

IT in the workspace – The need for digital transformation

Tiberiu TELEGESCU

tiberiu.telegescu@gmail.com

Abstract. *We live today in a world irreversibly and comprehensively impacted by the digital economy, either by its ability to transform traditional markets into digital ones or by creating new ones altogether. In such a digitized environment, agility, speed, adaptability and innovation through disruption are key attributes for organizations to maximize, in order to enable their workforce to be effective and efficient and achieve the organizational goals. The paper aims to outline that organizations have, as part of their digital transformation journey, opportunities to embrace the benefits that the new tools of the digital economy, such as cloud, mobility and big data analytics bring. The most immediate advantage of such a change is the ability to reduce the total IT spend, making the organization more frugal and allowing resources to be diverted into other (potentially revenue generating) parts of the business. As a method of proving that, we've taken several case study examples of enterprises both achieving savings by implementing new tools into their business. However, businesses often do not settle just for that but instead use part of the newly freed up resources to enhance their digital environments. Digital tools enable teams to work easily together and allow the workforce to access any and all of the organization's resources from anywhere and at any time they wish. This "consumerized" demand model, where IT service is customized every step of the way is what lead enterprises to change their internal IT work frame and thus migrate from the legacy "one size fits all " model, to the new, flexible, scalable and customizable model, through the usage of new capabilities like Cloud, Big Data, Analytics, Internet of Things (IoT), Mobility.*

Keywords: IT in the workspace, Digital Transformation, Cloud, Big Data, Analytics, Internet of Things (IoT), Mobility.

Introduction

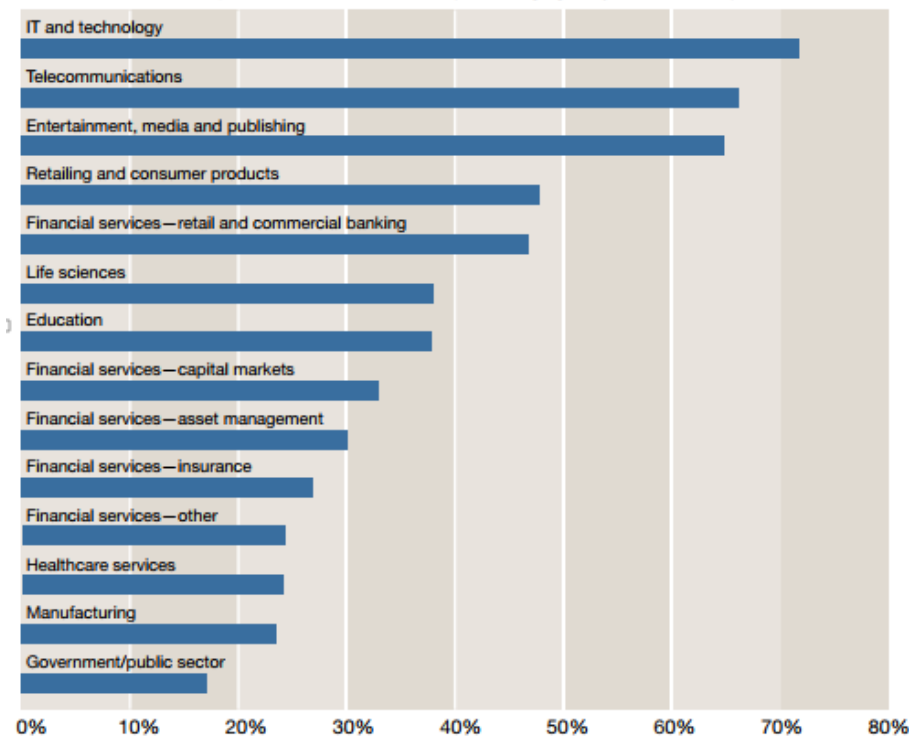
We are all familiar with the quote inspired from the work of the Greek philosopher Heraclitus "The only constant in life is change" and although this line of thought is millennia old, one may argue that it has never been "truer" than now. We are in the middle of a new era of "industrial" revolution, but this time the output is not tangible (per se), it's intangible - or digital. The economy has rapidly shifted towards digital and end-to-end digitally driven business (or more commonly known as ecommerce) is growing massively – one study finds (Wallace, n.d.) that in 2018 51% of Americans prefer to shop online and whilst 96% of Americans with internet access have made an online purchase in their life, 80% did so in the past month alone.

Deloitte (Cassar et al., n.d.) defines the digital economy as the "activity that results from billions of everyday online connections among people, businesses, devices, data, and processes. The backbone of the digital economy is hyperconnectivity which means growing interconnectedness of people, organisations, and machines that results from the Internet, mobile technology and the internet of things (IoT)." In order to survive and eventually thrive in this fast-paced environment, the enterprises need to undergo a (arguably, never-ending) digital transformation and, as the gig economy intertwines with the digital economy, expectations are that enterprises do not offer digitized and "consumerized" services only to their external clients, but also to the internal ones as well, so that they may service, in the expected parameters of time and quality, the end stakeholders.

In a study Oxford Economics conducted (Oxford Economics, 2011), they identified that this shift “is not just restructuring the world economy; it is leading to a new phase of industrial transformation.” The study finds that executive estimate that the industries who will be the most affected by change over the next five years are “ IT (72%); telecommunications (66%); entertainment, media and publishing (65%); retail (48%); banking (47%) and life sciences (38%) (Oxford Economics, 2011).

Chart 1. Industries most affected by digital transformation

In your view, which of the following business sectors will be most transformed (for the better) by information technology over the next 5 years? (% stating “greatly transformed”)



Source: <http://www.oxfordeconomics.com/my-oxford/projects/232584>

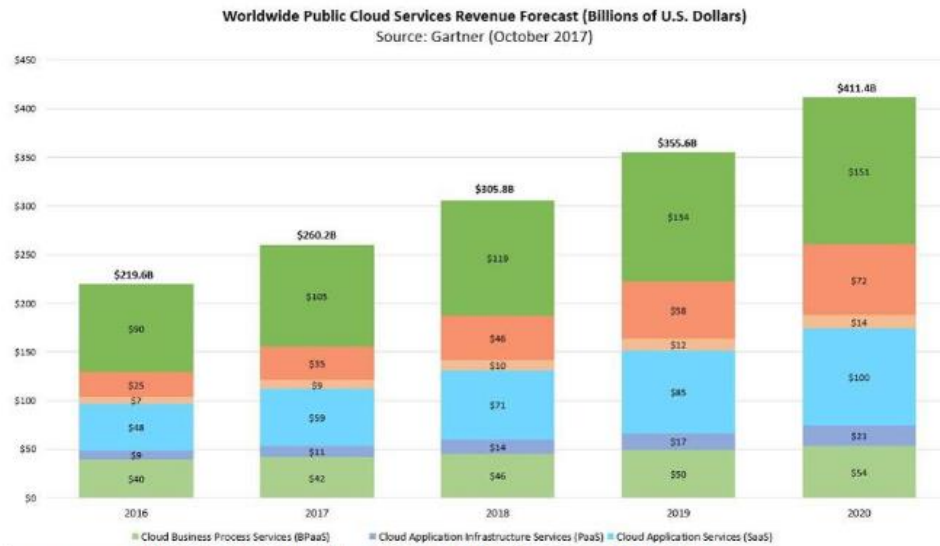
The new capabilities available to enterprises – Cloud.

“By 2019, 75% of workers whose daily tasks involve the use of enterprise applications will have access to intelligent personal assistants to augment their skills and expertise”. (Vesset, et al., 2016) This personalized experience provided to employees is the direct effect of the tools made available in the digitized era, and it all started with cloud computing.

But what is cloud computing? PCMag defines cloud computing as “storing and accessing data and programs over the Internet instead of your computer’s hard drive”. (Griffith, 2016). As the enterprise is making accessible a shared pool of resources to each user, one may configure, adjust and obtain, on demand and immediate, the resources they need in order to perform the task at hand.

Operating in a 200+ Bn\$ market that is projected to grow to 400+ Bn\$ by 2020 (Columbus, 2016) the top cloud providers battle in the so called “cloud wars” (Evans, 2016), each aiming to draw more revenue through their own “flavor” of cloud, while still providing cost reductions to their clients:

Chart 2. Worldwide Public Cloud Services



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Forecast

Source: <https://www.forbes.com/sites/louiscolumnbus/2017/10/18/cloud-computing-market-projected-to-reach-411b-by-2020/#5a32b08a78f2>



Figure 1. Magic quadrant for cloud infrastructure as a service, worldwide

Source: <https://blogs.dxc.technology/2017/06/20/gartner-shows-us-a-world-of-public-cloud-haves-and-have-nots/>

Top 10 Rankings – Nov. 7, 2017

1. Microsoft	— Nadella on \$20.4B run rate w/ <u>end-to-end customer-centric cloud</u>
2. Amazon	— AWS needs software! <u>10 software companies Amazon might look at</u>
3. IBM	— Rometty strikes gold helping customers convert legacy IT to private cloud
4. Salesforce	— Benioff must extend SFDC impact from SaaS deeply into PaaS
5. SAP	— McDermott accelerating major product-line overhaul to HANA and cloud
6. Oracle	— Ellison on cybercrime: <u>'Make no mistake, this is a war—and we're losing'</u>
7. Google	— Tons of potential but still unclear if/how it wants to play in enterprise
8. ServiceNow	— Jumps ahead of Workday: revenue up 40%, new products boom
9. Workday	— Q2 revenue surges 41% as <u>Bhusri</u> jumps into PaaS marketplace
10. VMware	— revenue & stock jump on deals w/AMZN MSFT IBM GOOG for hybrid

Bob Evans

Figure 2. Cloud wars Top 10 Rankings – Nov

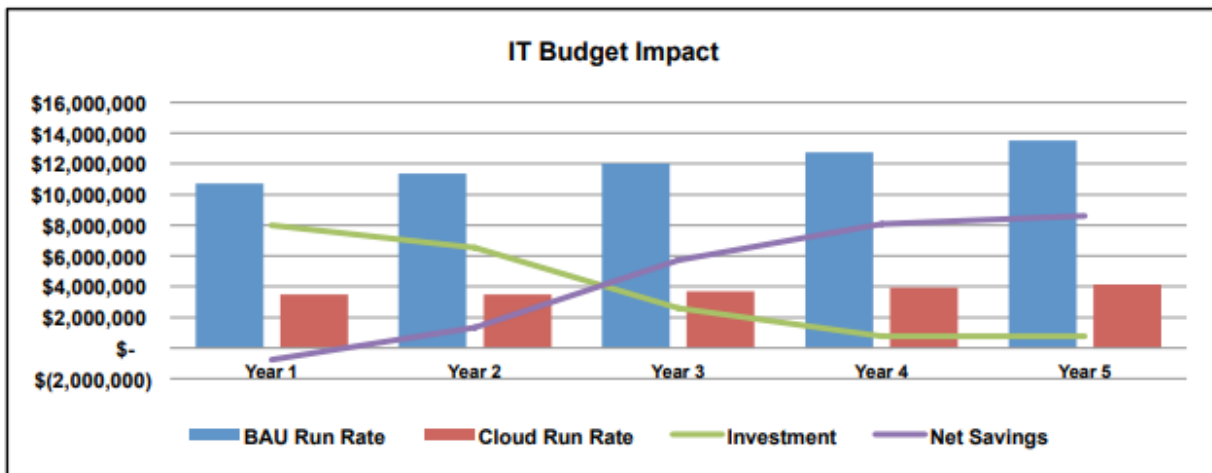
Source: <https://www.forbes.com/sites/bobevans1/2017/11/07/the-top-5-cloud-computing-vendors-1-microsoft-2-amazon-3-ibm-4-salesforce-5-sap/#6ff33e296f2e>

However, regardless of vendor and specificity of client needs, Azure notes that all cloud computing services do offer a series of benefits that make the shift appealing to organizations (“Top benefits of cloud computing”, n.d.). Firstly, the cost for the enterprise is probably to drop, as outsourcing environments to a third party provider does take out the capital expenditure (like hardware and software cost), but also the operating expenditure associated to the running of the cloud environment, like electricity cost. Furthermore, cost of workforce is reduced by making the labor associated with the environments redundant. Speed of sizing the IT infrastructure a key incentive for enterprises to make the shift. Usually, scaling to the appropriate needs is a quick online self-service action that provides enterprises the required flexibility to continuously adjust their purchases and benefit from the “pay-as-you-go” model. As the infrastructure is outsourced, the enterprise should have more time to focus on achieving its business goals, as all thus requirements of running the infrastructure go away, thus making the enterprise more productive and focused. Performance is ensured as the datacenters do get regularly updated. Furthermore, the reliability of the service is certified as through the usage of mirrored datacenters, data backup, disaster recovery and business continuity is performed at a lower level of cost.

A recent study found “that standardizing, consolidating and virtualizing hardware and software infrastructure reduces costs and improves operational efficiencies” (DellEMC, 2017). The study continues by showing that as a direct result, the average IT expenditure dropped by approximate 24%. The paper also references Forrester Consulting, as they analyzed the potential return on investment for enterprises “investing in an on-premises private cloud. They determined that for a composite organization based on existing private cloud adopters the ROI is 111%, with a Payback Period of 13.2 months” (DellEMC, 2017). As

a case study, the paper published the case of a premier energy company that achieved a 2.4 year payback period with a 123% ROI.

Chart 3. Premise and financial outcome



Source: <https://www.emc.com/collateral/white-papers/h15537-the-roi-of-private-cloud-wp.pdf>

In addition than for the organization, cloud does offer several advantages to the employees as well, as 92% of surveyed executives said their most successful cloud initiative enabled creation and support of new business models (Chua et al., 2016).

Furthermore, the same study shows that the adoption of hybrid cloud services facilitates innovation by enabling quick prototyping of new ideas for faster experimentation.

Chart 4. Why organizations said they'll strategically adopt hybrid cloud solutions

Growing business with cloud: Why organizations said they'll strategically adopt hybrid cloud solutions



Source: <https://www-01.ibm.com/common/ssi/cgi-bin/ssialias?htmlfid=GBE03766USEN&>

Also, the adoption of hybrid cloud solutions in the workplace may contribute towards employee satisfaction. A recent study shows that 1 in 5 millennials in IT "will start looking for a new job if their organization does not take their suggestion to change an IT policy or process, more than non-millennials (roughly 1 in 10)" (Microsoft, 2016).

The adoption of cloud however is not without tradeoffs and potential negative outcomes. In a survey (Talbot, 2017) done in mid-2017, more than 1 in 3 respondents

stated that services don't work as expected, while almost 1 in 3 mentioned the poor services and outages encountered.

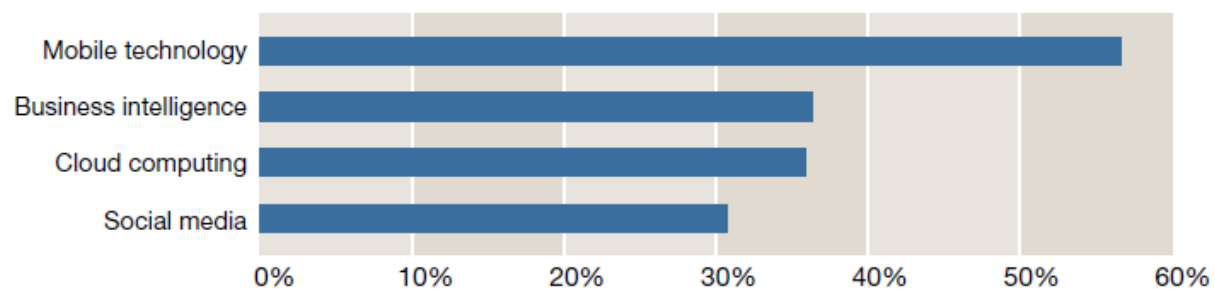
Adding mobility into the equation.

Cisco describes mobility as “access to information or applications from occasionally-connected, portable, networked computing devices” (Revzin, 2009). Mobility continues the trend within the gig-economy, allowing the user to access data from where-ever and using whatever terminal they please. Through mobility, employees may choose when, where and how to connect, collaborate, interact and create, thus making data fully accessible exclusively at their own convenience.

In 2011, Oxford Economics identified mobility as the number one technology that will have the biggest positive effect in the market in the near future (Oxford Economics, 2011).

Chart 5. Which do you believe will have the greatest positive impact on your new business over the next five years?

Which do you believe will have the greatest positive impact on your business over the next five years?



Source: <http://www.oxfordeconomics.com/my-oxford/projects/232584>

Mobility does also affect, the workplace and is by all means a major disruptor in comparison to the traditional way of doing business. As we are living the shift towards the gig economy, enterprises need to consider the effects that these types of disrupting technologies have both on the workforce as a whole and also on each employee's specific needs. To ensure that business outcomes are delivered consistently as expected, enterprises must address the “human” part of this transformation and answer questions like: is my workforce mobile and if no, why? Will it be mobile in the future? Are the devices that are being used today my workforce number one choice and if not, why? What types of devices can be used to empower my workforce tomorrow to deliver on tomorrow's needs and expectations? One additional barrier that mobility helps bring down is siloing: the segregation and isolation (usually involuntary) of business pillars due to technology related bottlenecks. Although the matter has been discussed in the past, quantifying what is the opportunity cost of an enterprise by its operating in silos has proven a hard task. By breaking down silos, corporations may then chance processes to be more data driven, thus increasing productivity by the usage of real time information.

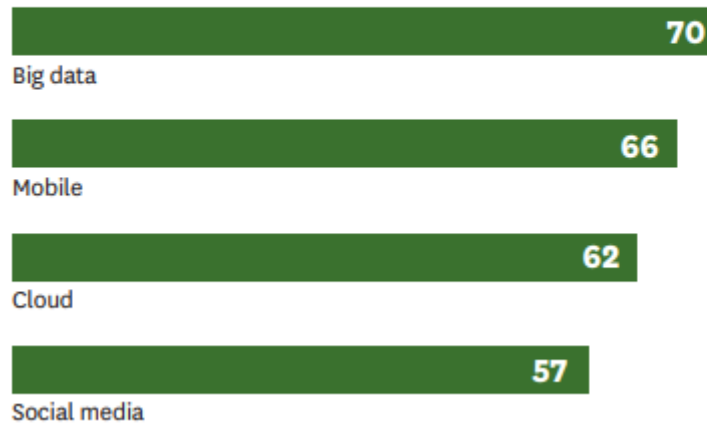
Big data – the enterprises' big guns in analytics.

Although it's being described as "an all-encompassing term for any collection of data sets so large and complex that it becomes difficult to process using on-hand data management tools or traditional data processing applications " (Press, 2014), the term "big data" has never been a term whose definition satisfies both its capabilities and its users alike. The Oxford English Dictionary does define it though as "data of a very large size, typically to the extent that its manipulation and management present significant logistical challenges" (Press, 2014). But what is " big data " really, how " big " is "big " and how can enormous amount of (arguably unstructured) information help corporations and employees alike ?To answer those question we'll start with some history and context. Researchers at Berkeley did conduct an estimation of how much data did the world produce. They found (Press, 2014) that in 1999 we produced 1.5 billion gigabytes and that that figure doubled in 2003. To put things into perspective and compare to today, Domo calculated that in 2017, humanity produced 2.5 billion gigabytes of data each day. The numbers are staggering; for example, each minute we produce around 47 thousand Instagram posts, perform 3.6 million Google searches and send 15.2 million text messages, as the world internet population has reached 3.7 billion people. 90% of the data available today has been produced in the last two years alone (Domo, 2017), and the growth trend continues: by 2020, we'll be producing 1.7 megabytes of new information will be created every second for every human being on the planet (Press, 2014). Big data is important to businesses as it may be used to predict future choices – what's usually referred to as predictive analytics and user behavior analytics. "Using advanced analytics techniques such as text analytics, machine learning, predictive analytics, data mining, statistics, and natural language processing, businesses can analyze previously untapped data sources independent or together with their existing enterprise data to gain new insights resulting in better and faster decisions" (IBM, n.d.).

IBM identified (Jacobson, 2013) that the four dimensions that big data spans across are volume, velocity, variety and veracity. The volume dimension refers to the increased level of data, in various types, that is now available to the enterprise. The enterprise may now, for example, create an instant and better market sentiment analysis through the scrutiny of tweets. The velocity dimension refers to the enterprise's ability to process huge amount of information in a record time and thus being able to use its new ability to lower even more its responses to time sensitive matters, like analyzing financial data to prevent fraudulent behavior. The variety dimension refers to the enterprise's ability to process, at the same time, data in various shapes and forms, both structured and unstructured, like both audio and video at the same time. This ability is a key resource in the enterprise's quest to create a better customer environment and experience. The fourth and last dimension identified in the study is veracity; the study showed that roughly 33% of executives question the veracity of the data they base their decisions on. The capability of having big data analytics comes to address this concern as it puts forward an outcome based on several linked factors.

In fact, in 2016 a study (Harvard Business Review, 2016) has shown that Big Data is the number one technology that will critically transform the business going forward. The same study showed that most respondents identified an increased level of agility as the number one impact of the digital technologies to the organization, a close second being the better utilization of assets.

Chart 6. New technologies key to digital transformation
NEW TECHNOLOGIES KEY TO DIGITAL TRANSFORMATION
 Percentage of respondents indicating that these critical technologies are transforming their organizations.



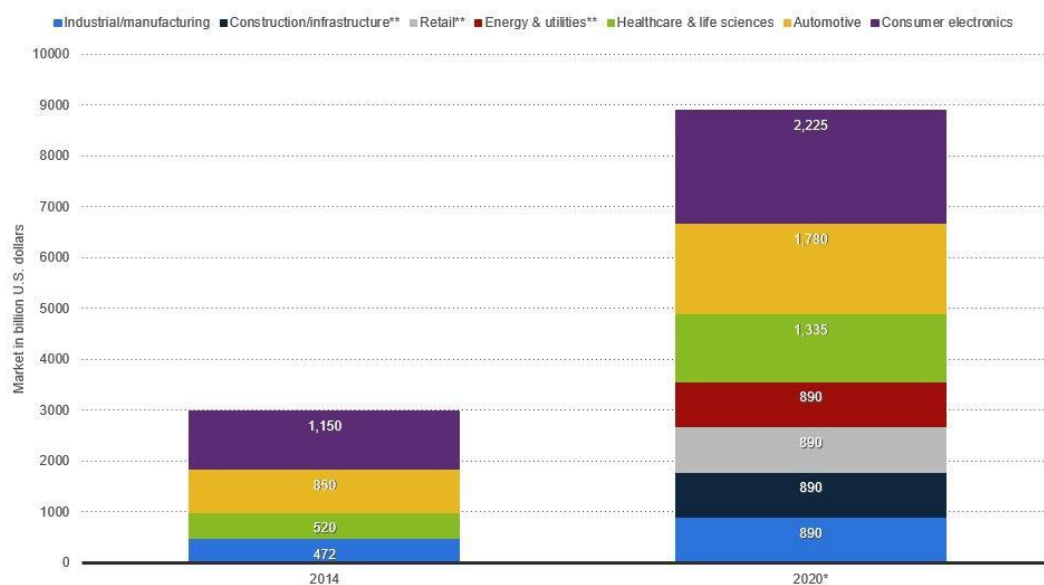
Source: https://hbr.org/resources/pdfs/comm/hp/19804_HBR_Report_HPE.pdf

Connected all the time, anywhere and with all that surrounds – the Internet of Things.

The internet of things (IoT) is defined by SAP (SAP, n.d.) as the “vast network of devices connected to the Internet, including smart phones and tablets and almost anything with a sensor on it” These items gather and share data amongst themselves through a machine-to-machine (M2M) technology thus allowing the reader of the output to have a comprehensive understanding of the events / environments looked into. The direct effect of such events would be that companies would be able to “predict and prevent service outages, airlines that can remotely monitor and optimize plane performance, and healthcare organizations that can base treatment on real-time genome analysis” (Sohail, 2016). The global IoT market will “grow from \$157B in 2016 to \$457B by 2020, attaining a Compound Annual Growth Rate (CAGR) of 28.5%” (Columbus, 2017). The reasons why the market is growing at such an exponential rate is because according to various statistical reports (Amyx, 2017), IOT is “is reshaping business practices in five major ways: increasing operational efficiency, redefining market winners and losers, transforming business strategies; reinventing product cycle; enabling real-time decision support from big data and data analytics”. This should not come as a surprise, as a report of (Amyx, 2017) The Economist's Intelligence Unit did find that one in four respondents to their survey assess that IoT “sparked a new wave of innovation thanks to data that give us better insights”, while one in five mentioned that it released incremental earnings opportunities from existing products/services. The benefit could be directly quantified in some cases, the same study showing that in certain Telefónica IoT augmented processes have increased efficiency by more than 82% and that customer service did increase by 45% (Amyx, 2017).

Chart 7. Size of the IoT market

Size of the Internet of Things market worldwide in 2014 and 2020, by industry (in billion U.S. dollars)

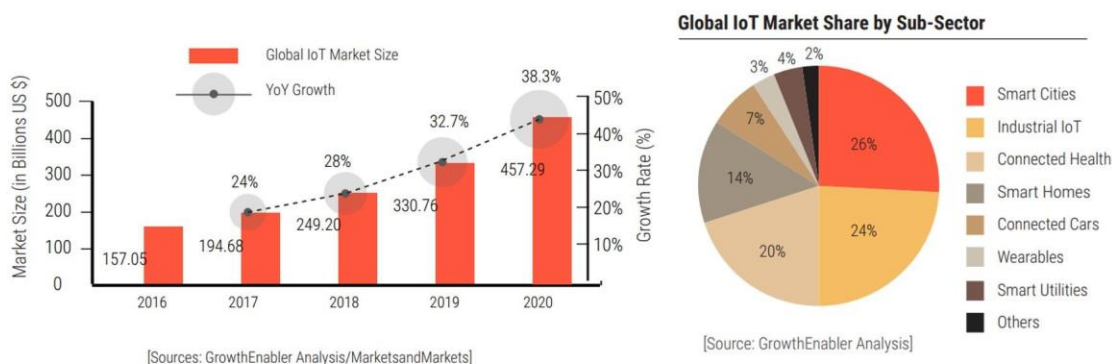


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Source: <https://www.forbes.com/sites/louiscolombus/2017/12/10/2017-roundup-of-internet-of-things-forecasts/#178870b01480>

Chart 8. Global IoT Market Share by Sub-Sector



Source: <https://www.forbes.com/sites/louiscolombus/2017/12/10/2017-roundup-of-internet-of-things-forecasts/#178870b01480>

In a report released by Cognizant, it was identified (Santhosh Reddy, 2014) that the manufacturing business is assumed to have the most to gain, although all industries will benefit from the implementation of these new capabilities.

Internet of Things: A Transformational Force

Industry	Key Change	Potential Benefits
Automotive and Transportation	Real-time driving behavior, traffic and vehicle diagnostics.	Improved customer experience, reduced pollution, increased safety and additional revenue streams.
Healthcare	Remote monitoring of staff and patients ability to locate and identify status of equipment.	Improved employee productivity, resource usage and outcomes that result in efficiency gains and cost savings.
Manufacturing	Quick response to fluctuations in demand; maximized operational efficiency, safety and reliability, using smart sensors and digital control systems.	Enhanced agility and flexibility, reduced energy consumption and carbon footprint.
Retail	Stock-out prevention through connected and intelligent supply chains.	Ability to predict consumer behavior and trends, using data from video surveillance cameras, social media, Internet and mobile device usage.
Supply Chain	Real-time tracking of parts and raw materials, which helps organizations preempt problems, address demand fluctuations and efficiently manage all stages of manufacturing.	Reduced working capital requirements, improved efficiencies and avoidance of disruptions in manufacturing.
Infrastructure	Smart lighting, water, power, fire, cooling, alarms and structural health systems.	Environmental benefits and significant cost savings with better utilization of resources and preventive maintenance of critical systems.
Oil and Gas	Smart components.	Reduced operating costs and fuel consumption.
Insurance	Innovative services such as pay-as-you-go insurance.	Significant cost savings for both insurers and consumers.
Utilities	Smart grids and meters.	More responsive and reliable services; significant cost savings for both utilities and consumers resulting from demand-based and dynamic pricing features.

Figure 3. Internet of things: a transformational force

Source: <https://www.cognizant.com/InsightsWhitepapers/Reaping-the-Benefits-of-the-Internet-of-Things.pdf>

McKinsey states (Manyika, et al. 2015) that in factories, the implementation and adoption of IoT has the potential to yield “an economic impact of \$1.2 trillion to \$3.7 trillion per year”. In fact, they were able to estimate that IoT would save “10 to 20 percent energy savings and a 10 to 25 percent potential improvement in labor efficiency. Improvements in equipment maintenance, inventory optimization, and worker health and safety are also sources of value in factories”.

IoT is not only helping employees in the daily operations, in fact, it's changing what is currently understood as “the workplace”. IoT technologies can increase workplace productivity by “filtering” out relevant and personalized information, from sensors relevant only to the recipient of the information, thus contributing to tailored data streams. This will affect decision making, from the business related items, to the personal ones that do, however impact the workplace, like commuter routes, time management and asset management.

Conclusions.

One may argue that the business world has changed materially and irreversibly changed “now”, from the time the reader started this article. “New” technologies and irreversibly and materially changing the business landscape at a pace never before seen. Although businesses, at a global level, are still in the beginning of the implementation phase of incorporating this disruptive technologies into both their client-facing model but also into their internal IT function, the augmentations that they bring to the traditional model are, although necessary, tremendous - and it's just the beginning.

New “new” technologies, like AI, Augmented & Virtual reality, quantum computing, blockchain technologies and RPAs are emerging and although they are in the early stages of development or in early adoption in their lifecycle curve, the impact that they're having to in business is profound.

Artificial Intelligence (AI) is in its early stages. Software that is able to learn and thus interpret, adapt to new circumstances and predict outcomes are making their mark into the world – just look at what Apple's Siri did to the mobile phone business and what IBM's Watson is doing at an enterprise level. In fact, IBM finds (Reddy, 2017) that by implementing a chatbot and AI strategy cost can be reduced upwards to 200 times / interaction.

Virtual and augmented reality will open a new era in customer service and customer interaction. Just as a commercial application, VR&AR have created new revenue streams that are expected (Grand View Research, 2017) to reach 46 Bn\$ by 2025. For the workplace, the benefits are numerous: the ability to overcome physical barriers by virtual conferencing everybody around the globe into the same room, creating safe environments for testing purposes. As per a PwC survey in 2016 (McCutcheon & Carrick, 2016) “about one of three manufacturers are already using – or are planning to adopt – VR and AR technologies in the next three years.”

Accenture estimates (Accenture, 2017) that quantum computing investments were 1 \$Bn in 2016 and Pluralsight estimates (Klint, n.d.) the market will grow to 5 \$n by 2020. Quantum computing is expecting to change both the way information is being stored but also processed – increase processing power upwards to a million times more (Marr, 2017) , thus making the IT sector both more powerful, but also more frugal in its resource usage and management.

The blockchain technology has become very visible lately, especially due to its link to the cryptocurrencies like Bitcoin. The principle that stands behind this technology is that databases are shared (not copied) amongst the users, continuously updated, while being openly shared amongst participants – there's no “centralized” location that holds the “one single golden source of truth “ , but actually, each user of the chain becomes a block and has their own “copy” of the ledger. Companies are starting to unlock the value inside this system –a study PwC conducted (PwC, n.d.) found that by using blockchain technology the level of productivity for the HR functions increased, as the technology could be used to vet any and all candidates' credentials.

Robot Process Automation are robots specifically built to perform repetitive (and usually time consuming) back office jobs, thus freeing up the workforce to focus on more adding value tasks. RPAs yield reduced cost, an increased quality output and faster processes. A case study on the finance department (Anagnoste, 2017) of an oil & gas company showed a 91% drop in the number of hours worked for a specific repetitive task.

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