. We strongly believe that, a single organisation cannot be sustainable without considering the shift or moves of the current century, so it is the internet of things.

Today, we are breathing in a world few could have imagined five decades ago. In addition, because it takes strength and courage to an organisation to invest on finding patterns of trends proven to disrupt our century, it is our responsibility to think without a box to what the workforce and workplace will look like in the next century from now.

# VI. CONCLUSION

Our awareness is our calling. Being aware and taking advantage of that reality may be one of our greatest challenges. Yet, it is also our greatest opportunity. Decision-makers must understand the implications of IoT now and some facts of the future if sustainability is ever crossing their minds. The orders of magnitude is what described the internet of things today. However, for us, IoT is not an illusion and will never be.

Joining our voice to many intellectuals of our time, the internet of things is in theory much more an honestly disruptive revolution of our century business and social automation, giving people the lack of restrictions to live and work more meritoriously. The Internet of Things (IoT) is the emerging disruptive technology of our century that is taking place in the business imagination.

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