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# Building the Future Telecommunications: Services and Networks of Internet

*Heinz Brüggemann, Jukka Salo, José Jiménez, and Jacques Magen*

*Internet has become the global hub for information and communication where different actors, whether businesses, communities or individuals, connect with each other, share their contents, and want to be aware of their context. They are connected to social networks and virtual worlds, sharing knowledge within a given community. They want all those features to be accessible anywhere, anytime and on any device, but they also want to protect their privacy. To achieve that ambitious objective a strategic agenda is required. This overall plan would help to build the Telecommunications of the future, establish priorities and indicate the different interrelations. In this paper, we identify the current major research lines, provide a classification and indicate which could be the major research outcomes for the coming years.*

**Keywords:** Autonomic Networks, Context, Digital Home, eHealth, Europe, Future of Internet, Identity, Internet, IoT, M2M, Networks, Semantics, SDP, Smart City, Smart Grid.

## 1 The New Telecommunications Scenario

Most human activities and business sectors are evolving towards the digital era. New societal challenges are appearing, with communication technologies likely to play a large role e.g. in environmental awareness. Technologies and solutions at *multidisciplinary level* are increasingly required

to tackle such issues as developing new applications to reduce the need for travelling or new technologies for reducing energy consumption, and moreover, to manage and control the best use of energy in other business or private sectors e.g. health, transport, energy, e-government, urbanisation, knowledge and culture.

The focus of the Internet as a whole has evolved and is now on "people" and "things", and on transporting multimedia "content" and providing "services". One of the keys for the future advance might well be technologies and solutions tackling interdisciplinary domains.

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All of this contributes to the need for more bandwidth, more reliable networks and more efficient and secure transport protocols and delivery mechanisms. Most new applications are demanding in terms of the amount of data exchanged, primarily because they deal with video content. The development of Video on Demand and video streaming, the appearance of HDTV, which will be more and more conveyed via the Internet, and then 3DTV, will continue and drive the demand for fixed networking. The explosion of smartphones drives users' requirements for having access to similar services on their mobile terminals, as well as additional specific mobile services (e.g. location based). Portable laptops have been continuously gaining ground against fixed PCs and contribute to the demand for nomadic access and services.

## 2 The Response of Industry

To answer those needs, a number of different industries have tried to establish a working framework where ideas could come together and enable a coherent plan to be designed. Among many other initiatives, in 2003 the major European telecommunications vendors and operators decided to work together and create an ambitious European R&D programme providing the means to tackle issues arising from end to end communications. This was to them the best option to address the roadblocks related to a "system view" of communications, in addition to designing and developing technological blocks.

The Celtic Initiative, which was the outcome of their common effort, is now widely recognized in the European ICT R&D environment as a key enabler for ambitious and innovative projects dedicated to communications solutions. Celtic brings together interested partners from industry, Telecommunications Operators, small and medium sized enterprises, universities, and research institutes together to

set up and run joint international projects. Celtic has become a very successful cluster programme, it has launched 78 projects with total budget of around 520 M• and totalling roughly 5,000 person-years.

Since then, as indicated above, the telecommunications technologies, services and applications have changed considerably. The number of Internet users has multiplied by two in Europe and in the Americas, and by four in Asia. Broadband penetration has increased by a factor of four in the G7 countries, and the number of mobile line subscriptions has doubled in Europe. Individuals and organizations are no longer dealing only with network connectivity and exchange of information, but more and more with social and business experiences where the frontier between physical and digital progressively becomes more tenuous.

Technologies and solutions are now more and more tackling interdisciplinary domains. More expansion e.g. towards services and user-centred solutions, is needed. "Ambient intelligence" cannot be understood any longer only in the sense of "always connected" or even "best connected", i.e. connected when required, but also as interdisciplinary and multidisciplinary service integration, e.g. automatic detection of appropriate services to be available on the more often mobile than fixed terminal, depending on the location and need of the user.

## 3 New Research Areas

The objective now is to promote a "Smart Connected World". The traditional boundaries between networks, service platforms and applications have become increasingly blurred. Better suited views of the whole communications system are needed.

Key research topics are now to be related to network elements and infrastructures, like wireless, optics and energy efficiency, as well as network architecture and con-

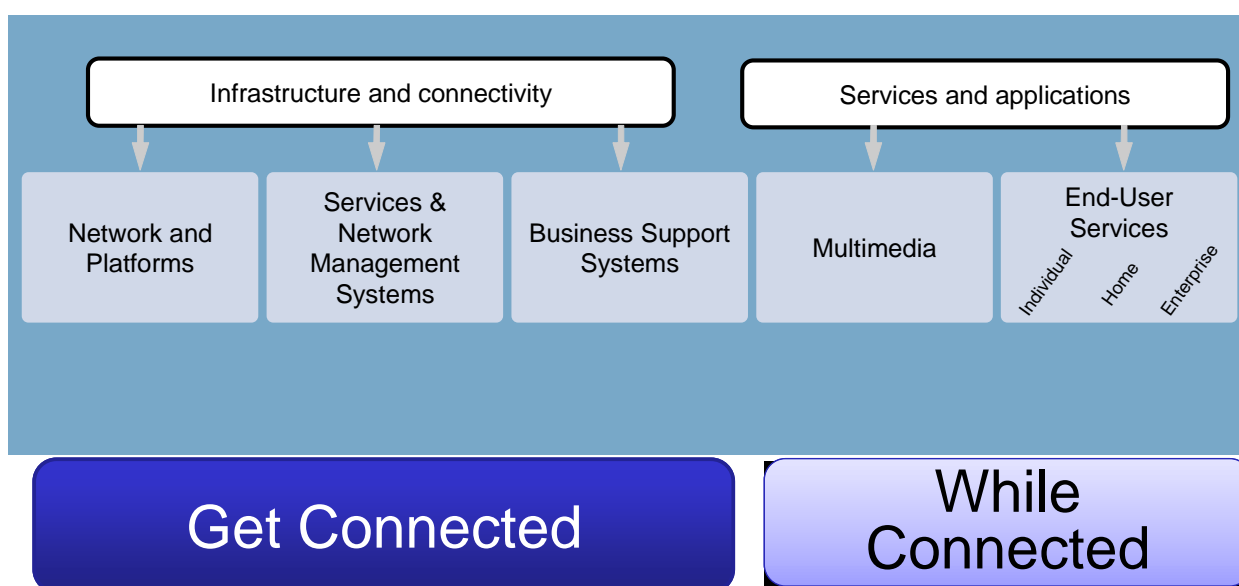


Figure 1: The Two Main Research Areas for Telcos and ICT.

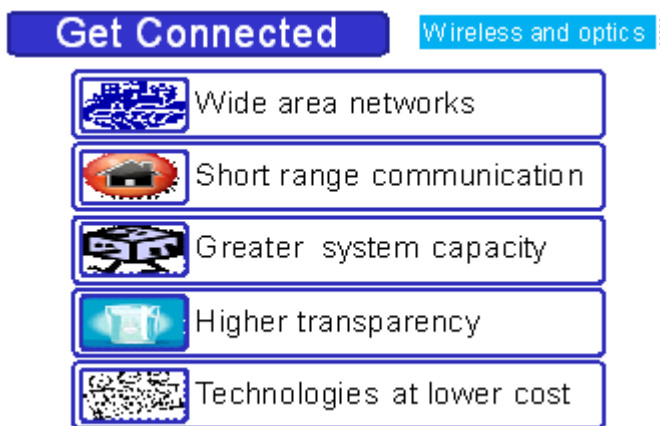


Figure 2: "Get Connected" Interdisciplinary Approach.

nectivity, like networking and autonomic networks. End-to-end services and applications are also to be considered.

New research projects will have to deal with future end-to-end services, like:

- digital home,
- digital enterprise,
- digital city,
- digital school,
- digital transports,
- e-Health

as well as horizontal services such as security, public safety and identity - especially when it comes to protecting the user while keeping European values such as individual privacy and confidentiality. This aspect also includes business aspects, like evolution of value networks in telecommunication business focus area, forecasting the changes in value networks and business models, and user modelling.

To further clarify the issue, one possibility (as done in the new program Celtic-Plus, <http://www.celtic-initiative.org/>), is to divide the research areas into two categories which could be named "Get connected" and "While connected". "Get connected" will tackle the infrastructure and connectivity aspects. Topics are related to network elements and infrastructures, like wireless, optics and energy efficiency, as well as network architecture and connectivity, like networking and autonomic networks.

New aspects related to the Future Internet will also come into consideration, in particular for issues that are closer to the market (see Figure 1).

Today's Internet protocol has been designed for fixed network applications, while the impact of the mobile radio channel has not fully been taken into account. Therefore, one major challenge is to further develop the network infrastructure, which makes mobile Internet with high Quality of Service happen in conjunction with a much higher flexibility, capacity (bandwidth) and mobility, so that future applications do not suffer from the current limitations of the Internet and that Quality of Experience stays at optimal level for each and every user.

### 3.1 Get Connected

"Get connected" considers the infrastructure and connectivity aspects, with topics around network elements and infrastructures, like wireless, optics and energy efficiency; and around network architecture and connectivity, like networking and autonomic networks. Interdisciplinary between "Get connected" elements is more and more required (see Figure 2).

More work is needed to contribute to advances on such topics as economic fibre solution, LTE and beyond 4G. Ambient intelligence shall be understood not only in the sense of "always connected" (or rather "best connected", i.e. connected when required), but also in the sense of interdisciplinary and multidisciplinary service integration (e.g. automatic detection of appropriate services to be available on the mobile terminal depending on the location of the user). Progress on urban computing and identity management will be critical for mobile applications, as well as technology enablers such as new video features and security. Security topics such as beyond DRM, trust, and security, will remain at the core of the main research areas, especially when it comes to protecting the user while keeping values such as individual privacy and confidentiality.

In addition, energy efficiency will become more and more a primary target for new communication systems and solutions. Therefore a multidisciplinary approach between "Get connected" and other areas such as energy efficiency is now needed (see Figure 3).

One of the main priority challenges in this area is of course to work on the architecture of the Future Internet. The reason for this further work lies with the fact that today's Internet protocol has been designed for fixed network applications. The impact of the mobile radio channel has not been taken into account. Consequently further development of the network infrastructure is necessary to make mobile Internet with high Quality of Service exist in conjunction with much higher flexibility, capacity (bandwidth) and mobility than we have today. These developments should support the requirements of the pillars of the Future Internet. If these technical requirements are fulfilled, fu-

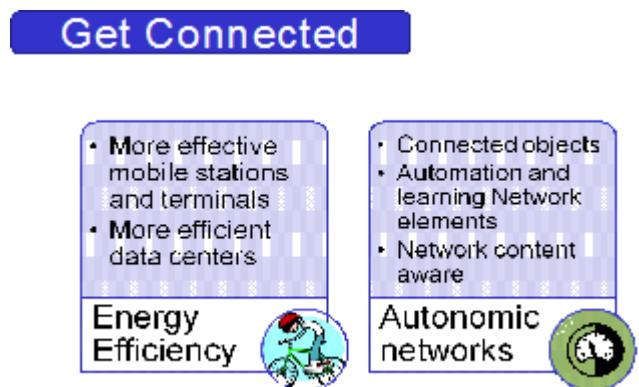


Figure 3: "Get Connected" Multidisciplinary Approach.



Figure 4: Future Services. The "While Connected" Scenario.

ture applications will not suffer the limitations in Quality of Service of today's Internet.

Besides, the mass market deployment of services and applications (like video streaming or the download of huge files) will require capabilities that today's infrastructure cannot offer.

### 3.2 While Connected

"While connected" will tackle the end-to-end services and applications, with topics related to future end-to-end services, like digital citizen, digital home, digital enterprise, digital city, digital school, digital transports, e-health and games; horizontal services, like security and identity; and business aspects, like evolution of value networks in telecommunication business focus area, forecasting the changes in value networks and business models, and user modelling. New aspects related to the Future Internet will come into consideration, particularly for issues that are closer to the market (see Figure 4).

The main objective is to evolve from "just connectivity" into:

- Connectivity;
- Storage;
- Processing.

The Internet is the global hub for information and communication where different actors, including citizens, share their contents and connect with each other. They are connected to social networks and virtual worlds, sharing knowledge within a given community. They want all those features to be accessible anywhere, anytime and on any device. The network is becoming less relevant and now a new definition of the Internet is emerging: *Internet is the people*.

As the Internet is evolving, efforts should be made in regard to provision of new tools, which allow user profiling, recommendation systems, and new applications to enhance the creation of online content by professionals and amateurs.

It will also become necessary to develop novel multidirectional interfaces and interaction mechanisms, including multimodality and "presence". These new interfaces, technologies, methodologies and certification models should be developed to ensure the Future Internet does not exclude anyone and, furthermore, that it makes the Information Society more inclusive.

The list of applications is large:

- **The smart city concept.** The objective is the provisioning of all elements in the city, ranging from security for people's life and goods, management of waste disposals, entertainment in the city, new ways of getting information, and advertisements.

- **Intelligent transport.** Design of intelligent, adaptive, context-aware and self-healing transport systems, including monitoring and management of transportation networks to get a better distribution. It also includes gathering and distribution of reliable, real-time traffic information.

- **E-Health.** This is a wide area including, among others, the interoperability of computer-based medical systems, management of electronic patient record, and the interconnection of hospitals and medical team remotely. It also includes more specific applications such as enhancement in remote care of patients while at home (especially for chronic diseases) or in hospital, robotic based solutions.

- **Development of energy-friendly solutions.** This is motivated by two facts. On the one hand, there is a wide consensus that networks should actively contribute to re-

duce the carbon footprint of the industrialized society. On the other, many devices to integrate the so-called Internet of Things will be severely constrained in what concerns energy consumption, computational complexity and storage capacity. In addition, a pervasive use of efficient Internet networks and services will have to assist to other sectors (e.g. transport) to reduce their own energy consumption.

■ **e-Government.** It will cover the globalization of public services including the accessibility by any telematic means; the optimization of public services information databases and processes.

The main difficulties lie in solving interoperability issues to address the heterogeneity of administrative procedures and systems.

Besides those applications, important work will be required into **service Enablers** such as:

### **Service Delivery Platforms**

The present concept of a global service delivery platform should go beyond the client/provider service model to support mechanisms of global service supply, where third parties or even the user will have the capability to aggregate services, act as intermediaries for service delivery and provide new channels. Under the Telco2.0 model, some operator capabilities can be accessed by the user by means of common web2.0 technologies (Ajax, JavaScript, PHP, etc.) to create a variety of mixed services involving communications, social networks, MM content sharing, etc. In addition, a Telco2.0 approach can take advantage of the transformation of most operators' networks towards NGN, and the benefit of IMS technology bringing new capabilities to the network, and empowering it into a new dimension.

### **Semantics**

Semantics is widely thought to be the "unifying glue" that will put together all the bits and create the overall intelligent interconnected network, hence the vision of the Semantic Web. However, the development and application of semantics is facing challenges such as those related to scalability (semantics must adapt to extend its scope and deal with data of increasing complexity) and the problem of generating useful, selected information from the huge amount of existing information.

### **Internet Computing**

This area includes the virtualization of infrastructures through more flexible and granular optimization of computing and storage resources. These "on the net" resources shall also be used by enterprises, using on demand models that would allow dynamic and intelligent accounting.

### **Platforms for Sensors and Actuators**

Sensor and Actuator Networks (SAN) will play a key role as a horizontal technology for delivering information about and enabling interactions with the physical world for the next generations of highly autonomous and adaptive Internet services and applications. Current SAN deployments

are still low in numbers and represent heterogeneous, vertically closed solutions. Tomorrow's ubiquitous world of tags, sensors, connected objects and smart systems can only be achieved, if existing and future SANs can be integrated into a scalable real-world information and interaction fabric, connecting the current Internet with the physical world.

### **Future Interfaces**

Key priority challenges in this area include:

- Intuitive interfaces
- New immersive 3D experiences at the frontier between real and virtual worlds: 3D World Tools
- Widget gadgets mash ups

Among the future interfaces, a specific place has to be contemplated for the 3D approach. This covers intuitive interfaces, new immersive experiences at the frontier between real and virtual worlds, and 3D world tools.

### **Audio/Video/Image Processing**

Among the various technologies that will shape multimedia in the coming years, 3D will play an important role. The increase of computing power makes it now possible to process the very content of images, either in order to display it differently from various viewing angles (this leads to stereoscopic multi-viewing), or even to interact with the content ( virtual reality, mixed reality).

Much has still to be designed in order to make that 3D technology popular especially when "natural" scenes are contemplated. The creation of 3D content is still in its infancy and will have to be developed in order to supply the various 3D TV systems with relevant material at an affordable cost.

### **Multimedia Search**

The Internet is becoming the global common access mechanism to information anywhere, anytime. Web 2.0 services like blogs, podcasts, YouTube and Flickr show that more and more individuals are also becoming content providers. But at the same time, the problems of management, delivery and retrieval of these audiovisual contents are rising. We require smarter, faster and more powerful search engines. Furthermore the amount of rich media prepared to be delivered to mobile devices is rising every day. As mobile phones offer more and more information – news, photos, video clips, music downloads – finding what you are seeking can be a big challenge.

### **Security and Trust**

New scenarios (enhanced home environment, virtualization at different levels, larger penetration of mobile workers, pervasive applications regardless of the access method, etc.) will open new breaches for cyber-attacks. Increased criminalization of malware and security threats, and larger exposure of personal and enterprise data to attacks will force users to increase their awareness and spending on enforcing security and privacy. Providing security solutions to end customers will only be possible if done

from the network, so that adequate scale is achieved; information aggregation is possible, and non-breakable mechanisms can be implemented.

The objective is to develop a proactive, holistic approach towards security and trust capacities and services, which can be flexibly used in a scalable way both to secure trust reputation and to provide tools for new advanced services.

Higher security is also a key element for developing and controlling barriers for electronic transactions, allowing the deployment of services that require irrefutable proof of identity, which will lead to a reduction of fraud.

### **Data Mining, Reality Mining, User modeling**

With people using more and more ICT to communicate with each other, and to access online services, increasingly more usage data becomes available. This data is a goldmine for service providers because it enables them to know their customers much better than before and thus be able to serve them better. It is a key enabler for high-quality personalization. However, service providers are allowed to take advantage of this information only if privacy concerns are adequately taken into account.

Looking at the data from an aggregated point of view rather than looking at individual users, enables the detection of global patterns, which can be key enablers for improving monitoring and management in diverse areas such as traffic management, migration monitoring, urban planning, disaster management, etc.

The latter point is the subject of reality mining, where communities of people using mobile phones with several sensors (GPS, movement, cameras, Bluetooth, etc) generate large volumes of data which then are mined for patterns, and to make predictions. As MIT puts it: "Reality Mining defines the collection of machine-sensed environmental data pertaining to human social behavior".

### **4 The European ICT R&D Landscape**

In addition to dealing with the new market and technological trends, companies have to take into account the evolution of the European ICT R&D landscape and adapt accordingly. The evolution of the communications and more broadly of the whole digital world-related market has been identified by several organisations at national and European level. New initiatives are appearing, and existing programmes change, especially to take into account a wider system and multidisciplinary perspective.

The European Commission in the different framework programmes is considering "smart" application areas, i.e. Smart Health, Smart Transport, Smart Energy, Smart Enterprises, Smart Living, etc. as the main objectives behind the Future Internet developments, and is currently starting a new Future Internet Public-Private Partnership.

Some national R&D programmes already place the "people" at the centre of the interaction and integration required between society, the economy and technology, and the environment, promoting priorities related to health and well-being, digital world, and sustainable world, or emphasize

the need for new generation networks to solve emerging social issues such as energy shortages, aging demographics, and natural disasters.

Eureka, is also promoting very comprehensive research programs. Among Eureka projects, Clusters (such as Celtic) try to provide a common agenda for research. Participation in Eureka clusters gives coherence to overall research and assures participation of major international players.

### **5 Conclusion**

The high importance of the telecommunications sector for the European economy and the increasing technological challenges are the main drivers to carry out further market-oriented research in all areas related to a "Smart Connected World". Research in ICT and Telecommunications is gradually expanding its topical focus from the connection and service aspect to a "Get connected" and "While connected" view, taking into account the adjustments described here in line with the evolution of the marketplace and of the R&D environment.

### **Sources**

- Celtic-Plus. Why a follow-up of the Celtic programme is needed. November 2009.
- Strategic Research Agenda. Staying ahead with SET. eMobility Mobile and Wireless Communications Technology Platform, December 2008.
- Strategic Applications Agenda. eMobility Mobile and Wireless Communications Technology Platform, July 2009.
- Strategic Research Agenda. NEM "Networked and Electronic Media" European Technology Platform, September 2008.
- Strategic Research Agenda. NESSI Roadmap, Strategic NESSI Input for FP7 Work Programme 2009-2010. NESSI, February 2009.
- ISI Strategic Research Agenda. ISI, the Integral Satcom Initiative, January 2006.
- Strategic Research Agenda 2009. EPoSS European Technology Platform on Smart Systems Integration.
- ISTAG. Revising Europe's ICT Strategy. Information Society Technologies Advisory Group – ISTAG. February 2009, European Commission.
- European Commission, DG Information Society & Media. Future Internet 2020. Visions of an Industry Expert Group. Directorate for Converged Networks and Services, May 2009.
- eMobility, NEM, Nessi, ISI, EPoSS. Future Internet: The Cross-ETP Vision Document, January 2009 <[http://www.future-internet.eu/fileadmin/documents/reports/Cross-ETPs\\_FI\\_Vision\\_Document\\_v1\\_0.pdf](http://www.future-internet.eu/fileadmin/documents/reports/Cross-ETPs_FI_Vision_Document_v1_0.pdf)>.
- Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of Regions. A public-private partnership on the Future Internet. COM(2009) 479 Final, 28 October 2009.
- European Commission. Draft Report of the Task Force on Interdisciplinary Research Activities applicable to the Future Internet. DG InfSo Task Force on the Future

Internet Content, July 2009.

- Federal Ministry of Education and Research, Alemania. ICT 2020: Research for Innovations, 2007.

- Telefonica. National R+D Plan Structure and activity lines (2008-2011). Presentation based on the National Science and Technology Strategy Plan (Spain).

- Tekes, Finlandia. People – Economy – Environment: Priorities for the Future. Tekes Strategy Focus Areas.

- ICT SHOK, Finlandia. Future Internet Programme Plan.

- Ministère de l'Économie, des Finances et de l'Industrie, Francia. Technologies clé 2010, 2006.

- NICT (National Institute of Information and Communications Technology), Japan. Diversity & Inclusion: Networking of the Future, New-Generation Network Vision.