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DIGITAL SOCIETY AND SMART TERRITORIES

INTRODUCTION

At present, the massive use of information and communication technologies (often called ICTs) is changing everything faster than ever. We are living in a new revolution era that will bring us from the industrial society, characterised by the intensive consumption of energy to the digital society which uses information as a power to transform.

These changes will affect every single aspect of our lives and, in the near future, no matter what our profession will be, we will need to understand, deeply, how to adopt and use these technologies.

Our ability for adopting digital services will be crucial in the path to a successful professional career, even if our personal way of life is not very "digital" we will work, with and for digital citizens, and digital companies.

It is not an option. We need to digitalise as much as we had to mechanise in the past, because it will help us to build a better world, and improve people's living conditions.

It is important, therefore, for everyone to understand what lies beyond this technology, and have a good understanding of what to do, and how to do it to incorporate these technologies in our field of expertise.

As we will look forward, collaboration between professionals will be key for creating value in the future. For a better collaboration, a closer look at the ICTs and a better knowledge of the digital world could be useful.

We will try to explain, using simple words, the principal trends behind this "techy" invasion:

- The adoption of the smartphones as preferred and "never forget at home" every day multi tasking device
- Cloud computing or the democratisation of the powerful data centres and super computers

– A new hyper-connected world thanks to the machine to machine communications technologies (m2m) and the "Internet of Things"
– Big data… or should we say… the big brother? The ability of knowing everything of everyone, every time
– Open Innovation as the new way for research and development, for making business and, may be, the opportunity for a global collaboration at the next stage
– The social Internet. or when the world becomes our neigh borough

Understanding this, we will try to answer some questions like: why are digital services growing and growing with no end, and what can we expect in the future?

And we will anticipate changes in the way people will work, enjoy and behave.

And finally, this knowledge will help us to discover new ways to face our own professional activity, collaborate with others and find ways for creating real value for people.

Let us begin an exciting journey to a digital society.

TRENDS THAT WILL CHANGE THE WORLD

Smartphones for all

A smartphone is an amazing device:

– Is an always on (permanently connected to the Internet) device
– It brings to you a remarkable process and storage capacity
– It is affordable for an increasing number of persons
– Using it is every day Is becoming easier.

Internet everywhere allows people to be permanently in contact with virtually anyone else (or anything), anywhere, any time. The implications of this are huge, and the number of people using this technology is growing faster every day.

No aspect of daily living is not affected by the adoption of this relatively new device.

We left Christmas Cards for email, email for the texting (SMS), texting for WhatsApp ….and this only took a few years.

Some devices are disappearing, simply because the smartphone is replacing them. The wired phones, the buzz clocks, navigators, photo cameras, wrist clocks … What do you think will happen to this device in the next ten years?

New business models are coming. In Kenya, most people (over 70%) use their mobile phone to pay every day because mobile payment arrived everywhere in the country before bank accounts and credit cards. This is happening just now.

We are changing our buyer habits. Now, you can compare prices and features in the store and make a decision "on the move" managing information from the world. The present store model must change.

Think of the crises of the music distribution model. Or the mass media changes… Amazon, a company that didn't exist in the 80's recently acquired "The Washington Post". This was unthinkable a few decades ago.

We are living a critical situation for business and institutions. Like in a glaciation period for the biosphere, only those individuals who will adapt to the changes will survive. It is evolution. It happened before. It was called the industrial revolution. What we are living now is a digital revolution.

So, we need to adapt.

Cloud computing

Today, if you want to be "in", it seems that everything must in the cloud. Your contacts, photos, music, applications… Yours entire life is there.

It makes sense. If you put your data in the cloud, you will access it from everywhere, using different devices and, someone (anywhere, in the cloud) will store it there and take care of it.

But, what is cloud computing? In simple words, it consists of moving the data processing and storage capabilities of a computer system from physical machines to virtual machines that are accessible from the internet. Instead of purchasing, installing and maintaining a computer system (including many software applications), you simply need to connect to a server that emulates the functionality of a physical computer system. Obviously, a virtual machine is composed of physical machines, but the difference is that in cloud computing, many powerful systems aboard the internet are working together to deliver a service that emulates the functionality of a system much more simply. When you are not using your service, these powerful systems can work for other clients. So, cloud computing is a very efficient technology.

Just as you usually do not have an electric generator at home because there is a reliable network you can connect to and obtain energy, with a reliable internet service you do not need to bring your computer, or a hard disk or complex software installed on your devices to enjoy powerful digital services.

This technology is changing the rules of the digital economy. In the past, if you needed to deploy a data processing centre (DPC), you needed adequate facilities, electric supply, expensive informatics systems, highly specialised technicians… patience, time and money. Now, you can hire a DPC in minutes with some help of a middle rank technician.

The production costs of the digital services have reduced dramatically over the last years. That is what is behind the explosion of digital services and the proliferation of apps.

Cloud Computing brings:
- agility
- simplicity
- economy
- flexibility
- globalism

But cloud computing must be managed with care because of some risks:
- security (of the information)
- law & regulatory considerations
- continuity

We need to adapt and some technologies, like cloud computing, will help.

Internet of things

The next revolution of internet technologies will come through things. Imagine a world in which everything is connected to the internet. So, virtually, it would be possible to read, control or program any device, everywhere, every time.

The set of technologies used to allow and automate communication between devices is known as the internet of things or M2M (machine to machine communication).

As it happened with the internet of people, the internet of things will not be radically influential until open protocols and services will be developed.

It does not mean that M2M is not relevant currently. It is, but I predict it will be more widespread in the near future. Although there exist many devices managed remotely today, we do not know how to communicate with them, unless we are the proprietors. This will change in the future. For example, the protocols for programming an air conditioner unit will be known by the community of software developers. It does not mean that everybody on the internet may program or read my air conditioner unit. Just as you need a permission to publish on my wall in Facebook, you will need me to grant a permission to interact with

my things. But the fact that all devices will be connected will change the rules and create new services, new business models and opportunities, new organisational and politic relations…

For now, M2M technologies are bringing growth, efficiency and transformation to many different sectors:

– In e-Health, many patients are being remotely supervised by their doctors reducing travels, making control more efficient and reducing costs of the public healthcare system
– Most of the energy meters are controlled remotely allowing energy suppliers to manage their electricity production better
– Vehicles of the future will be connected and monitored, thus increasing security with systems like e-call and improving the maintenance programs offered by car vendors
– There are many other sectors currently using intensively M2M technologies: electronic payments, vehicle fleet management, traffic control, consumer electronics…

These vertical applications are transforming sectors of activity and creating new business opportunities in each of them.

But, what will happen if you could manage and combine the information of different devices to offer new services and applications? Imagine you connect your GPS navigator with your remote air conditioner control. It would be possible to switch on your air conditioner when you were close to home. Imagine you combine this information with the measure of a thermometer to set up a comfortable temperature dependent on the weather.

The European Union is promoting the FI-WARE project which aims to develop the future internet. This is a step forward in the evolution of the internet that will create transversal platforms to facilitate information exchange between devices over open protocols.

An example of an application of a transversal platform like FI-WARE is a smart city, a city that uses ICTs to connect all the sensors and control devices installed in the city, making smart control of everything possible. Some examples:

– Irrigate gardens when the ground humidity requires it, not wasting water when it rains
– Collect the rubbish when the containers are full
– Switch on/off the lights depending on transit condition
– Establish parking dynamic rates or tolls depending on the contamination index
– Dynamical traffic control and public transport system management
– Allow citizens to look for parking places remotely from their navigation applications
– Open all this information to the community to support the creation of new services

All these things are currently possible. In fact, there exist real cases.

Open innovation

This is a crucial concept for a reasonable understanding of the digital society.

We could define open innovation as the strategy of innovation based on the open collaboration between different players to develop complementary solutions. Open means expose all the information to third parties to facilitate the creation of value added solutions.

Open innovation is the strategy behind the success of the smartphone ecosystems.

Why are people adopting smartphones?

Because you can communicate with them, and can use many exciting applications at a reasonable cost.

Why are there many different applications?

Because smartphone operative systems developers opened their systems to third parties allowing and supporting them to build

applications. Application developers benefit from this opening, creating applications to shell, and the owner of the operating system benefits from increasing the value of his software for the clients by increasing sales. More applications, more customers, more licenses sold, more application developers interested. It is a virtuous cycle that is generating value to the digital economy. More than 10 billion $ in 2012 and thousands of new jobs. 80% of the companies dedicated to the mobile application development created employment in 2012.

To create value in the digital world you need to combine the expertise and assets of a variety of players:

- "Real" service providers like hotels, entertainment, electricity, insurance, credit, software, healthcare, education …
- Digital service providers like music streaming, TV platforms, cloud service providers (email, storage, application stores)
- Network connectivity providers like operators
- Network platform providers
- Devices providers like Smartphone manufacturers, tablet, PC's, DESCO's, TV's, navigators…

All of these players must collaborate in an open way to maximise the value generated. Openness and collaboration are capital in the new economy.

It's not just about competing. When you are creating innovative services it is more important to develop the market than to compete to win a market share in an underdeveloped market.

Multidisciplinary profiles will be demanded in the future by the digital economy.

Social internet

The internet has become a global meeting room through the social networks that are changing social relations. Social networks are the preferred channel for an increasing number of persons. If Facebook was a country, only India and China would be more populated.

As the social networks are winning influence as mass media, other institutions are decreasing their power. Every day is more difficult to control your reputation through publicity or information campaigns.

People are more informed, may compare and contrast any information and can collaborate in an easier way than ever. Citizens are demanding more transparency and participation.

Have you ever heard about Politic 2.0, crowd funding, open educational resources…? Be curious, these kinds of movements are breaking rules.

Big data – open data

Think of everyone being connected to the internet, communicating through and using a wide variety of digital services. Think of those people who are broadcasting their thoughts and experiences. And think that all this information is somewhere in the cloud, stored in that kind of magical mega computing systems.

And when you notice that, not only people, even machines could be connected. Your car, your smartphone, the waste container, your conditioner air, your TV, the fridge…

Has someone thought how to use this information? Of course, the answer is yes. Many people with different purposes:

- Government. For your sake. What else?
- e-Commerce companies for offering you better services fitting your needs and interests
- Carriers, banks and other service providers that could use this information to characterise people's behaviour

It is possible to make a profit from this information.

Technically, big data is the technology able to manage, store and process (sometimes in real time) huge amount of data with the purpose to generate value. Open data is a policy than an institution may adopt, defining rules and protocols to make data public.

We are now talking about third generation systems. It means billions of users and millions of applications in a single platform.

Expert systems (meaning artificial intelligence systems) may access almost any imaginable information to automate decision makings.

There are many applications of big data:
- Analyse moving patterns of mobile phones to offer real time traffic information
- Identify threats
- Efficient resource management. For instance, smart electricity supply
- Situational marketing
- Socio-demographic knowledge

But there are remarkable risks to deal with:
- Privacy lose
- Law uncertainty
- Moral conflict.

What happens when you put it all together? Watch http://youtu.be/xca9v4zjV4s

CREATING SMART TERRITORIES USING TECHNOLOGY

Now is the time to link the real world with the digital world and discover how to integrate all this technology in an urban strategic plan.

First of all… Why use ICTs in the city? Because they can help get over many of the issues inherent in urbanisation and because the opportunity to develop new economic sectors based on digital society.

It is estimated that in 2007 the urban population overtook the rural one for the first time in history and by 2050 70% of total population will live in cities. This is a demographic challenge, putting pressure on public transport and mobility management, lighting, waste management, water/energy supply… a nightmare if we are not able to increase efficiency dramatically.Sociologic changes due to the adoption of technology. People are changing the way they live, work, enjoy, and communicate adopting these technologies at high rate. People are asking governments for more information, more influence, more transparency, more democracy… The city and its services cannot turn their back to this reality.

The city is plenty of connectable devices and people communicating and making decisions in real time. Possibilities and expectations are multiplying.

A model for a smart city

Cities were created around meeting places for interchanging goods and ideas. If I had to define a city I could say it is an open space for human iteration and collaboration. The purpose of the city is to serve inhabitants by providing spaces and facilities to live, commerce, share ideas and develop collective projects. It serves to articulate society.

Like cities, internet technologies are open (accessible for almost anyone) and facilitate collaboration. A simple recipe for success in attracting people.

To translate these concepts (openness and collaboration) to the ICTs of the city it is necessary to define a model in which:
- anyone may connect with anyone else (or anything else, remember m2m)
- there are protocols and rules known by all
- data generated by the city management are accessible by and to everyone

In my opinion, the ICTs of the city may not consist of a series of closed systems for partial management. The data collected by one system

should be available for others and should be public. Open to the public does not mean not ruled. Obviously, there must be laws and rules guaranteeing privacy, safety and respect of people rights. But, data collected from the city activities (including the activity of citizens) are a valuable asset that can be used to generate value for people and improve their lives.

I believe that data, when aggregated and anonymous, should be propriety of the community and may not be private. When personal, each one decides.

Strategic city planning must consider ICTs as an essential infrastructure as important as any other. Even more if you think that ICTs are used to interconnect infrastructures and services with their managers and users.

Let us have a look at the main elements of an open and collaborative ICT model:

- Network connecting different elements must be open, and the opener of anyone is the internet. So, why not the internet?
- VPN (virtual private networks). These networks are built over the internet for sensible services
- ICT Solution providers should use cloud technologies
- A few ICT infrastructures maybe physical to guarantee service continuity, protect sensible data or any other special requirement
- A Control centre must be deployed
- Persons and machines will be connected to this infrastructure:
- Citizens (including their smartphone applications and social networks)
- Devices like sensors (temperature, humidity, contamination, presence, noise…), remote controllers, vehicles, light control systems…

Open protocols and data access policies are critical topics for the management of the ICT infrastructure.

The city government must establish rules to access this infrastructure guaranteeing openness and promoting collaboration. It is essential for the success of this model that these rules fit the interests and needs of all the players.

Public services managers

Waste management, public transport, parking regulation, urban lighting, fire detection, water cycle management, energy supply…

There are many services to manage in a city. Some are managed by public institutions; others may be managed in a public private partnership model or may be delivered by private companies regulated by the government. In any case, the city government is responsible for the adequate delivery of these services. And managers will make efficiencies and get benefits by using appropriated ICT infrastructures and having access to the collection of data retrieved by all devices connected to the city technological platform.

An example of this would be the use of real time traffic information combined with the information of the containers fulfilment status that could make the waste management company assist in programming dynamically optimal routes.

Innovative digital service companies

A city that opens its data to the community of innovative digital companies can benefit their citizens because it is promoting the development of new services and creating new economic activities.

Would you like your mobile phone to get you to a parking place? Be sure that if your city opens data someone is going to offer you this application. Just watch http://youtu.be/ssNLjPIwPGw

Citizens

In a city with an open ICT infrastructure

citizens are best informed and have a chance to participate. They receive better services.

Benefits

The benefits for the city adopting these technologies are:

1. Cost savings and increased efficiency in the delivery of services
    a. Reducing the number of agents needed to control regulated parking places by controlling their use remotely
    b. Controlling electric consumption regulating illumination intensity
    c. Reducing water need to irrigate gardens controlling humidity
    d. Paying services for the results not for the resources employed
2. Economic growth and development
    a. Use digital signage as a publicity support
    b. Better management of tolls and fees controlling traffic
    c. Monetising data generated by the city
3. Better government and planning of the city
    a. Better resource management controlling all variables
    b. Prioritisation of investment depending on the population movement pattern
    c. Better understanding of socio-demographic trends
4. Sustainability and life quality
    a. Time saving locating a parking
    b. C02 emissions reduction
    c. Efficient use of water
5. Innovation
    a. Making the city attractive for innovators

CONCLUSIONS

We are living in a revolutionary era moving to the digital society. It is very important to understand these technologies, be able to incorporate digital services in our professional activity and collaborate with technological professionals (and for them to collaborate with non technological professionals).

ICT infrastructure must be considered as an essential part of city planning and digital services will impact in new designs.