"INTERNET OF THINGS" – A NEW TECHNOLOGICAL EVOLUTION

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ABSTRACT: Currently, the Internet provides access to content and information by connecting many terminals, such as PCs, smart phones or TVs to the internet pages. The next evolution will make possible to access information related to the physical environment using connected objects, able to perceive the environment through sensors and to communicate through smart chips using radio frequency identification (RFID), with or without human intervention. We are liven in a world of "connected "objects / things able to communicate with each other or with us, collecting, analyzing , transmitting a lot of information, sometimes so much that we began to wonder whether it's too much. Some call this the "Internet of things" or "Internet of objects". It is about an array of objects linked in a network and exchanging information with each other, which reminds of the people Internet. "Internet of Things "(abbreviated as IoT) is an upcoming technology where everyday objects like telephones , automobiles , household appliances , clothing and even food are connected to the Internet through smart chips that can collect and exchange data.

KEY WORDS: internet of things, internet services, communication, Smart Devices, hyper-connection

1. FOREWORD

I heard about diapers and sensor equipped that analyzes the position of the leg when running and compiling a report about this. We do not understand the real utility, but there are already appliances, sprinklers, alarm systems, electronic locks and many other devices, all connected by wireless and can be remotely controlled.

What is the impact of the phenomenon of connecting objects on our lives? It's a good or bad thing? We have already exceeded the safety limits? How things will evolve? These are questions that arise whenever a tendency to generalize the phenomenon - even globalizing - seems to threat the take over of our lives and dramatically interfere with our biological and social functioning. Hyper-linking (excessive linking) makes no exception - its rise generates a number of questions and concerns which are nothing but expressions of interest in an evolutionary process that has the potential to drastically change our existence (habit).

Until we will all experience the effects of this *"Internet of things*" mixture in our lives, we should hear some opinions from people who have studied the phenomenon and are able to give us some of their conclusions, or at least to launch ideas that make us to reflect more deeply on the phenomenon and to draw our own conclusions.

The term "*internet of things*" was launched in the 1990s by Kevin Ashton, for naming a large network of computers able to gather and process data from objects equipped with the ability to provide these data without the involvement of human operators to enter information into your computer. In his view, these structures have the power to produce a tremendous impact in our lives. "*Internet of things*", he said, "*has the potential to change the*

world, as the Internet did. Perhaps even greater."

The endowment of a car with GPS could be a way to quickly and easily reach your destination. The Internet offers both to children and adults new ways of learning. A complex counter can help us better manage our water, electricity and fuel in the household.

What about a diaper urine detector? The system includes an application that notifies the mother, babysitter or anyone carrying the children when the presence of urine is detected. Some experts believe that this approach is an exaggerated example. We rely on technology instead let our own sense of reality and intuition to guide us. Waiting for a connected device to tell us when the diaper is full, instead of being aware about the condition of our child, we risk to losing control over our own lives and letting the technology to take it over.

1.1. Pros and cons of "internet of things"

Referring to a recent report by *Future of Humanity Institute*, from Oxford University, experts believe that excessive recourse to technology could create a scenario that would lead to the extinction of mankind. The report said that it is not difficult to imagine a category of catastrophic scenarios when a specific technology that puts a huge destructive power on hands of large number of individuals, is discovered.

Many experts have the same opinion with the Oxford report's authors - it's dangerous to abuse of technology, because the consequences can be serious - although not necessarily in the sense of human extinction, but at the individual or family, social group's level.

Todd Creager, professor at the USC School of Social Work, believes that there is a human element that could be removed, replaced by a higher amount of information and too many gadgets; to rely

too much on such things, we can reduce intuition and creativity.

Some experts tend to see the bright side of things. They believe that a quantified and connected society could and worth the effort of adjustment we have to do – because it is obvious that getting to use this daily and continual data collection and transmission will require a period of adaptation on our part.

It is noted the positive aspects of the "Internet of Things" which interacting with people internet, will bring improvements in their lives such as telemedicine, monitoring and alert in case of danger, which will be beneficial to many people.

Others put their trust in inherent "*selection*", filtration on which the market, consumers will operate in the world of connected devices: some will penetrate into our lives and spread, others will be just failed attempts. They remember that we are already surrounded by many devices of this kind, but that not all will survive on the market. If a device that monitors a baby's breathing can attract the interest of parents - may have real medical reasons to supervise the children, or are just exaggerated careful – do not seems to be a great need of many other people.

Ultimately, consumers will decide. If it is profitable, they will use it. For example, in U.S. is used a thermostat that can be programmed very simple, can be controlled remotely and through which the consumers can significantly reduce the cost of home heating. More than 50,000 units are sold on a monthly basis.

For example, a complex laboratory for the "*Internet of Things*" was launched this year in Jiangmen city from the Chinese province of Guangdong. This was founded by the Company of science Lingyang from Taiwan and Wuyi University from Guangdong province. Laboratory was created to train staff in this area. "Internet of Things" is the third wave of information technology, after the computer and internet. Experts say that it will change the

people living and working way of life. China treats "Internet of Things" as a new strategic industry.

"Internet of Things", like any other technology, must expand our capacities. If people do not think that it will do it, then it will not catch on. There is also a certain resistance to change, that prevents people to quickly adopt new ideas, so some of the great transformations by this omnipresent connection may encounter resistance. Ultimately, the market decides.

Part of the solution to the problem lies in the way we use these objects, which are related to the internet of things. Simple fact that anything can be connected via the Internet - the machine, the objects from house or the clothes we wear - does not mean that they must be connected.

If we choose to control our lives in harvesting attention to our own feelings and to interpersonal relationships, instead relying on technology, we can control more safety the devices we are using, instead of allowing them to control us.

2. EUROPEAN REGULATIONS BY THE EUROPEAN COMMISSION

If an older person forgets to take a vital role pill, it could be sent a warning letter to a close family member or a local emergency center so that someone make a short visit to check that everything is fine. It is the "*Internet of Things*" or about a future where everyday objects like telephones, automobiles, household appliances, clothing and even food are connected to the Internet through smart chips (or sensors) and can collect and share data.

European Commission (EC) launched a consultation on the rules for smart connected devices - "Internet of Things". Brussels launched a public consultation with aim for ensuring that the rights of persons with regard to storage and data processing are fully respected.

Currently, any person owns at least two objects connected to the Internet, and it is expected that this number will increase to seven by 2015, when worldwide there will be over 25 billion devices connected by wireless. By 2020, their number could double, reaching 50 billion.

The achievement of enormous economic and societal potential of "I*nternet of Things*" requires a level playing field allowing all to compete on an equal terms, without guards, without users locked away. In order for the "*Internet of Things*" to be accepted by society, it is necessary to define an ethical and legal framework supported by technology and providing people control and security. In this consultation, the Commission wanted to receive views on the protection of privacy, safety and security, critical infrastructure security supported by the *Internet of Things*, ethics, interoperability, governance and standards. The results will help the Commission recommendation on the Internet of Things, which will be presented by the end of 2013.

Currently, the Internet provides access to content and information by connecting many terminals, such as PCs, smart phones or TVs to the internet pages. The next evolution will make possible to access the information on the physical environment using connected objects, able to perceive the environment through sensors and communicate through smart chips using radio frequency identification (RFID), with or without human intervention.

There are endless examples illustrating this evolution of network devices: using integrated sensors capable of transmitting information, a vehicle may report the status of its various subsystems for remote diagnosis and maintenance, business travelers could receive information on house doors and shutters on the smart phone, or even the contents of the refrigerator, all transmitted by sensors in the house; a car may guide you to another route to avoid potential congestion;

personal devices could transmit in a center, latest information on health status of patients in a distance medical care.

3. INTERNET OF THINGS AND SERVICES

In the near future, more and more devices and systems will be able to deliver and receive data automatically via the Internet. This allows the emergence of entirely new services that will change the daily lives of people. This innovation is called "*Internet of Things and Services*". Currently, we can only guess where this technology is moving in the same way we could only guess what will be when the Internet was released or how mobile phones change our lives when they became popular in the 90s. Within a few years, it is estimated that billions of devices and systems will have

the ability to communicate data independently. Elevators and air-conditioning systems, for example, will communicate via the Internet with the assistance centers for which will then coordinate repairs. Vehicles will communicate with traffic management systems for receiving every minute updates about the traffic situation, while the containers can transmit its real-time position to a logistics center, which will automatically direct the truck to the point of lifting and free space in the warehouse.
When referring to the intense link between physical elements and computer components, experts talk about "*cyber-physical systems*" or CPS (Cyber-Physical System). In contrast, the term "*machine to machine*" or M2M is used on wireless networking devices.
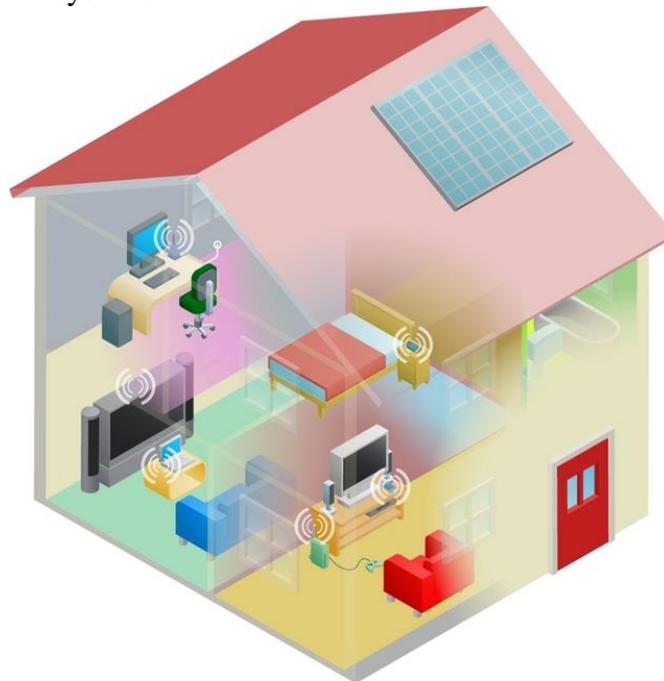

Fig 1. 1 A home where we have many items / things connected and controlled over the Internet
(photo: Shutterstock.com)

For example, Bosch has already created some practical applications in the domain of ''*Internet of Things and Services*''. Telemedicine service allows automatic registration and evaluation of thousands of patients' daily data. In this way medical staff

acts only when data reveals anomalies. Another example is the Bosch plant in Homburg, where boxes are provided with RFID transmitters, allowing material flows of production real-time tracking. As a further development, the products will have the

ability to automatically send the position to the center of logistics planning.

3.1. Example: eMobility Platform

"Internet of Things" related activities are an area in which the Bosch Software Innovations company managed to be distinguished in a project running in Singapore. E-mobility platform architecture performed there includes electric vehicles, charging stations, suppliers, networking and related services. All these are connected to the eMobility platform supplied by Bosch Software Innovations.

From this platform can be accessed different service portals. For example, drivers of electric vehicles can use mobile phones to access the data that is available on the portal. Moreover, other service providers can access portals from Bosch platform for providing specific services to their customers.

Cars are permanently connected to the Internet, connected with other vehicles and satellites through a powerful radio interfaces. The manufacturer-specific applications and services, the participant- the vehicle or the driver - receives applications and services offered by software developers. On the other hand, the participant sends two types of data through radio interface - general and specific domain. Thus, the general data can be further processed in a computerized system for managing customer data and billing services.

Also in Singapore, Bosch has implemented a specific service on the "e-mobility" platform. This service will direct drivers to the nearest free parking and will manage the billing procedures of the company that provides this service. But this software platform can do much more. Car rental companies, car park operators and retailers can also use this platform that was specifically designed to allow its use by competing companies. The example of Singapore shows how the various players in the market may benefit from entirely new business models.

3.2. Airport based on Internet of Things

London Airport will become the first airport of the future, by eradicating all associated flight inconveniences by means of a technology based on the "*Internet of things*". The developers of this idea will get rid of the problems caused by lost luggage, delayed flights or long lines at security checks.

New experience is rendered with technology known as the "Internet of things". This is a platform that enables a variety of devices and machines to communiate with each other, and the airport in London is the first in the world to test this type of communication in commercial aviation.

In the next year, the airport will integrate different technologies to provide a sample of what is possible in this area. For example, passengers will be track by a mixture of face recognition, while travelers that will order food online or via smartphones will be able to receive it as soon as they arrive in the departure lounge.

A similar technology may allow a passenger who has booked a taxi in advance to exit from the airport immediately and to use the car awaiting him. In the same time, passengers and their baggage can be tracked at the same time so that, for example, if a passenger loses a plane, his luggage will not be boarded to that flight.The "Internet of Things" idea is that every physical object can be connected to the Internet, in order to "communicate" with other objects and thus transmiting information to people.

4. CONCLUSIONS

All these things are possible due to the new technologies that create connections between the virtual and the real world. In the development of this technological foundation, it is estimated that processing power, bandwidth for data transmission and memory capacity will be doubled approximately every two years. This exponential growth fundamentally drives future technological advances. It is important to note that these things happen in a way that can be predicted.

The rapid growth of processing power and bandwidth allows creating new web-based services such as cloud computing. In future it will even be possible to store a huge amount of data in the cloud system at a low price.

Rapid and comprehensive analysis of the data creates a solid foundation for the spread of the Internet of things and services. The decisive factor will be the ability to achieve combination of technical knowledge in the various areas of data collection. Therefore, some companies focus their work on data mining and algorithms - for example, in areas such as tele-health and robotics, this activity requiring the use of highly complex mathematical methods.

For companies, the stand-alone devices to cloud computing systems shift requires modification of their products. To pave the way for connected applications such as systems monitoring and home heating, vehicles and sensors, the first task of the company is to produce Web technology compatible hardware devices,wherever is necessary. The primary challenge is to be fast enough to keep the pace with the market development technologies. It is extremely difficult to predict what applications and what business models will be implemented on the market. The approach should be dynamic and able to take into account all the options and risks. We must warn with regard to the fact that the Internet connection does not only have a positive potential. There are some risks. We must take into account that there will be hackers who will try to infiltrate in the systems. Therefore, it is necessary to use the latest technology to prevent unauthorized access. For the new generation of control units, has already been developed a hardware security module that protects against external attacks. Also, the security competence centers foundations were laid. Their purpose is to provide advice and support on how to use the technologies of the future and what security measures involving their use.

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