

Summer 2015

EURESCOM message

The magazine for telecom insiders



Celtic-Plus
Newsletter 1/2015

ICT-supported health and well-being

Events

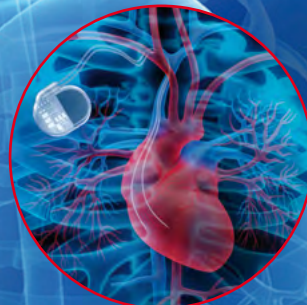
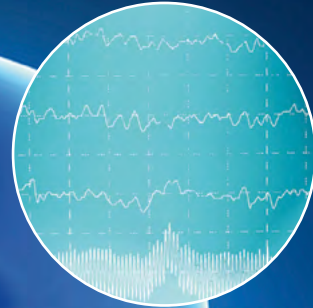
**Net Futures event
in Brussels**

European issues

**Launch of €3.5bn
European programme
on 5G**

A bit beyond

Welcome to the robot hotel



Join the Industry-Driven Research Programme for a Smart Connected World

Celtic-Plus Call for Project Proposals – Deadline: 15 October 2015

Don't miss the opportunity to participate in Celtic-Plus, the industry-driven European ICT and telecommunications research programme under the umbrella of EUREKA. Deadline for the next Call for Project Proposals is 15 October 2015.

All EUREKA member countries and associated countries can financially support Celtic-Plus projects. More information on public funding and national contacts per country can be found on the Celtic-Plus Public Authorities Website. Please talk to your national contact early in the process.

Benefits of participating in Celtic-Plus

- You are free to define your project proposal according to your own research interests and priorities. Your proposals are not bound by any call texts, as long as it is within the ICT/telecommunications area.
- Celtic-Plus projects are close to the market and have a track record of fast exploitation results after the end of the project.
- High-quality proposals have an excellent chance of receiving funding, with an average success rate of 70 %.
- The results of the evaluation will already be known in December 2015.

Easy proposal process

Preparing and submitting a Celtic-Plus project proposal is easy. Just register on the Celtic-Plus online proposal tool, fill in the Web forms, and upload your proposal in pdf. A template for the proposal can be downloaded from our Call Information page ("proposal forms and documents").

If you have any questions or need help, do not hesitate to contact us; we are pleased to help you.

Contact:

Peter Herrmann, herrmann@celticplus.eu or
Peter Stollenmayer, stollenmayer@celticplus.eu



Discuss your project ideas at the Celtic-Plus Proposers Day

Co-located with EuCNC

Paris, 29 June 2015

On 29 June 2015 Celtic-Plus organises its second Proposers Day in 2015, where you can present and discuss your project ideas. The event will take place in the amphitheatre of Orange's Innovation Gardens, 38-40 Rue du Général Leclerc, 92130 Issy-les-Moulineaux (near Paris).

This Proposers Day is co-located with EuCNC, the European Conference on Networks and Communications, sponsored by the European Commission.

The Celtic-Plus Proposers Day is an excellent opportunity to present and discuss your project idea with potential partners, and to learn about other project ideas. Also information about possible funding will be provided. Just indicate with your registration if you plan to present a project idea.

This Proposers Day is one day before the EuCNC conference on 30 June – 2 July 2015, so you can perfectly combine both events.

More information on the Celtic-Plus Proposers Day, programme and registration: www.celticplus.eu

More information on EuCNC, programme and registration:
<http://www.eucnc.eu/>

Contact:

Peter Herrmann, herrmann@celticplus.eu or
Peter Stollenmayer, stollenmayer@celticplus.eu



Dear readers,

The number of old people in developed countries is growing, due to a generally high standard of living and good healthcare. As a consequence, healthcare costs are exploding while available healthcare budgets per capita are shrinking. This either calls for drastic measures to set the age pyramid right, or a miracle. As killing old people is socially not accepted, and politically not feasible – most members of parliament are old – developed countries like the member states of the European Union need a miracle. And this transposes seamlessly to ICT, as information and communication technologies are generally regarded as the key to boosting efficiency and productivity in the healthcare system.

As the middle-aged editorial team of this magazine is also contributing to the challenging demographic change that affects European healthcare systems, we have a natural interest in making sure that the ICT miracle happens to maintain good healthcare for everyone. As one of us is even leading a large European research project, which aims to contribute to this happy outcome and which is closing soon, we thought the time has come for featuring “ICT-supported health and well-being” as a cover theme.

In the introductory article to the cover theme, Anastius Gavras, Eurescom’s coordinator of the healthcare-related EU research project FI-STAR, gives an overview on how ICT can help reduce healthcare cost while increasing the quality of healthcare. This is followed by an article describing the Future Internet service platform developed by the aforementioned FI-STAR proj-

ect, written by a team of experts from the project. The ensuing article describes activities by the European Institute of Technology (EIT) to push solutions that will keep us fit and healthy even longer than today.

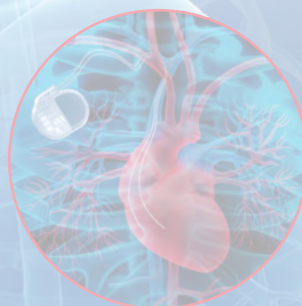
In an exclusive interview, Henrique Martins from the Portuguese Ministry of Health Information and Communication Technologies shares his insights on how Europe can exploit the opportunities of ICT for improving health and well-being. Finally, Kostas Pattichis from the University of Cyprus explores novel, patient-centric applications for electronic health records (HER).

This issue also includes a variety of further articles on different, ICT-related topics. See, for example, the new opinion article by Eurescom director David Kennedy in his column “The Kennedy Perspective” where he poses, and answers, the question why we fight over collaboration agreements. In another article, under “European issues”, David Kennedy provides an overview on the first phase of the 5G Infrastructure PPP, which will start in July 2015. See also the event articles on the Net Futures event and the co-located CI-FIRE workshop in Brussels. Finally, in

the latest “A bit beyond” article you can learn about the advantages of hotels without human staff.

My editorial colleagues and I hope you will find value in this edition of Eurescom message, and we would appreciate your comments on the current issue as well as suggestions for future issues.

Milon Gupta
Editor-in-chief





Events calendar

29 June – 2 July 2015

EuCNC – European Conference on Networks and Communications

Paris, France
<http://eucnc.eu>

28 – 30 July 2015

Science and Information Conference 2015

London, United Kingdom
<http://www.thesai.org/SAIConference2015>

30 August – 3 September 2015

ESB 2015 – 27th European Conference on Biomaterials

Kraków, Poland
<http://esb2015.org>

22 – 23 September 2015

ITEA Project Outline Preparation Days

Brussels, Belgium
<https://itea3.org/podays2015/index.html>

15 – 16 October 2015

NEM Summit

Frankfurt/Main, Germany
<http://nem-initiative.org/nem-summit/>

20 – 22 October 2015

ICT 2015 – Innovate, Connect, Transform

Lisbon, Portugal
<http://ec.europa.eu/digital-agenda/en/ict2015-innovate-connect-transform-lisbon-20-22-october-2015>

Snapshot



Concierge robot

On 17 July 2015, Ms Iwazume (photo) will start her work as concierge at the reception desk of the 'Henn na Hotel' in Sasebo, Japan. Ms Iwazume is one of ten life-like robots greeting guests, carrying bags, and cleaning rooms at the new high-tech hotel in the south-west of Japan.

For further information see the 'A bit beyond' article in this issue.



Contents

	3	Editorial
	4	Events calendar
	4	Snapshot
THE KENNEDY PERSPECTIVE	6	Why do we fight over collaboration agreements?
COVER THEME		ICT-supported health and well-being
	7	ICT-supported health and well-being – An overview
	9	Advanced healthcare provisioning based on Future Internet technologies
	11	Prevention through the quantified self – Solutions for better health and well-being
	12	Different paths to healthier lives – Interview with Henrique Martins from the Portuguese Ministry of Health
	14	Novel applications for electronic health records – Enabling patient-centric solutions with EHR
		Celtic-Plus Newsletter
	2	Imprint
	2	Editorial
		<i>Celtic-Plus Success Stories</i>
	3	SPECTRA – Spectrum and energy efficiency in 4G and beyond
	4	MediaMap+ – Media management from acquisition to publishing
	5	COMMUNE – Network management under uncertainty
		<i>Events</i>
	6	The future of digital business – Celtic-Plus Event in Vienna
		<i>View from a Public Authority</i>
	8	How Spain fosters international cooperation within CELTIC-Plus
		<i>Project Highlights</i>
	9	Seed4C – Security embedded element and data privacy for the Cloud
	11	HFCC/G.fast – Hybrid fibre-copper connectivity using G.fast technology
EVENTS	15	Visions of innovation and market scale – Net Futures event in Brussels
	16	Internet playground for European businesses – 2nd CI-FIRE Industry Workshop
EUROPEAN ISSUES	18	Launch of €3.5bn European programme on 5G – First-phase projects of 5G Infrastructure PPP start in July
NEWS IN BRIEF	20	European Commission presents Digital Single Market Strategy ++ Text walking lanes in Antwerp
A BIT BEYOND	21	Welcome to the robot hotel – Have a nice automated stay



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Why do we fight over collaboration agreements?



David Kennedy
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I have had a number of experiences over the past few years where there have been aggressive and hostile discussions when preparing contracts that are supposed to support collaborative work. What amuses me is that the most aggressive contract negotiators are lawyers who don't seem to understand that the purpose of the collaboration contract is to facilitate co-operative constructive actions. I can think of a few examples where clauses have been added which, in effect, neutralize the rest of the contract. I have to assume these clever lawyers know what they are doing, but their actions only mean that the contracts are not enforceable.

Residuals

My favourite subversive clause is the concept of "residuals". Do you know what residuals are? In maths it means whatever is left when you take the rest away, but in collaboration agreements it means something totally different.

Many collaboration agreements I have seen define "residuals" as the information which is "remembered" by the individuals who have rightfully had access to it in the course of the collaboration. This means that if you show me your valuable intellectual property in the course of our collaboration and I, with my incredible memory, remember it all afterwards and use it in my products, you have no grounds for complaint. Actually, I don't present a risk here as I can't even remember names, but the point is clear.

If we take this to the extreme – unless you can prove I deliberately captured your intellectual property, maybe by electronic or paper means – you cannot protect your shared information. The question then is why haggle over many pages of IPR rules, if you also implement a residuals rule?

Confidentiality in practice

Similarly, one recent example had many rules for confidentiality in practice and they concluded that the collaboration should use at least the same level of information protection as the participants would use for their own company's internal information. Having concluded this, the collaboration participants then immediately put all the shared info into Google docs. While I am not going to debate the safeness of Google docs, I am concerned that, to facilitate collaboration, these documents were not secured in any way. They were in the public domain – clearly not the

minimum security standard used within the participating companies for their internal documents.

So what is the point – why do we argue over detailed terms and conditions when setting up a collaboration agreement, when clearly the participants don't want and won't observe the agreement?

An unrealistic wish

In way too many years of collaborative research work, I have never seen any action coming from either a consortium agreement or a collaboration agreement. At this stage I would be totally happy to dump the lot and only have memorandums of understanding where we promise to work together and to be nice to each other. I would like to see what happens. I reckon the world would keep turning and we would get on a lot better with the people we trust. However, the reality is that the clever lawyers will never let me do this – unfortunately we cannot put this evil back in the box.



ICT-supported health and well-being – An overview



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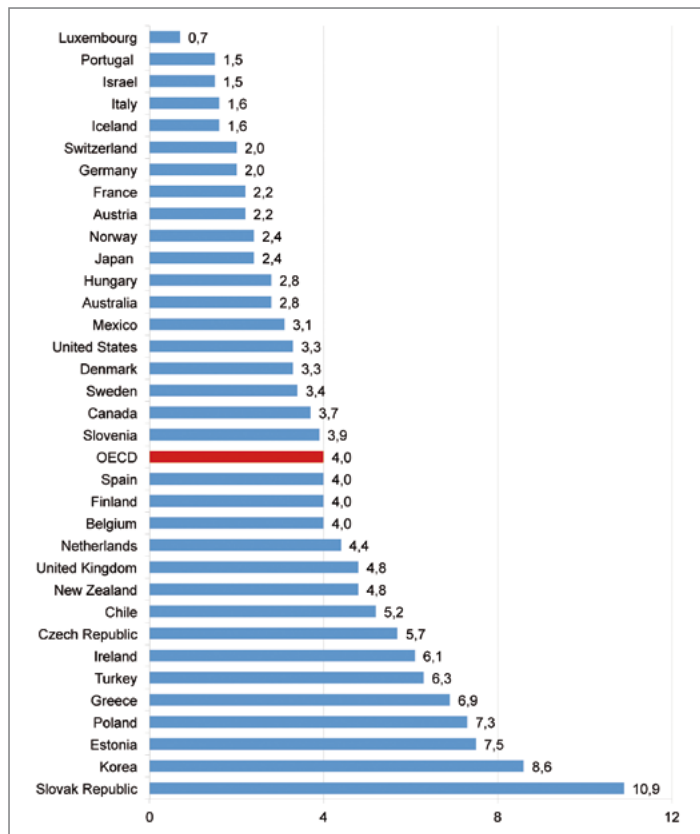
The cost of healthcare has grown and continues to grow at a higher pace than the GDP, reaching an unsustainable level, worldwide. This situation is exacerbated in Europe where the strong inclusive growth policy of its member states is combined with a demographic evolution to an aging society. Health and care services are undergoing a rapid transformation to adapt the existing systems to the changing and growing demand, among others because there is also a strong pull from markets adjacent to healthcare, such as well-being, assisted living and healthy aging.

At European level a large number of initiatives are heavily investing resources and funds to ensure that the societal systems in these areas are sustainable in the long-term. ICT is a key enabling technology towards this objective. Smart solutions based on ICT are removing barriers and pave the way to more innovation and smart growth in the healthcare and its adjacent sectors.

In the primary healthcare sector the complexity of the different forms of diseases, the variety of therapeutic means in the presence of extensive comorbidities and polypharmacy, along with the need to deliver the treatment at the point of care, form significant barriers to the deployment of an effective, efficient and profitable patient-oriented healthcare system.

Future Internet technology

Europe has mobilized a significant part of its industry in a Public-Private-Partnership on Future Internet (FI-PPP), which is the European programme for Internet-enabled innovation. The FI-PPP accelerates the development and adoption of Future Internet technologies in Europe, advances the European market for smart infrastructures, and increases the effectiveness and cost efficiency of business processes through innovative services and delivery mechanisms. This initiative delivers technologies that respond to the current societal challenges. In this context the



Annual average growth rate of health expenditure per capita 2000–2009 (source: OECD Health Data 2011)

FI-STAR project establishes early trials of services and applications in the healthcare sector by building on top of the European Future Internet Technologies (FIWARE). The project has adopted and augmented the FIWARE specifications to create a sustainable ecosystem for all stakeholders in the global health care and adjacent markets, integrating these across supply-chains centred on the FI-STAR eHealth Platform Provider and driving change towards improvement of effectiveness, efficiency and profitability. FI-STAR delivers standardised and certified software including a trustful, secure and resilient application-delivery platform for decentralised and integrative health care, taking advantage of all Cloud Computing and Big Data benefits and guaranteeing the protection and controlled sharing of personal data. The frameworks, applications and tools produced by the FI-STAR project are currently tested, validated and evaluated through integration into the partners' cloud hosting facilities and by running a number of real clinical trials involving a rich set of healthcare giver and taker stakeholders in seven European countries receiving high appreciation (see Figure 2).

Wellbeing and assisted living

Over the last few decades consumers have reshaped their private agenda around health and wellness and have made a connection between health and quality of life. Consumers now expect many products to contribute in some way to their personal health, or well-being. Growing consumer empowerment requires innovative and entrepreneurial ICT enabled solutions to improve quality of life by giving people of all ages the ability to live an active life. The focus of well-being extends to independent living and the avoidance of social exclusion at an advanced age.

ICT based innovation in this area is focusing on prevention, comfort and safety for a good reason. Regulation barriers are much lower in this market although the impact of good prevention for example can be huge on the actual demand for primary expensive healthcare. Early identification of emerging health issues can help avoiding health problem escalation by proposing lifestyle adaptation.

The lower regulation barrier in this market presents a tremendous opportunity for SMEs and innovators to enter the market, which normally has a high cost of entry due to numerous needed certifications for a product of service before it can be offered in the regulated healthcare market.

Outlook

After numerous advances in ICT based healthcare systems and well-being products, there are still many areas that need significant improvement. In particular the focus must move to promoting people oriented, demand driven innovation, which brings tangible and facts based benefits to the end-users, the patients and the business ecosystem serving the sector. Cross-border healthcare delivery is still an issue in Europe. Information sharing is sensitive to security and privacy issues with national differences across Europe to date. Information interopera-



FI-STAR at the NetFutures 2015 Conference in Brussels (from right): Günther Oettinger, European Commissioner for Digital Economy and Society; Anastasius Gavras, FI-STAR project leader, Eurescom; Dr. Stefan Covaci, technical director of FI-STAR, Technische Universität Berlin

bility across systems in this area is improving but could still be called poor. These and many other areas represent opportunities for small and large businesses to deliver smart and efficient solutions for a European society that is increasingly mobile and that wants to age active and healthy.

Further information

- The European Innovation Partnership on Active and Healthy Aging — http://ec.europa.eu/research/innovation-union/index_en.cfm?section=active-healthy-ageing
- Future Internet Social and Technological Alignment (FI-STAR) — <https://www.fi-star.eu>

Advanced healthcare provisioning based on Future Internet technologies



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Dr. Stefan Covaci
Technische Universität Berlin

Nowadays, there is an increasing consensus that the impact of Information and Communications Technologies (ICTs) on healthcare organizations could be considerable due to the emergency of the Future Internet concept that is established over innovative technologies such as cloud computing and Internet of Things (IoT). The FI-STAR project aims to implement the next generation of healthcare supporting applications by taking advantage of FIWARE state-of-the-art services. These are cloud applications and services for healthcare provision centred based on the needs of the patient and the healthcare professionals.

Due to issues related to personal, private and confidential information, FI-STAR has built a “software to data” platform to prevent disclosure or misuse of sensitive data. The project established early trials in the healthcare domain building on Future Internet technology. It highlights new opportunities in the area of healthcare provision including new personalized applications and services that utilise IoT enabled devices acting as the integration and orchestration strategic plan for secure future healthcare services.

Personalized healthcare using the Future Internet concept

In recent years cloud computing has been fostered as the technology to offer virtualized resources to Internet users on a bespoke manner. This includes hardware, software and platform that could be delivered as a service. For many areas such as industry, agriculture etc. this has been served as an efficient approach with regards to the minimization of operational costs and increased flexibility; yet not in the healthcare domain. Data stored in the cloud are available over the Internet and could contain confidential and private health information. Today there are various standards, regulations and recommendations such as national legislation, ISO standards (ISO 80001) and the need to comply with security standards (ISO 27000), imposing severe restrictions to data transfer and storage. As a result, cloud computing that is profoundly based on the Internet and openness, becomes a hurdle to its adoption in healthcare. To overcome it, the FI-STAR project designed and implemented suitable “software to data” solutions based on Generic Enabler (GE) technology provided by FIWARE to build secure healthcare applications. In future, it is expected that the FI-STAR platform

- will highlight new opportunities in the area of healthcare provision in combination with the IoT and
- will define the integration and orchestration strategy for secure future healthcare services.

In such cases data will be collected from the IoT devices of the user (e.g., wearable sensors that are connected to a smart device) for allowing personalized and user-tailored healthcare. The data will be processed on the patient's smart device, and will be transferred through secure data connections to private data storage on the private cloud which makes it accessible to the healthcare application provider. The application will be composed from private cloud services in the form of ready to use Software as a Service instances offered by the private cloud providers.

The FI-STAR platform and beyond

The FI-STAR platform is made of a set of software modules, namely enablers that fulfil the requirements of the health domain. It makes the shift to an innovative technology that incorporates

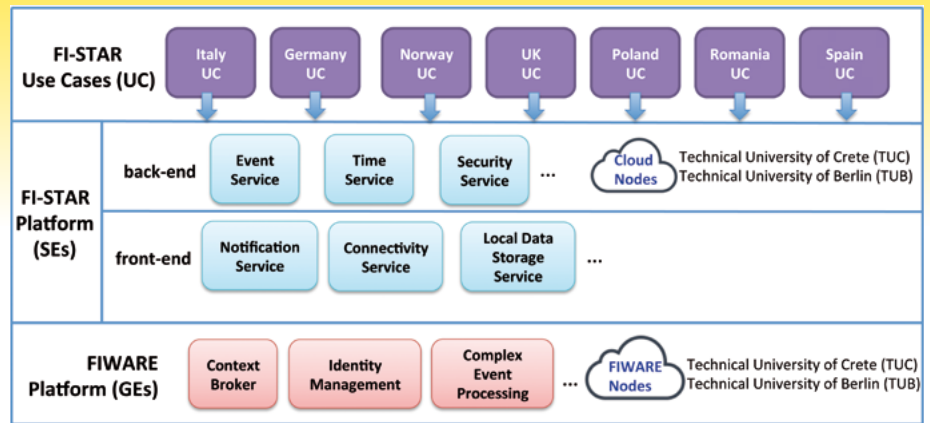
- a cloud platform with available enablers and
- a “software to data” cloud model for secure deployment of enablers.

Since application programming interfaces for healthcare have been characterized as one of the very resistant areas to be hosted on public clouds this approach facilitates a future global adoption. Project FI-STAR, is driven by the opportunities of utilizing FIWARE solutions in the health domain for enabling adoption of new standards. The advantages are twofold,

- it will offer new opportunities for cloud providers, web entrepreneurs and Small & Medium Enterprises (SMEs) to commercialize their products and services and
- it will allow healthcare providers to improve efficacy by implementing services based on FIWARE. FI-STAR offers a public cloud development platform allowing enablers to be instantiated at customer's private clouds.

The figure depicts the FI-STAR platform model that illustrates the FI-STAR use cases utilising the FI-STAR platform components as front-end and back-end enablers such as Event Service, Security Service, and Notification Service, which are deployed at the infrastructures of the Technical University of Crete and the Technical University of Berlin to build healthcare applications. The lower level is the FIWARE platform that provides the enablers such as Context Broker as general building blocks for domain specific developments.

In FI-STAR we expect to allow next generation healthcare systems to emerge naturally. Specifically, a crucial aspect of future healthcare is the personalization and user-tailored services in or-



The FI-STAR platform model

der to deliver a high quality customer experience that is individual-based, handy, appropriate and convenient. Solutions utilizing the FI-STAR platform support future applications that improve the quality of the provided healthcare services, while at the same time assisting the reduction of the cost of healthcare provision, for example by allowing patients to spend less time in the hospital through adaptive monitoring. In this way we can ensure continuous observation of health data that will be collected by wearable sensors while the patients go about their daily activities.

FI-STAR use cases

The FI-STAR platform has been deployed and supports advanced applications for healthcare provision at several experimentation sites that execute the FI-STAR use cases. These are:

- tele-health network for diabetes patients that use smart phones (Norway)
- 2-D bar-coding reverse supply chain for preventing delivery errors and counterfeiting of pharmaceuticals (UK)
- services for people with mental-health problems (Spain)
- integrated network of different applications and devices for general practitioners and specialists to monitor real-time data (Italy)
- virtualization of the operating theatre for reduction of errors (Germany)
- e-health services for treatment of cancer patients (Poland)
- cardiology real-time service for people with heart failures (Romania)

The use cases demonstrate a diverse set of scenarios where the platform enhances systems' intelligence and performance. In addition, it is expected that the solution acts as a trigger for more advanced developments as the straightforwardness of the technology makes it easier than ever to efficiently deliver personalized digital experience that moves beyond the basics in healthcare provision.

Conclusions

The technological solutions based on the FI-STAR platform are reconfigurable and interoperable and accommodate future needs of the healthcare domain. It can easily include new capabilities of the IoT sensor technology and adapt to the needs of different use cases, as demonstrated by the FI-STAR use cases. Solutions are scalable with no limitations to the number of users or to the amount of data they can serve while ensuring privacy and secure data handing. FI-STAR will impact on improved utilization of human and technology resources for providing personalized medical care in real time and on effective utilization of reinforced medical knowledge in a generalized manner.

In summary the platform supports advanced features in the areas of tele-monitoring, personalization of health and care plan including communication, trust and privacy of sensitive data, knowledge creation and sharing for collective intelligence purposes, as well as decision taking processes for caregivers, patients and information providers.

FI-STAR highlights new opportunities for wider adoption of Future Internet technologies in the healthcare domain. Future solutions will aim to offer an innovative infrastructure demonstrating improved usability and adaptability in integrated and personalized healthcare, taking advantage of improved interactions between patients and healthcare professionals. This could include active participation of patients and persons from their social context, like, e.g., family, during the care process.

Further information

<http://www.fi-star.eu>
<https://catalogue.fi-star.eu>

Prevention through the quantified self

Solutions for better health and well-being



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The mission of the EIT Digital Action Line Health and Wellbeing (HWB) is to reduce the demand for expensive healthcare by detecting small physical and cognitive health issues early and to avoid larger health problems through suitable lifestyle interventions.

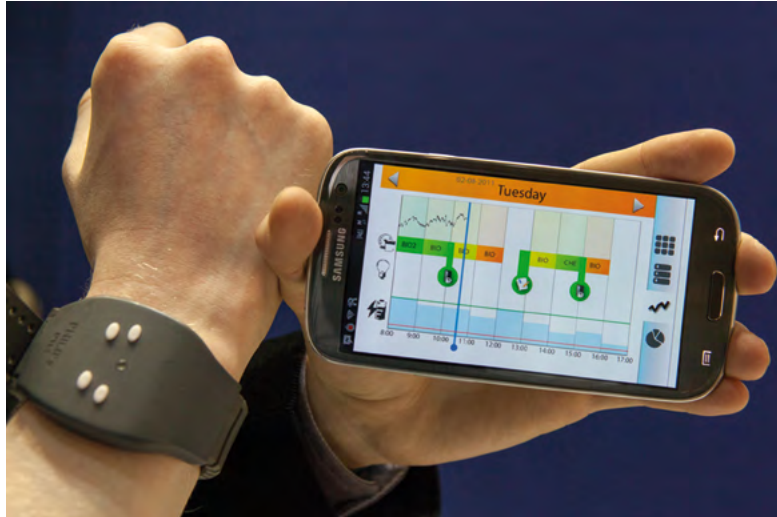
Global and societal trends, like the ageing population and growing consumer empowerment, demand an innovative and entrepreneurial ICT-enabled and -supported approach. The EU28 population's annual healthcare expenditure has risen to 1,085 billion euro, a substantial share of which arises through secondary prevention, long-term care and home-care (90 billion euro). These costs are increasing towards 2020, while the available budget and the number of caretakers are shrinking.

The Action Line will act on this challenge by offering ICT-based solutions that respond to the consumer demand for self-monitoring. These solutions will also reduce the costly demand for secondary prevention, cure and care for caretakers and insurers. Focusing on primary prevention areas, where regulation barriers are less strict, allows for the application of a more diverse set of ICT-enabled solutions and consequently encourages entrepreneurship ensures effectiveness.

Challenges

In order to realise these ambitions, EIT Digital, and more specifically the Action Line Health and Wellbeing, faces three key challenges:

1. Ensure the availability of affordable unobtrusive vital signs sensors, in order to mature these primary prevention product service combinations and bring them to the market;
2. Overcome the fragmentation of the European domestic market, which in healthcare is an even bigger challenge than in other sectors due to the cross-member state differences in legislation, healthcare financing and healthcare processes; and



Stress@work – a holistic framework for stress management

3. Leverage on the European lifestyle and wellbeing businesses that have competitive advantages opposed to their US counterparts with regards to their IPR portfolios, partnerships with traditional health care sector and ecosystems of innovative SMEs. However, European businesses need to increase their consumer-orientation compared to non-European competitors.

The provided solutions have both societal and economic impacts. Societally, they improve quality of life through early treatments and by avoiding life-threatening health issues as well as through early treatments and extended labour participation and independent living due to reduction of burnout an early development of dementia. Economically, they lower healthcare costs due to less hospitalisation and due to less residential care. The combined markets are estimated at one billion euro in 2020.

Strategic priorities

The strategic innovation agenda of EIT Digital includes two relevant priority areas: Priority 1 aims at early detection and treatment of physical anomalies with a focus on cardio-vascular diseases. Priority 2 is dedicated to early detection and treatment of cognitive deterioration with a focus on stress and dementia.

The Action Line's activities directly address the EU 2020 goal of adding two more years to the labour participation and period of independent living through user-centric early detection and

self-monitoring solutions. EU citizens and society at large will benefit from an improved quality of life, which will be achieved through early detection of anomalies and new solutions for reducing the need for treatment and therefore reducing the use of limited resources.

The Action Line Collaborates with other initiatives like the Ambient Assisted Living (AAL) programme and the new Knowledge and Innovation Communities (KIC) on Active and Healthy Ageing (EIT Health). The latter relationship will be structured in the coming period. Achievements up-to-date include the following solutions:

Stress@work

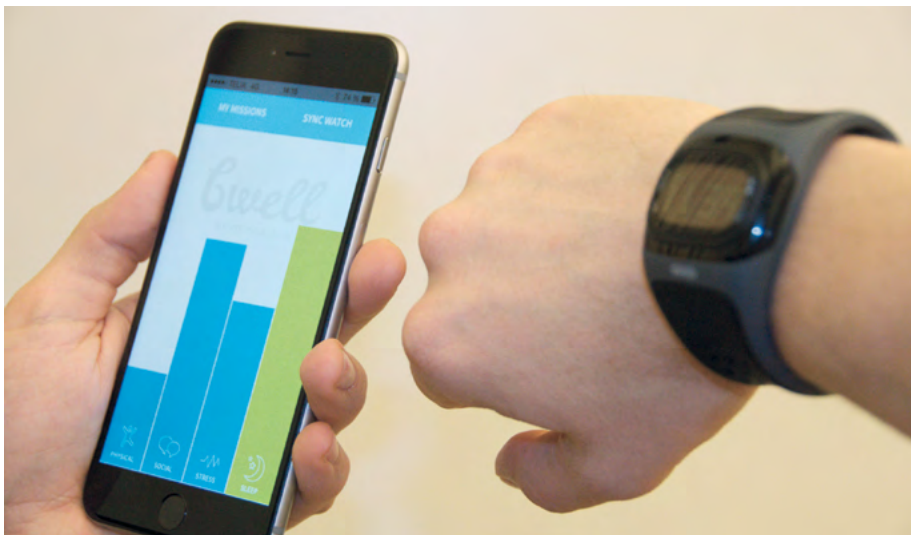
The Stress@work activity developed a holistic framework for stress management and burnout prevention. Stress at work has become a serious problem affecting many people of different professions, life situations, and age groups. The workplace has changed dramatically due to globalization of the economy, use of new information and communications technologies, growing diversity in the workplace, and increased mental workload.

In the 2000 European Working Conditions Survey (EWCS), work-related stress was found to be the second most common work-related health problem across the EU. Only in the Netherlands, direct costs of stress are about 4 billion euros a year. Stress can contribute to illness directly, through its physiological effects, or indirectly, through maladaptive health behaviours (for example, smoking, poor eating habits or lack of

sleep). It is important to motivate people to adjust their behaviour and life style and start using appropriate stress coping strategies.


Due to modern sensor technologies, objective measuring of the stress level becomes possible. Such symptoms as heart rate, galvanic skin response (GSR) and facial expressions are known to be highly correlated with the level of stress a person experiences. Moreover, due to extensive

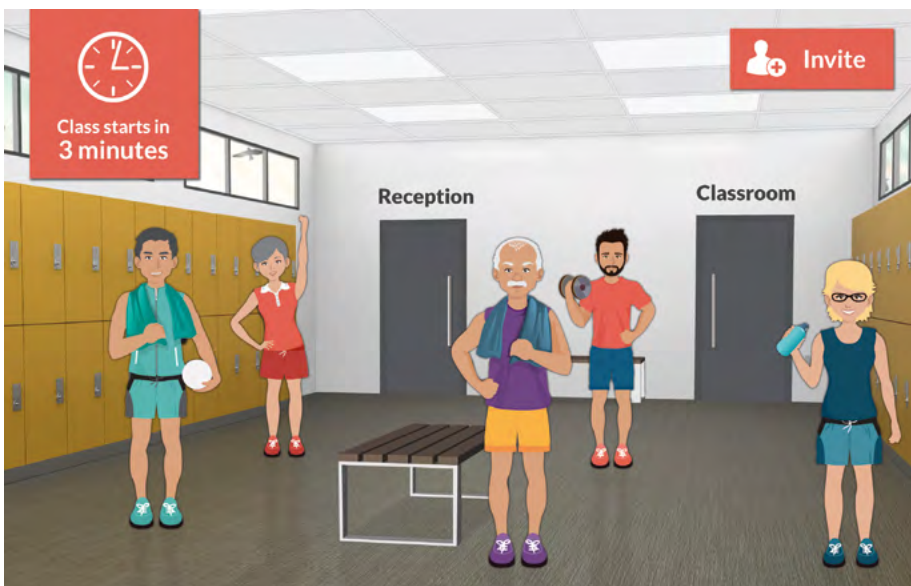
use of social media and electronic agendas, it becomes possible to develop methods and tools for the analysis of correlations between the increases and decreases in the stress level with the characteristics of the activities of daily life.



Cognitive Endurance


The Cognitive Endurance activity delivered value through a new attractive mobile application for detection mental decline at a very early stage and reducing the progression of mental decline via promotion of an active lifestyle. As a result, the spinoff 'Memorizon' will bring the 'bwell' product to the market in 2015.

 **Further information**
www.memorizon.com



Virtual Social Gym

The Virtual Social Gym activity developed a fully functional generic software platform for health-related applications. A Personal Fitness Coach application, providing nutrition and lifestyle advice, is included. The technology has been licensed to the spinoff 'Gymcentral.net' with a market potential of 150 million euro in the EU, US, and Russia and an expected yearly turnover of about 30 million euro. The launch of the product has been scheduled for 2015.

 **Further information**
www.gymcentral.net

Different paths to healthier lives

Interview with Henrique Martins from the Portuguese Ministry of Health

Information and communication technologies offer tremendous opportunities for health and well-being. The challenge for Europe is now to exploit these opportunities and reap the benefits. Eurescom message editor-in-chief Milon Gupta asked professor Henrique Martins, a medical doctor and health expert from Portugal, about the progress and the obstacles in Europe as well as his vision.

Professor Martins is CEO of SPMS.EPE Shared Services of the Portuguese Ministry of Health and coordinates the health executive education at the Catholic Lisbon Business School. In addition, he teaches as an assistant professor at the faculty of Health Sciences at Universidade da Beira Interior.



Which major advances in ICT-supported health and well-being do you expect for Europe in the next five years?

I expect that we will fund and develop through CEF, the Connected European Facility, the enthusiastic environment that will lead governments and major providers of care to focus on sharing data in an electronic format. I expect telemedicine no longer to be a special separate topic in news, meetings, and projects. It will be just a regular tool in healthcare, like the stethoscope that all doctors know how to use and all citizens recognize as an icon of medicine. These are measurable outcomes. Above all I expect more commitment and the will and push to act!

What is your personal vision for ICT-supported health and well-being in the EU's digital single market?

My personal vision is that roads and rails of digital health data will be interoperable and secured by governments and communities, a range of transport vehicles for poor and rich ICT-health consumers will exist. Like in today's EU roads, public transportation, secured by not-for-profit, government, and community intervention, exist side by side to more expensive, exclusive models freely supplied by industry. These will be the vehicles of ICT-supported health. The fuel will be data itself and returns from increased health gains. The driving code: e-health interoperability. Lastly, the citizens are the drivers, not the clinicians, who should, nonetheless, sit in the front rows. The path to health and well-being will mean very different routes to different people at different times in their healthier life.

How can ICT help improve health and well-being?

ICT are not just a help, they will be essential for health. Dementia patients, for example, are reminded via apps that link to their health and medication records and call them or their families. Such apps will be commonplace and as important for dementia treatment as the drugs themselves. We will have internalized chips that constantly monitor vital signs and blood levels of circulating molecules. Furthermore, there will be apps measuring drug concentrations alerting for risky low levels, for example, in epilepsy patients. They will be wirelessly linked to phones and from there through the Internet of Things to the responsible clinician. These are just two examples of a myriad of possibilities, if countries and people invest in health ICT seriously and in a free open interoperable manner.

What are the opportunities and risks of Big Data for personalised healthcare?

There are tremendous opportunities: Big Data analysis will be to modern medicine what penicillin and anaesthetics were to surgery in the 20th century. Data is not just the new world currency, it is also the newest world laboratory for basic as well as applied biomedical research. The risks are that a few groups of people and countries may come to benefit, if costs are too high, or knowledge gained is restrictively protected. A further risk is that people forget that health data

is special – it is about a living being! This means it needs smart additional protection, but no confinement by restricting it to silo databases for fear of privacy and security breaches; this would kill the core nature of personalised healthcare.

What are the major barriers for fully realising the potential of a single healthcare market in Europe?

Well I would point the following: first, most travelers are relatively healthy because others more sicker people are scared of leaving their home/hospital base. This is a trust issue, once services exist at cross-border level, both provision as well as data services, people will travel more and use healthcare around Europe. For now, just look at airports, 95 per cent or more may have been to healthcare facility more than one year ago. So demand needs to be there, and supply as well. Networks of providers and of ICT-connected organizations need to be supplied.

These need to be connected in an interoperable and safe way, securing data flows that provide patient safety and cross-border billing and clinical data flow. For such supply to exist, clinicians and citizens need to trust and be willing to co-create a single healthcare market. This involves mutually recognising professional degrees, structured documentation of records, provision of care via tele-services, and more. Open spirits engaged in the effort to co-conceive, train and develop the digital tools to support that realization.



Celtic-Plus

Newsletter 1/2015

The future of digital business –
Celtic-Plus Event in Vienna

How Spain fosters international cooperation
within Celtic-Plus

HFCC/G.fast – Hybrid fibre-copper connectivity
using G.fast technology



Editorial

Table of Contents

Editorial 2

Celtic-Plus Success Stories

SPECTRA – Spectrum and energy efficiency in 4G and beyond 3

MediaMap+ – Media management from acquisition to publishing 4

COMMUNE – Network management under uncertainty 5

Events

The future of digital business – Celtic-Plus Event in Vienna..... 6

View from a Public Authority

How Spain fosters international cooperation within Celtic-Plus 8

Project Highlights

Seed4C – Security embedded element and data privacy for the Cloud 9

HFCC/G.fast – Hybrid fibre-copper connectivity using G.fast technology 11

IMPRINT

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Dear reader,

Every day when I go to work I have to drive through a town with exactly 15 traffic lights within a distance of about three kilometres. None of them is synchronised with the others, so it is purely accidental whether they show red or green when you approach them. Synchronising these 15 traffic lights in an intelligent, real-time context-dependent way would solve various problems, such as saving a lot of energy by avoiding stop-and-go, keeping the drivers happy and in a positive mood, and last not least giving a good and modern impression of the town. This case is a rather simple, but illustrative example comprising several of the current hot ICT topics: Smart Cities, Internet of Things, Future Internet, and 5G.

The chance to solve such issues has never been as good as now. EUREKA has just started an Inter-Cluster Smart City Initiative with the goal of seeing many cross-disciplinary projects helping cities to better manage their energy, transport, water, administration, and many other issues. Nearly always we need ICT networks and services to enable and support these projects. This is a good example that the R&D world is becoming more cross-disciplinary. It is not so much the technical developments, which are in the focus, but the societal challenges like ageing population, health, efficient transport, energy efficiency, and food security.

In the first half of 2015, the ICT R&D community focused a lot on the first 5G-PPP Call within the EU's Horizon 2020 framework programme. The first 5G-PPP projects are expected to start mid-2015. This creates an ideal scenario for complementary projects within the Celtic-Plus Programme.

To allow Celtic-Plus projects to start in a timely manner, we organise three Celtic-Plus Calls in 2015. The first Call ended in February and resulted in five project proposals. The second Call closed on 29 May with four proposals, and the third Call will close on 15 October. You are very welcome to submit your project proposals under the current call.

The Celtic-Plus programme offers proposers a number of benefits. It uses a bottom-up approach for research topics, i.e. there is no prescribed Call text, and proposals can be about any relevant ICT challenges. In addition, Celtic-Plus has a low administrative overhead, a high success rate, and the time between project proposal and the start of the actual project can be very short.

In this newsletter issue, we present to you a number of results and activities which resulted from our R&D programme. Most prominently, we had our largest ever annual Celtic-Plus Event this year co-located with the B2B Software Days in Vienna in April. You can read the article about this major event in this issue. In this context, we would like to thank Nokia for providing some key event sponsorship which helps us to improve the quality of the Celtic-Plus Events in 2015.

In this issue you will also find a new "Views from Public Authorities" article, which features the R&D activities of Spain, a very active player in the Celtic-Plus programme.

We hope you find this issue of our Newsletter and the articles interesting, and would welcome your comments.

Peter Stollenmayer
 Editor



SPECTRA – Spectrum and energy efficiency in 4G and beyond



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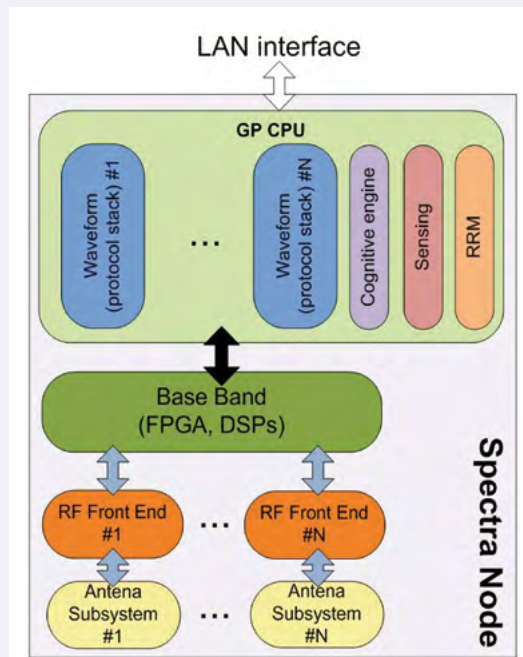
The SPECTRA project (Spectrum and energy efficiency in 4G communication systems and beyond) made significant progress in the field of new cognitive radio algorithms and innovative approaches to designing radio frequency front-end and base-band components. The main goal has been to achieve better spectrum and energy efficiency for communication systems beyond 4G. The realized blocks were integrated on two hardware platforms to show the capability to communicate cognitively in real-time and the significant efficiency gains brought by SPECTRA.

More than thirty hardware components were developed by the project, and the integrated system were successfully tested and verified in field trials. The advanced level of the developed hardware components and algorithms led to the release of six new products and to improvements in four existing lines of products with significant positive impact on the business of the project partners.

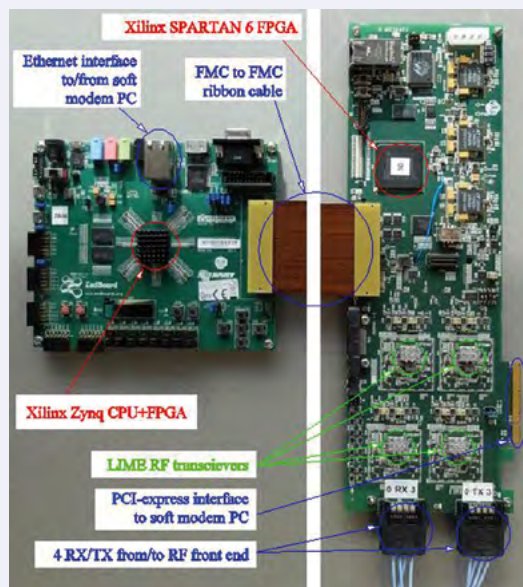
The SPECTRA Node – multi-functional, flexible and efficient

The core of the project has been the development of a flexible and efficient node implementing different waveforms, capable of covering multiple roles in the network (base station, relay and user equipment) and acting cognitively.

The result is the SPECTRA Cognitive Node, which is fully compatible with the LTE standard. Field trials of the prototype realized in a cellular environment showed that the proposed node is capable to act as a base station for existing commercial LTE devices. This guarantees that the SPECTRA solutions have a short time to market, and it makes the SPECTRA Node a serious candidate for the deployment of small cells.



Cognitive Spectra Node Architecture



The SPECTRA hardware platform

Small cells and new spectrum sharing paradigms

The increasing need of resources for mobile communications and the scarcity of available spectrum are pushing regulators all over the world to reconsider the allocation principles of spectrum resources. This will lead to new licensing models. The SPECTRA project provides the key technical components to fully exploit the opportunities of the future flexible spectrum environment.

The SPECTRA prototype and the related open source software released by the project has generated a lot of interest in the telecommunications

community. In particular, the hardware platform realized for the project was produced in several copies and sold to customers in Europe and Asia.

A community has formed around the released software leading to the creation of the "OpenAir Interface" foundation with the mission to maintain, protect and enrich it. The next step will be the creation of a service company to commercially exploit the key project results.

- Further information is available at <http://spectra-celtic.eu>



MediaMap+ – Media management from acquisition to publishing



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In today's context of exponentially growing data, organizations need to adapt and capitalize on rapidly changing scenarios, have better access to information resources, discover new opportunities, and improve their decision process. The MediaMap+ project has tackled these challenges in the area of media management.

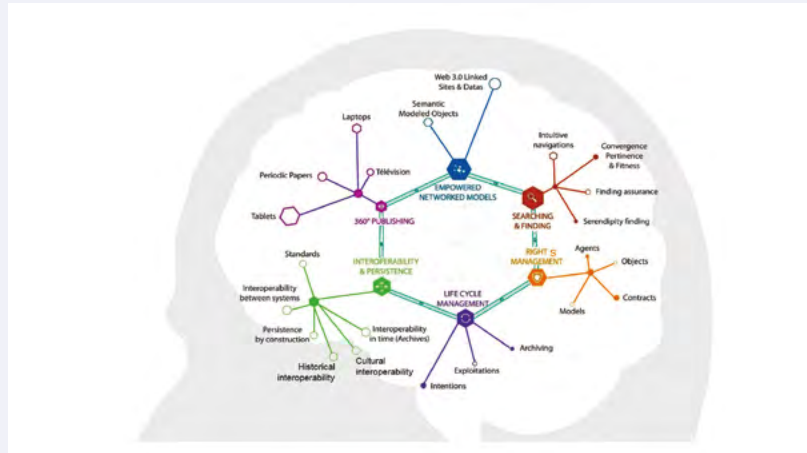
The members of the Celtic-Plus project Media-Map+ have addressed some fundamental issues of traceability and broadcasting of audio-visual material. MediaMap+ has integrated a dynamic, low-entry threshold and cost-effective semantic ecosystem into media production systems for the requirements of 360° publishing, i.e. publishing for all types of end devices. Hence, the individual users are at the centre, without prejudging their mode of consumption. This has required new architectures to produce interconnected rich content, paving the way to knowledge.

Semantic ecosystem

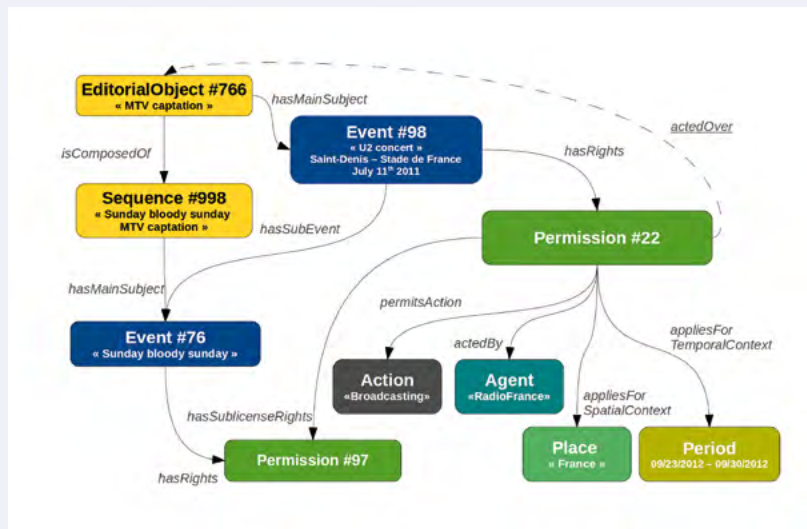
The project has developed a Web as a Brain (WaaB), a networked computer system that lets the network of human, machine, knowledge and know-how cooperate in the creation and the development of augmented audio-visual assets. As the WaaB assumes the traceability of the processes, it guarantees a proper clearance of rights. The project has extended the boundaries of valuation and monetization of the content, allowing mixed marketplaces, collaborative recommendation, and updating content on the fly.

Main results

The customer interface has been drastically improved in the past decade, and it speeds up. Actual Internet pure players have demonstrated a semantic ecosystem is a key factor of success to



WaaB : Web as a Brain



The semantic Event & Rights modelling

conquer and develop market segments. This is the essential difference between the GAFA (Google, Apple, Facebook, Amazon) and traditional brands.

The MediaMap+ project reshapes the business intermediation, thanks to a better traceability of the assets' life cycle, and a continuous enrichment process. MediaMap+ fixes interoperability and operational issues of Big Data and media. For its targets, it enables open, collaborative and transversal approaches of the business.

Conclusion

This efficient and effective exploitation of the Web 3.0 opportunities opens new business opportunities to the members of the consortium, who in less than six month since the end of the project, already delivered their breakthrough solutions to the market.

The results will bring innovation not only to the European media industry. It is relevant to any business that requires capitalizing upon its knowledge and listen to its ecosystem like in e-commerce, media agency and media brand markets, for instance. And thus it addresses local issues like proliferation of open networked knowledge bases or curation of sustainable knowledge.

- Further information is available at <http://mediamapplus.eu>

COMMUNE – Network management under uncertainty



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The Celtic-Plus project COMMUNE (Cognitive network Management under UNcEr-tainty) explored how to manage networks under conditions of increased complexity and uncertainty.

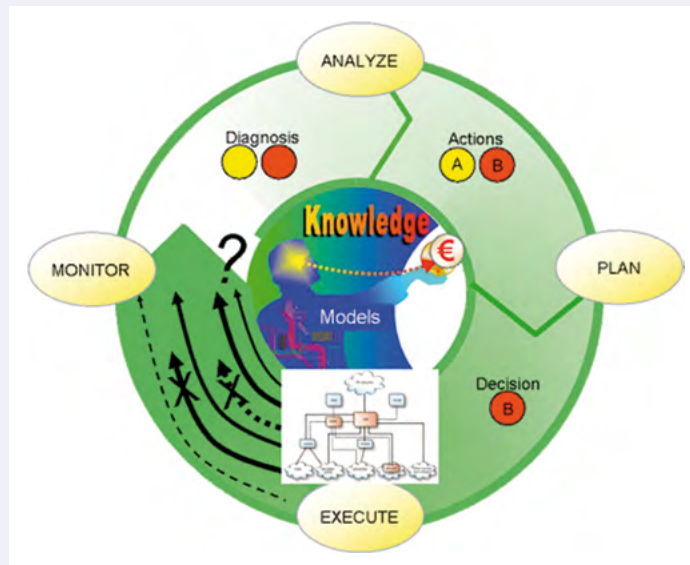
Telecommunication networks are growing in size, complexity and heterogeneity, with a rich blend of services being deployed on top of them. The Future Internet will consist of a set of cooperating players including network operators, service providers, and content providers. Cooperation between these players will be necessary in order to provide end-to-end services.

The multiplicity of devices, networks, providers and service domains, along with the introduction of a virtualisation layer that hides the actual resources from their users, will make network management and operation very challenging. This leads to increased complexity in the management of future networks.

Focus and approach

Uncertainty is an intrinsic property of future telecom networks, and currently in the real world only human operators are able to deal with this problem. COMMUNE addressed the problem by using technologies which support learning capabilities, also called cognition. It utilised a scenario-oriented approach to identify the causes of uncertainty, and characteristics and requirements of a number of relevant use cases.

The use cases included radio access (self-organizing network - SON) management, Fibre to the Home (FTTH) management, Internet of Things (IoT) and multimedia Quality of Experience (QoE) management for both peer-to-peer (P2P) and mobile networking cases. The outputs of the scenarios' work and the uncertainty models were used to select the suitable cognitive algorithms for each scenario. The combination of the overall scenarios and the knowledge repre-



The COMMUNE vision

sentation choices guided the design of the COMMUNE cognitive network framework. In the end, a small number of applications were prototyped and further validated using both simulations and experimentation.

The figure illustrates the COMMUNE vision, where the different COMMUNE concepts are grouped along the well-known MAPE (Monitor-Analyze-Plan-Execute) loop.

Results

The generic architecture for the autonomic and cognitive network management ("GARSON" from Orange) provided a comprehensive architecture for the implementation of cognitive algorithms in a number of different network management scenarios. GARSON is a very high-level approach in which the management architecture is decomposed into several planes, namely monitoring, actuating, knowledge, cognition and policy.

A number of scenarios indicated that a hybrid management approach, i.e. a combination of centralized and decentralized management, is often more appropriate than a unilateral approach. In addition, the suitability of different distributed implementation frameworks for the network management, including the Programmable Distributed Execution Environment (PDEE) framework which combines OSGi and FIPA technologies, was demonstrated. These were used in a distributed SON management scenario involving a number of partners. Substantial input was also made to IETF standardisation in the IoT area.

Conclusions

According to the EC's Digital Agenda for Europe, realizing the promise of next generation (5G) communications in terms of flexible and cost-efficient provisioning of versatile and context-aware services faces fundamental challenges in the domain of network management. Together with the infrastructure and services evolution, the management systems require a major step forward to efficiently manage the complexity and the diversity of these new infrastructures and services, while helping to satisfy the overall goal of cost efficiency. A high degree of automation and cognition is required to continuously tune the network to the current communication demands, and to concurrently improve the efficiency in the use of resources.

The goal of the Celtic-Plus project COMMUNE was to investigate cognitive techniques in order to solve problems or failures where the root causes cannot be completely identified. COMMUNE built an innovative solution for cognitive network management under uncertainty for selected scenarios. It was successful in demonstrating the mitigation of uncertainty by using suitable cognitive methods. It is expected that the technologies and concepts developed in the project will also be used as a platform for future research, particularly for research related to SDN and 5G.

- Further information:
<http://projects.celtic-initiative.org/commune/>



The future of digital business

Celtic-Plus Event in Vienna



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This year's Celtic-Plus Event in Vienna attracted more than 500 international experts and decision makers from the digital sector. They gathered in the Austrian capital on 27th and 28th April 2015 to discuss nothing less than the future of digital business. The major annual event of Celtic-Plus presented results of the programme's past and ongoing ICT projects and offered ample matchmaking opportunities for developing new project ideas.

For the first time, the Celtic-Plus Event took place in Vienna. This reflected the strong commitment of Austria's public authorities for research and innovation to further boost the country's role in the European ICT domain. The event was co-located with the B2B Software Days 2015 and was hosted by the Austrian Research Promotion Agency FFG, together with the Austrian Chamber of Commerce and the Vienna Business Agency.



High level of interaction at the plenary sessions of the Celtic-Plus Event.

Matchmaking and awards

The first day of the two-day event was dedicated to bilateral meetings of researchers, developers and innovation managers. The purpose of the matchmaking activity was for participants to meet other experts from the ICT community to discuss emerging R&D needs and proposals for collaborative projects.

At the networking event in the evening, the Celtic-Plus Awards were presented to the partners of the winning projects. There were three excellence awards for outstanding achievements in the categories Network Technologies, Services and Applications, and Connecting People, as well as an Innovation Award for a project which finished some years ago and has meanwhile generated significant business impact from its innovative results (see text box).

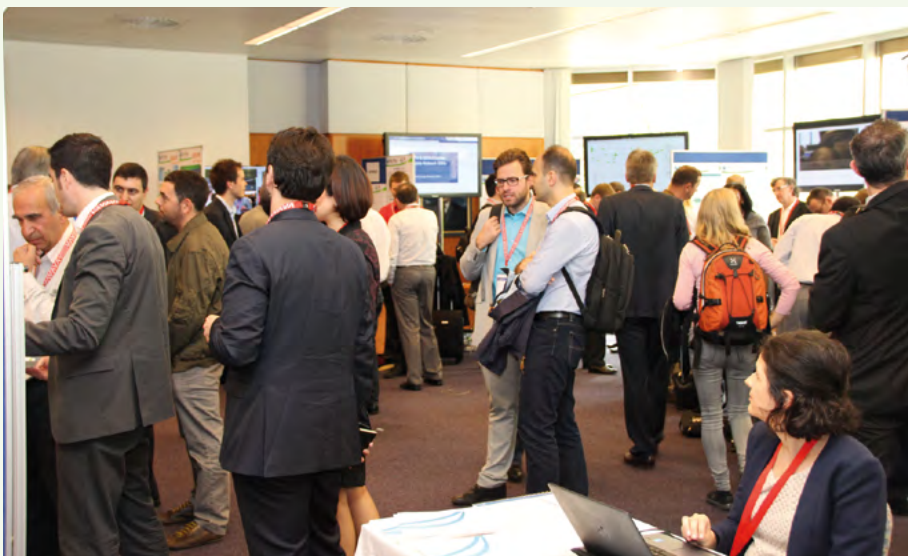
Conference and exhibition

The conference on the second day was opened with welcome speeches by Andrea Höglinger from FFG, the Austrian research promotion agency, and Jacques Magen, chairman of Celtic-Plus. The highlight of the opening session was a keynote by Jean-Sebastien Bedo from Orange Labs, who presented the 5G Infrastructure Association's 5G vision. In the next session, representatives of the award winning Celtic-Plus projects MediaMap+, CIER, SPECTRA, and Opera-Net presented their results.

The ensuing session focused on the successful projects of tomorrow: 13 researchers and developers from all over Europe presented their innovative project ideas for the next call of Celtic-Plus in short pitches.

The conference also included presentations by representatives from Canada and South Africa, who provided insights into their countries' R&D priorities and project achievements. Charles Despina, President of the Canadian innovation agency Prompt, explained how Canada is driving sustainability through an integrated telecoms and energy infrastructure. Jeanette Morwane, Director ICT and Service Industries at the South African Department of Science and Technology, presented telecoms research trends in her country. Canada and South Africa fully participate in Celtic-Plus, which means, participants from these countries are eligible for Celtic-Plus projects.

The conference concluded with a high-level panel discussion on the future of telecommunications, moderated by Eurescom director David Kennedy. The discussion focused on industry evolution, future services and business mod-





Panel on the future of telecoms (from left): Thabo Malebadi, e-Mbizo Solutions; Jesús Canadas, Spanish Ministry of Industry, Energy and Tourism; Jean-Sebastien Bedo, Orange Labs; Martin Lehrbaum, Kapsch CarrierCom.



Manfred K. Mueller, Siemens Convergence Creators; Waltraud Müllner, A1 Telekom Austria; Fisseha Mekuria, CSIR Meraka Institute (from left).

els.

The event was complemented with an exhibition, including results from 15 Celtic-Plus projects. Their prototypes provided an interactive experience of the technological progress they achieved. Many of these results have already made it to the market, which once again highlighted the benefits of the industry-driven focus of Celtic-Plus.

- Further information on the Celtic-Plus event, including videos, photos and presentations, is available at <https://www.celticplus.eu/videos-and-presentations-from-the-celtic-plus-event-2015-in-vienna/>

Celtic-Plus Awards 2015

Innovation Award: Opera-Net

The Opera-Net project on 'Optimised Power Efficiency in mobile Radio Networks' developed a solution which has been rolled out by French network operator Orange across most of Europe, Africa and the Middle East, reaching more than 140 million customers. Technologies developed in the project enabled savings between 2% and 3% of power consumption in Orange's 2G/3G radio networks, corresponding to an OPEX reduction of about 5 million euro per year.

Project leader: Orange Labs, France. Consortium: nine other industry and academic partners from Belgium, Finland, France, Ireland, and Singapore. Duration: June 2008 – May 2011

Opera-Net Website: <https://www.celticplus.eu/project-operanet/>

Excellence Award for "Connecting People": CIER

The CIER project brings broadband connectivity to rural areas in Europe and Africa. The project developed a plug-and-play radio-frequency communication system that brings high-speed Internet to rural areas. In a field trial in Tanzania, a 90 km network has connected three schools and a Hospital. A first commercial deployment has been done in the German City of Nordhorn, connecting a business area in a few days.

Project leader: Fraunhofer FOKUS, Germany. Consortium: seven further industry and academic partners from Finland, France, and Germany. Duration: February 2011 – July 2014

CIER Website: <https://www.celticplus.eu/project-cier/>

Excellence Award for "Network Technologies": SPECTRA

The SPECTRA project implemented novel cognitive-radio techniques which allow automated self-configuration of devices. SPECTRA developed the hard- and software components and demonstrated two proof-of-concept platforms which are able to communicate cognitively in real time. They can be used in quite different application cases, including LTE network, femto-cells but also in emergency communication systems.

Project leader: Thales Communications & Security, France. Consortium: six further industry and academic partners from France, Monaco, and Spain. Duration: September 2010 – 31 August 2014

SPECTRA Website: <http://spectra-celtic.eu/>

Excellence Award for "Services and Applications": MediaMap+

The MediaMap+ project made it possible to produce a TV programme with much less effort for manipulating and verifying media content prior to the broadcast. MediaMap+ provides an integrated workflow for audio-visual productions covering the whole production chain. It makes audio-visual content easily identifiable and available for re-use in future media productions. Videos are enriched with semantic meta-data that allow users to find relevant video sequences via a built-in search function. The MediaMap+ toolset enable a high degree of automation throughout the whole media production.

Project leader: SGT, France. Consortium: five further industry and academic partners from Belgium and France. Duration: April 2012 – June 2014

MediaMap+ Website: <http://mediamapplus.eu>



How Spain fosters international cooperation within Celtic-Plus



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In Spain two ministries are involved in the management, representation and promotion of CELTIC-Plus and other EUREKA Clusters: the Ministry of Industry, Energy and Tourism (MINETUR), and the Ministry of Economy and Competitiveness through the Spanish Innovation Agency, the Centre for Industrial Technological Development (CDTI).

The Ministry of Industry, Energy and Tourism (MINETUR) is the responsible institution for defining the national ICT policies, in agreement with other departments.

CDTI participates actively in Celtic-Plus due to the added value of innovation performed internationally and the ability to enable Spanish companies to foster their technological capacities. This allows the companies to expand the impact of their products, processes and services on the global market. EUREKA Clusters have become an excellent way to foster the Spanish industry for global competitiveness.



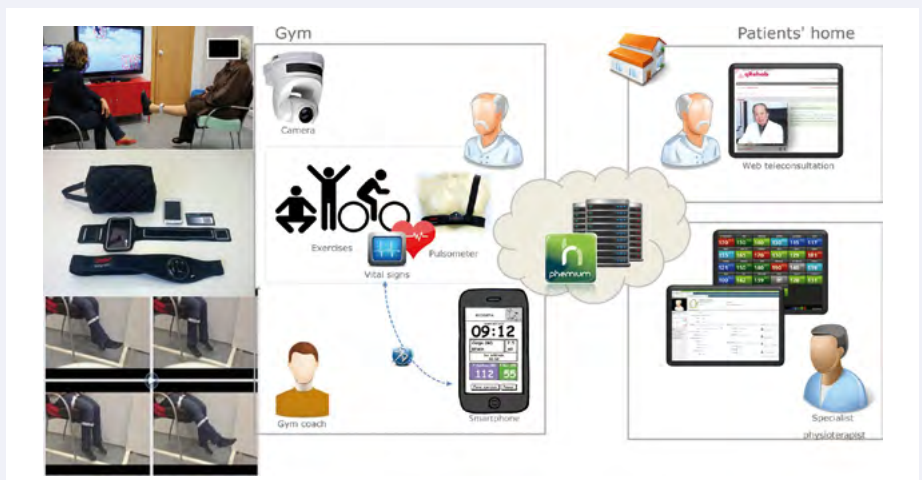
TILAS Project: Detail of the nodes with antennas and encapsulated customized deployment

EUREKA Clusters and their projects offer Spanish industry the advantage that they are bottom-up international initiatives to stimulate collaborative R&D in Europe. Within the Clusters, Celtic-Plus is particularly relevant, as the R&D field of Celtic-Plus – telecommunications, including networks, services and applications – has gained great relevance in the ICT-related industry, which is of importance for Spain. Spain has made major contributions to very successful Celtic-Plus projects, two of which are presented below.

Successful Celtic-Plus projects in Spain

The HIPERMED project, funded by MINETUR, has developed an open high-performance low-cost telemedicine platform that has a huge potential for reducing healthcare costs in developed countries and provides cost-effective healthcare to remote areas of developing countries. It has received the following European awards:

- Celtic-Plus Excellence Silver Award (April 2014)
- Winner of the EUREKA Award in the category “Added Value” (August 2014)
- Winner of the prestigious EUREKA Innovation Award (November 2014)



Celtic-Plus project HIPERMED: First real deployments of HIPERMED rehabilitation solutions

The TILAS project on Technology Improvements for Large Scale Smart Cities Deployments, funded by CDTI, provides technological solutions that enable the deployment of IoT (Internet of Things) devices in large-scale smart cities environments. The breakthroughs are focused on new models of end-to-end security devices with limited resources, management of massive remote firmware upgrades, new routing protocols, incorporation of IPv6 on PLC and actual deployments of validation in urban environments. Several articles have been published about TILAS at international level.

Funding in Spain

Usually MINETUR and CDTI grant the Celtic-Plus projects a funding of 25% or more for large companies and about 35% for SMEs. Research centres and universities must be sub-contracted by industry.

Both, MINETUR and CDTI, have a proven method to foster this kind of projects due to the high potential for Spanish participants to improve their competitiveness and exploitation capacities on the European market. Besides, CDTI has rein-

forced the funding tools for EUREKA Cluster projects with loans up to 85% of the fixed interest rate Euribor, and a 30% non-repayable part, the highest offered by CDTI for R&D projects.

21 projects have been funded by MINETUR and CDTI since 2011. While MINETUR opens specific calls for Celtic-Plus Projects, CDTI has an open call the whole year round.

Conclusions

Celtic-Plus is a bottom-up R&D programme that complements other international and national programmes and offers an International cooperation framework. It is a very interesting programme for Spanish companies, and it provides the best solution for applying technology at key and strategic sectors.

The Spanish Authorities have a high interest in Celtic-Plus, involving two Ministries with complementary funding tools for Spanish organisations, mainly for industry, although research centres or universities are welcome within the consortiums if they are sub-contracted by companies.

National contacts in Spain

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Seed4C – Security embedded element and data privacy for the Cloud



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The virtualization of critical business applications is still restrained by security and data protection issues in the Cloud. The Seed4C project is determined to overcome these restrictions. It has therefore developed an approach which consists of attaching hardware-based Secure Elements (SE) to Cloud nodes in order to offer strong security enforcement and to support an end-to-end process ranging from security policy modelling to security assurance.

Security in the Cloud

The benefits of Cloud Computing are widely recognized, but enterprises are still hesitant to rely on Cloud infrastructure for their sensitive data and applications, as they fear potential data security and privacy issues. Moreover, some sensitive data are subject to constraints due to regulations. Seed4C proposes therefore an approach allowing the strong enforcement of security policies which are typically defined in the Service Level Agreement established with the Cloud Service Provider (e.g. on data location or processing isolation). In addition, the Seed4C approach allows providing some guarantees that these policies have been well enforced all along the lifecycle of the applications in the Cloud.

End-to-end security based on Secure Elements (SE)

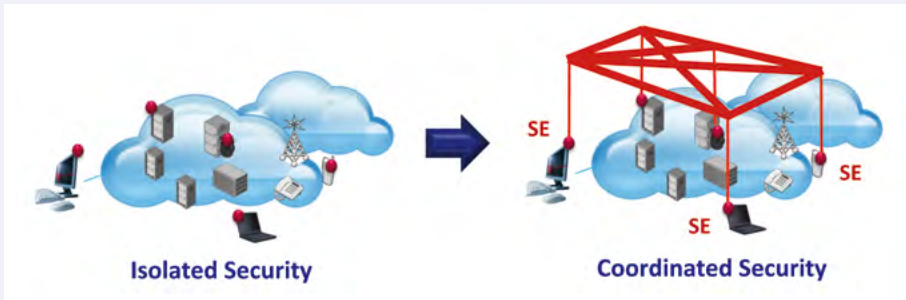
Seed4C allows the end-to-end and in-depth enforcement of security in Cloud infrastructures handling critical data and applications. The main

idea has been to attach hardware-based Secure Elements (SE) to Cloud nodes in order to enforce various security policies, e.g., using the node certified location stored in the SE. In addition, relying on these SEs, additional security services are offered to enforce security policies with various Security Services Modules (SSM). The SEs are connected through a Network of Secure Elements allowing for instance to get the certified security context (e.g. location) of a remote Cloud node. Finally, Seed4C provides an assurance verification mechanism offering the customer, or an auditor, a comprehensive view of the security level of his Cloud applications.

Seed4C security process

Seed4C has defined an end-to-end security process which consists of the following stages: (i) security policy modelling, (ii) application and policy deployment in a Cloud platform, (iii) SE-based policy enforcement, and (iv) monitoring and assurance of the enforcement of these policies.





From isolated security to coordinated security in the Cloud

In order to support this process, the following tools have been designed and prototyped:

- A Policy Modelling tool allowing the modelling of the application (i.e. its different components and data flows) and its security policies such as confidentiality, isolation, or integrity.
- An extended OpenStack platform allowing the application deployment according to the previous security model and the configuration of the security policies using the SE. For this purpose, SE-based security services allows the dynamic configuration of different SSM such as firewall, Mandatory Access Control, or Data Protection engine.
- The policy enforcement also relies on these SE-based services (e.g. to get the node certified location or encrypt/decrypt a sensitive data). Administration tools are also offered to manage the network of SEs and, for each tenant, to manage its own critical data (e.g. keys) in a secure space in the SEs.
- Monitoring and Security Assurance tools allow testing the security policies and aggregating all the test results via security assurance metrics to establish a security dashboard showing to an administrator the overall security status of the Cloud infrastructure and applications.

Project achievements

These technical achievements have been presented in 18 publications and at various Cloud-related events. The Seed4C platform has been implemented in use cases of different business domains, like, e.g., airport management system, telecommunication, security management. Furthermore, it has created a new product and several improvements of existing products.

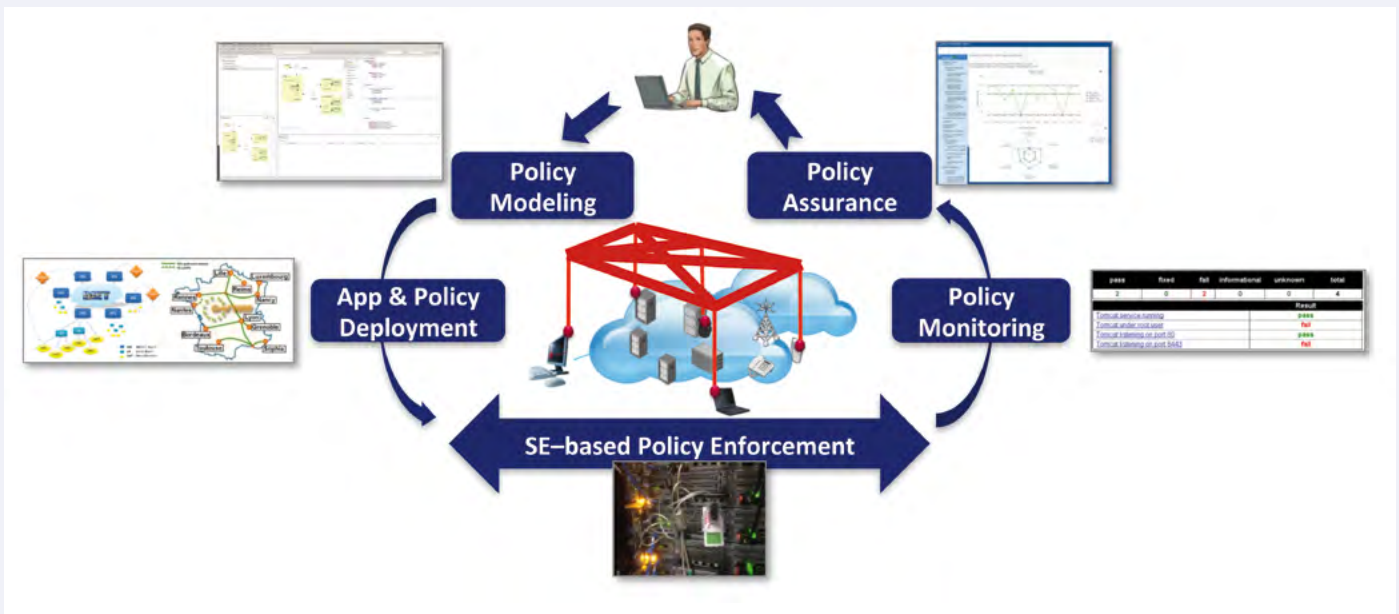
Seed4C has interacted with various standardization bodies (e.g. GlobalPlatform, Trusted Computing Group, ETSI Network Function Virtualization), allowing leveraging the expertise built in the project on SE-based Cloud security. Recently Gemalto has purchased Safenet (HSM provider of Amazon AWS), which opens another opportunity for further impacts of the project in the industry. Finally, Seed4C advisory board meetings organized with other industrial actors (e.g. railway operator, electricity supplier) have shown the relevance of the Seed4C approach to address the security concerns of other businesses which want to virtualize their critical applications.

Conclusion

Seed4C has demonstrated how hardware-based Secure Elements – embedded in Cloud nodes – can strongly improve the security of sensitive data and applications in the Cloud. The approach chosen by the project serves a wide range of challenges. There is for instance an increased demand for data sovereignty and control of critical flows in the Cloud, e.g. trans-border flow control.

In this context, the upcoming Network Function Virtualization combined with the Software Defined Network technology brings new benefits along with strong security concerns that can also be addressed by exploiting Secure Elements attached to Cloud nodes or network equipment. In another context, the digital services offered on various devices, or in IoT objects, are holding and exploiting an increased volume of sensitive data and are becoming more and more invasive for people’s lives. Exploitation of dedicated attached hardware Secure Elements may also improve data protection and privacy control, increasing as well the trust of each customer in this new digital and Cloudified world.

- Further information is available at <http://www.celticplus-seed4c.org/>



Seed4C end-to-end security process

HFCC/G.fast – Hybrid fibre-copper connectivity using G.fast technology



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The HFCC/G.fast project can be seen as a response from the broadband industry to the 100 Mb/s ambitions set out in the European Commission's Digital Agenda. Mass deployment of fibre-to-the-home broadband being prohibitively expensive, industry looked for a solution to combine deep fibre deployment with short copper drops to deliver gigabit speeds to homes. To reach the targets of at least 100 Mb/s to European citizens, a new telecommunication standard was needed.

The HFCC/G.fast project had three goals:

- Complete the standardization of G.fast, a process started by the Celtic project 4GBB (2009-2012).
- Maintain a European technology lead in the fixed-line broadband area and thus lay the foundation for continued export success stories.
- Address the path from the completed G.fast standard into a commercial, widely deployed success.

The project consortium and how it worked

The project included 14 partners from nine countries, many of them self-funded, which indicates both the value of participating in the project and the high commitment of the partners. Self-funded partners are also a credit to the value creation of Celtic as a platform for collaborative work.

The project also served as an arena for innovation and knowledge generation. At the start of the G.fast work, it was largely believed that using the public telephony copper wiring in the intended way was impossible or at least impractical. A joint learning journey revealed surprising potential, which was very stimulating for the many individuals working in the project. The frequent physical meetings, where technical discussions were given ample time, were always well attended, and provided high-quality results.

The consortium composition with partners from the whole value chain turned out to be of unexpected importance. One of the project's main achievements is the shortening of time-to-market of about five years compared to previous comparable standards. This can be seen in the table below. Keep in mind for this comparison that G.fast is in its structure very complex and that it really is a whole family of standards.

	ADSL	VDSL	G.fast
Start of standard development	1992	1996	2011
First approved ITU standard	1999 (T1.413 approved in 1996)	2004	2014
Start of interoperability tests	~2003	~2006	2015
Start mass deployment	~2000	~2009	Expected 2016
Years to deployment	11 years	13 Years	5 Years

We can illustrate how time was saved by an exaggerated anecdote: Normally when an integrated circuit chip is ready, time is needed to integrate this into a prototype; time is needed to develop test plans; time is needed to negotiate and allocate testing in operators' labs; and time is needed for testing. In our case you could imagine chips being dropped into their sockets in otherwise complete and integrated prototypes that were already hooked up into measurement setups in operator labs.

This high development speed also put expectations on others to keep up and created the trust needed for others to move quickly. The trust creation, both inside and outside the project, and the importance of this trust creation was not foreseen from the beginning, and hence a very positive surprise.

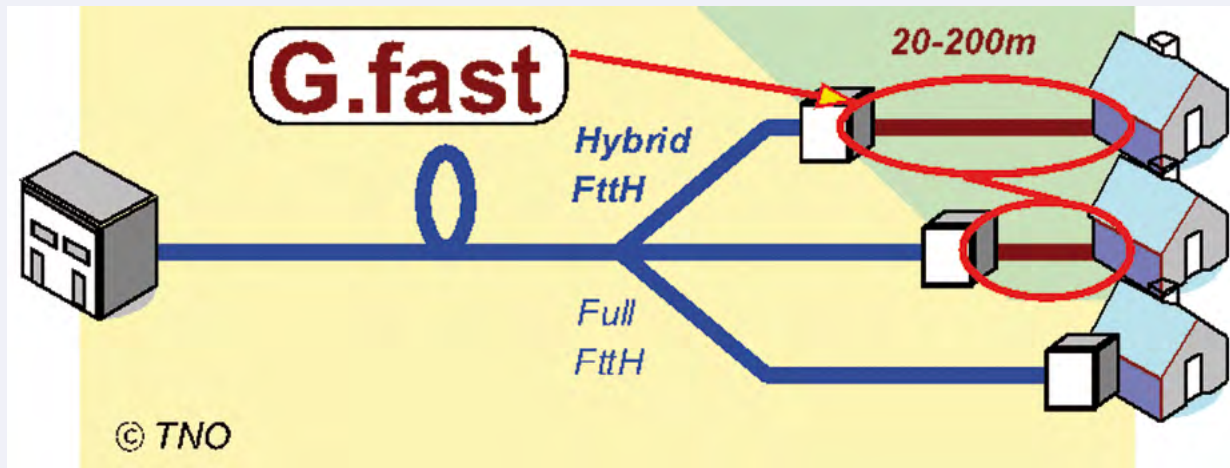
G.fast and other standard-like activities

During the course of the project, the G.fast standard (G.9701) was initially 'consented' by the ITU in December 2013 and approved in December 2014.

In parallel to the work in the ITU, there were also activities in ETSI and the Broadband Forum on key solutions to enable the deployment of G.fast including reverse power feeding for small G.fast fibre-fed nodes, Zero Touch operations administration and maintenance (OAM), to avoid the need for manual intervention in the field and the development of test methods to drive delivery of high performance interoperable system components.

The approval of the G.fast standard G.9701 led to the immediate delivery of chipsets that can provide an aggregate throughput of almost 1Gbps speeds over standard twisted-pair copper wires at a range of 100 meters, and up to 170Mbps has been reported at a range of 480





G.fast use case

meters using silicon designed by HFCC/G.fast partner Scipio Technologies. The figure shows a use case for G.fast. The surprisingly good performance of the technology over ranges longer than 200m has even increased the operational envelope compared to the initial performance estimations.

Chips, prototype development and trials

G.fast can be considered as an ideal interim technology where the existing copper infrastructure of the local loop is utilised until it becomes economical to universally deploy a full Fibre-To-The-Home (FTTH) access network. The operators

in the project consortium, Orange, BT, Telefonica and TNO (on behalf of KPN), are currently performing trials. In particular, BT has publically announced that this summer it will commence the deployment of two G.fast pilots at two different locations with around 4,000 businesses and homes participating.

Conclusion and outlook

The Celtic project HFCC/G.fast has achieved the three main goals set at the outset of the project, and large pilots are being implemented. A successor project “GOLD “(Gigabits Over the Legacy Drop)” has just started. By increasing the deploy-

ment range, it makes G.fast an even more useful technology to network operators since it will now be capable of replacing VDSL2 services in the access network and thus serve more customers from a point deeper in the network. The field trials starting in the summer of 2015 will boost the research and development of deployment procedures and best practises. The field trials will surely also reveal new challenges to be overcome.

- Further information is available at <http://www.4gbb.eu>



www.celticplus.eu

About Celtic-Plus

Celtic-Plus is an industry-driven European research initiative to define, perform and finance through public and private funding common research projects in the area of telecommunications, new media, future Internet, and applications & services focusing on a new “Smart Connected World” paradigm. Celtic-Plus is a EUREKA ICT cluster and belongs to the inter-governmental EUREKA network. Celtic-Plus is open to any type of company covering the Celtic-Plus research areas, large industry as well as small companies or universities and research organisations. Even companies outside the EUREKA countries may get some possibilities to join a Celtic-Plus project under certain conditions.



Novel applications for electronic health records

Enabling patient-centric solutions with EHR



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An electronic health record (EHR) is a systematic collection of electronic health information about an individual patient. EHRs may include a range of data, including medical history, medication and allergies, immunization status, laboratory test results, radiology images, vital signs and personal statistics like age and weight. Recent advances in healthcare information systems have demonstrated the need and usefulness for such records that are capable of being shared across network-connected, enterprise-wide information systems and other information networks or exchanges making EHRs an integral part of future healthcare software applications.

Furthermore there is a huge need for open source software solutions in the healthcare domain, given the flexibility, interoperability and resource savings characteristics they offer (see Figure 1). In this context, this article presents the development of three open source libraries – Domain Specific Enablers – for e-health applications that were developed under the European project titled “Future Internet Social and Technological Alignment Research” (FI-STAR) funded under the “Future Internet Public Private Partnership” (FI-PPP) program.

The three enablers that were developed under the Electronic Health Record Application Support Service Enablers (EHR-EN) correspond to:

- Electronic Health Record enabler,
- Patient summary enabler based on the EU project “European patient Summary Open Source services” (epSOS SE) supporting patient mobility and the offering of interoperable services, and
- Picture Archiving and Communications System (PACS) enabler based on the dcm4che open source system for the support of medical imaging functionality.

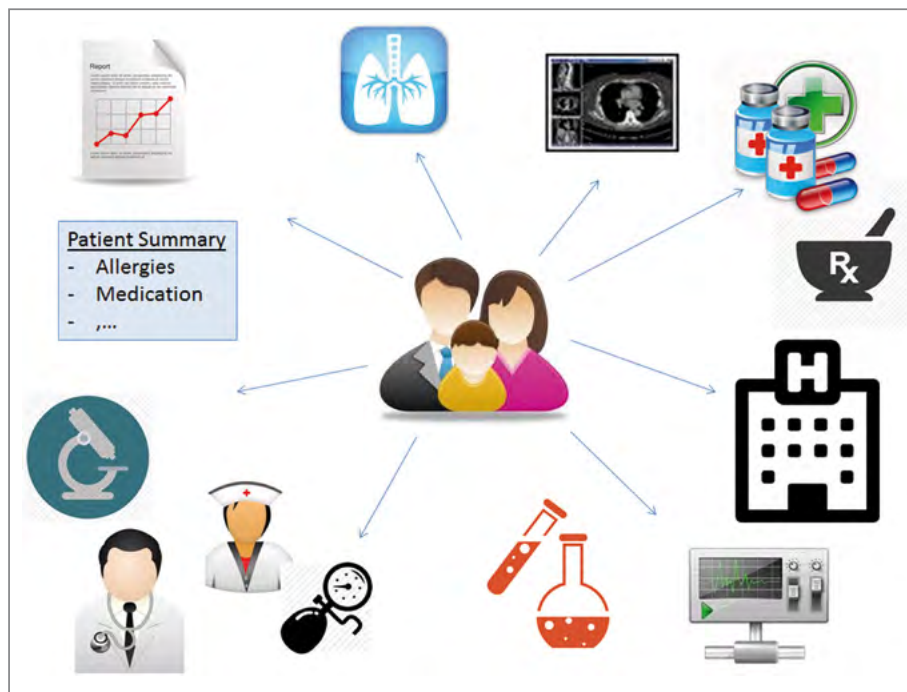


Figure 1: Patient centric e-health solutions and services

The three enablers were developed by the e-health Laboratory of the University of Cyprus and InfoTEX, a Cyprus-based SME.

EHR enabler

The EHR enabler was designed and developed following a patient centric concept for the support of e-health solutions and services as demonstrated in Figure 1. The architecture of the EHR enabler is shown in Figure 2. The core component of the component is the EHR repository. The EHR repository stores the EHR data and provides Application Programming Interfaces (APIs) for the retrieval, insertion and update of such data. The EHR enabler is connected to further three enablers of the FI-STAR platform: the time service, which is used for updating the server time, the storage enabler for backup support and the security and privacy enabler for user authentication.

The EHR enabler database schema covers the following tables: patient data, patient medical devices, medical devices, patient medical implants, medical implants, pharmacy, scheduling, coding, vital signs, surgical procedures, insurance data, admission type, admission data, diag-

nosis, medication, vaccinations, pregnancy history, lab analysis, allergies, social history, and functional status.

epSOS enabler

The patient summary epSOS enabler is also shown in Fig. 2. The purpose of the patient summary is to make critical patient data readily available anywhere that the patient seeks treatment (away from his/her home town or healthcare provider). It helps the physician in offering the patient better services based on more informed decision making. It is a prerequisite concept for cross-border healthcare provision as defined and instructed by the EU directive: Directive 2011/24/EU.

PACS enabler

The PACS enabler is developed and implemented based on the open source PACS software package dcm4che. It supports the exchange of images based on the Digital Imaging and Communications in Medicine (DICOM) standard and implements the related Integrating the Healthcare Enterprise (IHE) profiles (see also Figure 2).

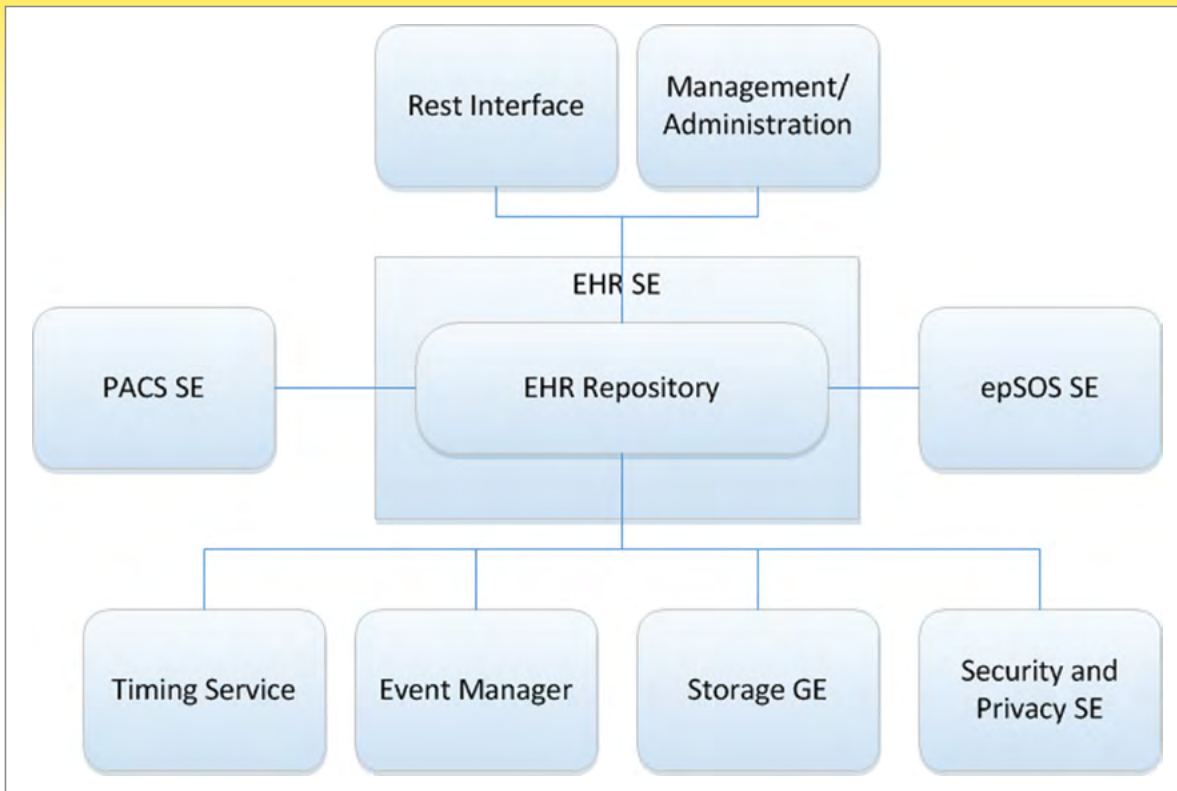


Figure 2: EHR enabler architecture

EHR enabler at Connectathon 2015

The team of the University of Cyprus participated in the IHE European Connectathon 2015 in Luxembourg, and tested and passed the IHE profiles implemented in the FI-STAR HER enabler. The IHE is an initiative by healthcare professionals and industry to improve the way computer systems in healthcare share information. Specifically, the HER enabler implemented the PDQv3 and XDS.b IHE profiles. The PDQv3 supports a consumer profile and lets applications query a central patient information server and retrieve a patient’s demographic and visit information. The XDS.b Profile (Cross-Enterprise Document Sharing) is focused on providing a standards-based specification for managing the sharing of documents between any healthcare enterprises.

Outlook

The three implemented enablers are currently under evaluation and lessons learnt and step by step cookbook recipes will be generated for pro-

viding guidelines for the efficient and effective use of the enablers both by the medical experts and the patients. Targeted exploitation for the implemented EHR, epSOS and PACS enablers as well as the FI-STAR platform is anticipated, especially in EU countries that have fallen behind in the adoption of e-health tools and services as prescribed by the eHealth action plan 2012–2020. Moreover, given the current economic crisis, the adoption of e-health solutions at national and European levels becomes of paramount importance.

Further information

- on the HER, epSOS and PACS enablers are available in the FI-STAR catalogue – <https://catalogue.fi-star.eu>
- Open Source Clinical Image and Object Management – <http://www.dcm4che.org/>

Visions of innovation and market scale

Net Futures event in Brussels



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The first Net Futures event in Brussels was dedicated to the motto “born to scale”. While the scale of innovation generated via EU-funded programmes is still up for debate, the scale of the event was impressive. The Net Futures event on 25 and 26 March 2015, which replaced its predecessor, the Future Internet Assembly, offered a very diverse programme and attracted about 1,000 participants from all over Europe and beyond to The Egg, a former factory near the Midi train station.

Despite the new name “Net Futures”, the structure of the event was not so different from the Future Internet Assembly events in Athens and before. The main conference programme was complemented by a set of co-located workshops on the day before as well as so-called concertation meetings on the first day and an exhibition of research projects and initiatives in various areas related to Future Networks.

However, there were also some changes: the number of parallel sessions appeared more limited, and the programme was enriched by the Net Futures 2015 FIWARE Challenge, which added some excitement, at least for the people competing for the award money. The challenge for SMEs, web-entrepreneurs and start-ups was to use FIWARE technologies, and the winning projects were rewarded with prizes totalling 75,000 euro.

Opening plenary

The opening plenary was dedicated to digital innovation and how research can help create the Digital Single Market. In his opening keynote, Günther Oettinger, Commissioner for Digital Economy & Society, presented the EU’s promising research initiatives in areas like cloud computing, open platforms, including FIWARE, and the Internet of Things. Oettinger said: “Europe needs to reach critical mass in investing in Future Internet solutions.” In order to create this critical mass, he considers establishing a Digital Single Market in Europe as crucial.



Net Futures audience at plenary session

“For these digital technologies that know no borders we need a fully functional Digital Single Market that provides sufficient scale and allows all Europeans to benefit quickly from the latest innovations,” the Commissioner said.

After his keynote, the Commissioner launched the Alliance for Internet of Things Innovation (AIOTI), together with AIOTI board members from Bosch, Philips, and Sigfox, who represent European industry in the alliance. On the industry side, AIOTI brings together large, medium and

small companies from the IoT domain and different application sectors.

The main goal of the Alliance for Internet of Things Innovation is to support the creation of a European IoT ecosystem. This initiative, the Commissioner explained, will help build synergies between the public and private actors in the European IoT ecosystem as well as support convergence around common platforms and common standards.



Launch of the Alliance for Internet of Things Innovation (AIOTI)

Exhibition

The exhibition showed the richness and diversity of European research on technologies, services and applications for future networks. Different research communities, like the ones of FIWARE, IoT, Cloud and FIRE, were brought together in the exhibition. This facilitated cross-sectoral exchange and the discussion of new ideas.

Mario Campolargo, Director Net Futures at the EC's DG Connect, said that "Innovation happens where people meet". If that is true, a lot of innovation must have happened at the exhibition. In any case, Mr Campolargo certainly identified the major value of EU events like Net Futures 2015, which lies rather in the informal encounters and productive discussions at the exhibition and at the networking dinner rather than in the mostly predictable and sometimes boring presentations in the official programme.

Conclusion

Overall, the event was well organised to facilitate the informal exchange between participants, while keeping the official programme of standard sessions at an acceptable level. The bold claim made in the motto of the event – "Born to scale" – still needs to be underpinned by hard facts and



FIWARE stand at the Net Futures exhibition

the realisation of the Digital Single Market, which Commissioner Oettinger had announced. Will Europe be capable to produce large-scale innovation? Stay tuned and wait for Net Futures 2016 to get answers on this question.

✦ Further information is available at <http://netfutures2015.eu>

Internet playground for European businesses

2nd CI-FIRE Industry Workshop in Brussels



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The 2nd CI-FIRE Industry Workshop focused on testing and experimental platforms as the Internet playground for European businesses. It took place at The Egg in Brussels on 24 March 2015, one day before the Net Futures event at the same venue. The workshop targeted businesses and entrepreneurs that need to test a beta technology or new idea. A range of ICT testing facilities were shown to help match business needs with testing services.

The workshop was jointly organised by CI-FIRE and FUSION, two EU-funded support actions in the area of Future Internet Research and Experimentation (FIRE) which promote the use of FIRE testbed facilities by businesses. The half-day event consisted of five sessions, which presented the available facilities and services and explored their market perspectives.

Service offerings and business benefits

Session 1 was dedicated to smart, sustainable services for future internet testing. Alexander Willner, CTO of FanTaaStic, a business unit of EIT Digital, presented the FanTaaStic broker service (<http://testbeds.eu>) as a lean and agile approach for businesses that need to perform testing of their applications and services. Loic Baron from UPMC presented OneLab as a set of world-class test-beds for the Multinet. And Stefan

Bouckaert from iMinds shared his lessons learned from the use of the iMinds-iLab.t experimental facilities by SMEs and industry.

Session 2 focused on the business benefits of federated test-beds. Victor Oncins from Routek presented his company's commercial network services and how they benefitted from federated test-beds. George Ioannidis from Greek service provider IN2 talked about his company's experiences with testing and building scalable web-based services.

Market perspectives and business opportunities

Session 3 featured an expert panel on market perspectives and business opportunities in the Future Internet applications and services domain. Giorgio Micheletti from IDC offered inter-



Small business panel, from left: Monique Calisti, Martel Consulting (chair); Raph Crouan, Startupbootcamp IoT London; Ronan Breen, European Business and Innovation Network; Fenareti Lampathaki, Digital Business Innovation; and Serafim Kotrotsos, Incelligent

esting insights into market trends in the shift towards “smart environments” that cross several traditional vertical markets enabled by cloud, IoT and big data analytics. Mirko Presser, chairman of the IoT Forum, highlighted the increasing importance of testing close to the users in the IoT domain. He also invited the FIRE community to gain a better understanding of user needs as key to bridging the gap between cutting-edge research and the market. Fabrizio Davide from the CROSS project showed how FIRE is helping to deliver new services for the most vulnerable members of society through a multi-service platform that is bringing socially sustainable innovations.

Small business perspective

Session 4 presented the perspective of small businesses. Serafim Kotrotsos, co-founder of start-up Incelligent, showcased the firm's innovative solution for smart networks as a potential user of FIRE.

Raph Crouan, Managing Director of the Startupbootcamp IoT Programme, explained new business opportunities coming from emerging trends, offering advice on improving user experience and support. Ronan Breen from the European Business and Innovation Network highlighted the need for flexibility when dealing with SMEs so the support and testing services better fit their specific needs. Fenareti Lampathaki from

Digital Business Innovation offered perspectives on fostering digital innovation in the enterprise through practical guides on funding and market opportunities.

A healthy ecosystem for test-beds

Session 5 presented a broad range of topics under the common theme of facilitating a healthy ecosystem for test beds with global outreach. The session featured the GÉANT pan-European network infrastructure as a key service for distributed FIRE test-bed facilities and two on-going FIRE initiatives: FORGE and SmartFIRE. Michael Enrico presented the added value of GÉANT and new test-bed services to ensure it continues to support innovative test and validation services. John Domingue showcased FORGE (Forging Online Education through FIRE), which is part of an online education initiative bridging the gaps between FIRE and the educational community. Loic Baron from SmartFIRE added international perspectives, showing how leading European and South Korean organisations in the FIRE domain are working together to break new ground in networking and software defined networking technologies.

Conclusion

The discussions showed a mixed picture in the area of testing and experimental platforms: while there are plenty of interesting test-bed offerings from the FIRE area, demand from industry users, particularly from SMEs for testing services seems to be still relatively low, which was underlined by the low number of SME representatives in the audience. The Internet playground for European businesses is there, as the workshop convincingly showed, and the open question is, which companies are going to play in this playground.

➤ **Further information** is available on the CI-FIRE website at <http://www.ci-fire.eu/2nd-industry-workshop-24-march-2015>

Launch of €3.5bn European programme on 5G

First-phase projects of 5G Infrastructure PPP start in July



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On 1st July 2015, the first-phase projects of the European 5G Infrastructure Public Private Partnership (5G PPP) will start. This is a major milestone in the joint initiative between the European Commission and the European ICT industry to advance the 5th generation of mobile and wireless networks. The 3.5 billion euro programme aims to get research investment coherently focused on the challenges of creating a communications infrastructure capable of coping with all future demands by 2020.

The motivation for the 5G PPP is to secure Europe's leadership in the particular areas where Europe is strong or where there is potential for creating new markets such as smart cities, e-health, intelligent transport, education or entertainment & media. The 5G PPP initiative will reinforce the European industry to successfully compete on global markets and open new innovation opportunities.

5G Infrastructure PPP goals

The goals for the 5G Infrastructure PPP are:

- Providing 1,000 times higher wireless area capacity and more varied service capabilities compared to 2010.
- Saving up to 90% of energy per service provided. The main focus will be in mobile communication networks where the dominating energy consumption comes from the radio access network.
- Reducing the average service creation time cycle from 90 hours to 90 minutes.
- Creating a secure, reliable and dependable Internet with a "zero perceived" downtime for services provision.
- Facilitating very dense deployments of wireless communication links to connect over 7 trillion wireless devices serving over 7 billion people.
- Ensuring for everyone and everywhere the access to a wider panel of services and applications at lower cost.

The 5G infrastructure will have to cope with everything from billions of small devices in the Internet of Things domain to billions of heavy data consumers enhancing their lives and activities with real-time multimedia content. The new approach must be fully convergent as well as there will be no arbitrary distinction between fixed and mobile - there will be simply a seamless infrastructure satisfying everyone's communications needs in and invisible, but totally dependable, way.

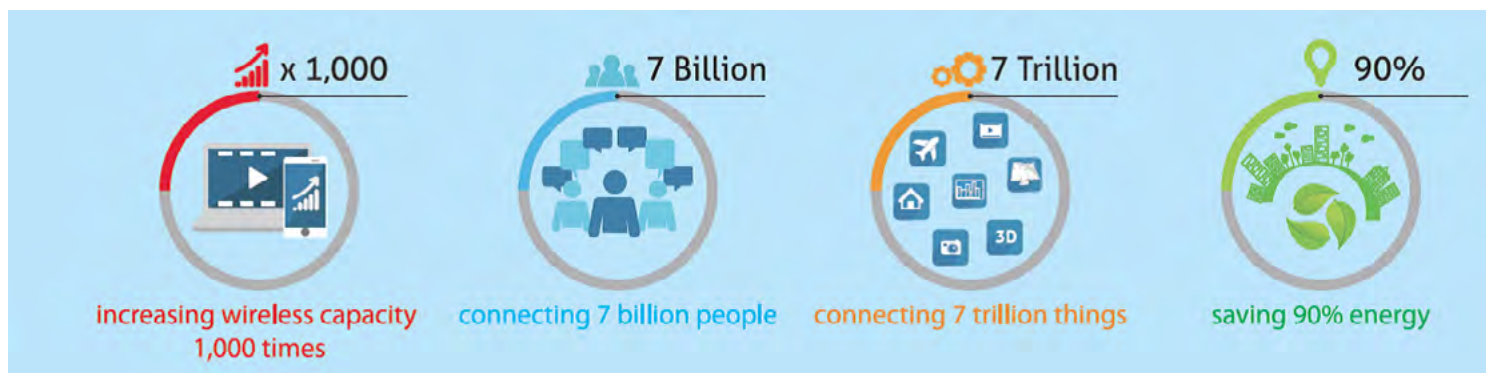


5G Infrastructure Association

The 5G Infrastructure Association, as the private side of this public-private partnership, has already started working groups, in collaboration with the Network2020 ETP community, on key items such as pre-standards, spectrum requirements, and maintaining a 5G vision to guide the work.

First-phase 5G projects

The first call for projects held at the end of 2014 has resulted in 18 projects being selected addressing a rich cross section of the research challenges leading to a 5G infrastructure by 2020. Predictably, the majority of the projects are focusing on radio and wireless technologies as the shared belief is that the vast majority of future communications will use wireless access technologies. This puts tremendous requirements on the projects to find ways to maximize the efficiency of the wireless interfaces, optimize the



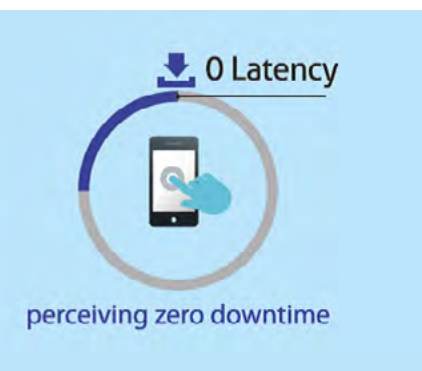
The five key targets of the 5G Infrastructure PPP

5GEx	5G Exchange
5G-NORMA	5G NOvel Radio Multiservice adaptive network Architecture
5G-Xhaul	Dynamically Reconfigurable Optical-Wireless Backhaul/Fronthaul with Cognitive Control Plane for Small Cells and Cloud-RANs
CHARISMA	Converged Heterogeneous Advanced 5G Cloud-RAN Architecture for Intelligent and Secure Media Access
COGNET	Building an Intelligent System of Insights and Action for 5G Network Management
COHERENT	Coordinated control and spectrum management for 5G heterogeneous radio access networks
EURO 5G	Euro-5G: Supporting the 5G-PPP programme operators
FANTASTIC 5G	Flexible Air iNTerfAce for Scalable service delivery wiThin wireless Communication networks of the 5th Generation
Flex5Gware	Flexible and efficient hardware/software platforms for 5G network elements and devices
METIS II	Mobile and wireless communications Enablers for Twenty-twenty (2020) Information Society-II
mmMAGIC	Millimetre-Wave Based Mobile Radio Access Network for Fifth Generation Integrated Communications
SELFNET	Framework for Self Organised Network Management in Virtualised and Software defined Networks
SESAME	Small cEIS coordinAtion for Multi-tenancy and Edge services
SONATA	Service Programing and Orchestration for Virtualized Software Networks
SPEED-5G	quality of Service Provision and capacity Expansion through Extended-DSA for 5G
SUPERFLUIDITY	Superfluidity: a super-fluid, cloud-native, converged edge system
VirtuWind	Virtual and programmable industrial network prototype deployed in operational Wind park
XHAUL	Xhaul: The 5G Integrated fronthaul/backhaul

use of scarce resources, such as spectrum and energy, and dramatically increase the throughput capability of the infrastructure.

These projects represent the first phase of investment in the 5G challenges, and they will be followed by a second set of 5G PPP projects, building on the work from the first phase, which is due to be called for in 2016 and launched in 2017.

 **Further information** on the 5G PPP is available at <http://5g-ppp.eu>



News in brief

European Commission presents Digital Single Market Strategy

In May 2015, the European Commission presented its Digital Single Market for Europe strategy, which consists of 16 initiatives. The aim of the Digital Single Market is to remove regulatory barriers and finally move from 28 national digital markets to a single one. According to the Commission, a fully functional Digital Single Market could contribute 415 billion euro per year to the EU economy and create hundreds of thousands of new jobs.

The Digital Single Market Strategy includes a set of 16 targeted actions built on three pillars.

Actions under **Pillar I** – Better access for consumers and businesses to digital goods and services across Europe:

1. Rules to make cross-border e-commerce easier. This includes harmonised EU rules on contracts and consumer protection when you buy online: whether it is physical goods like shoes or furniture; or digital content like e-books or apps.
2. More rapid and consistent enforcement of consumer rules by reviewing the Regulation on Consumer Protection Cooperation.
3. More efficient and affordable parcel delivery. Currently 62% of companies trying to sell online say that too-high parcel delivery costs are a barrier.
4. Termination of unjustified geo-blocking – a discriminatory practice used for commercial reasons, when online sellers either deny consumers access to a website based on their location, or re-route them to a local store with different prices.
5. Identification of potential competition concerns affecting European e-commerce markets.
6. A modern, more European copyright law: legislative proposals will follow before the end of 2015 to reduce the differences between national copyright regimes and allow for wider online access to works across the EU.
7. A review of the Satellite and Cable Directive to assess if its scope needs to be enlarged to broadcasters' online transmissions and to explore how to boost cross-border access to broadcasters' services in Europe.
8. Reduction of the administrative burden businesses face from different VAT regimes; so that sellers of physical goods to other countries also benefit from single electronic registration and payment.

Actions under **Pillar II** – Creating the right conditions and a level playing field for digital networks and innovative services to flourish:

9. An ambitious overhaul of EU telecoms rules. This includes more effective spectrum coordination, and common EU-wide criteria for spectrum assignment at national level; creating incentives for investment in high-speed broadband; ensuring a level playing field for all market players; and creating an effective institutional framework.
10. Review of the audio-visual media framework, focusing on the roles of the different market players in the promotion of European works. It will also look at how to adapt existing rules to new business models for content distribution.
11. Analysis of the role of online platforms in the market. This will cover issues such as the non-transparency of search results and of pricing policies, how they use the information they acquire, relationships between platforms and suppliers and the promotion of their own services to the disadvantage of competitors.
12. Reinforcement of trust and security in digital services, notably concerning the handling of personal data. Building on the new EU data protection rules, due to be adopted by the end of 2015, the Commission will review the e-Privacy Directive.

Text walking lanes in Antwerp

In June 2015, dedicated lanes for people sending text messages have been spotted in the centre of the Belgian city of Antwerp. The purpose of these "text walking lanes" is to avoid that pedestrians texting on their mobile devices collide with other pedestrians or lamp posts.

The "text walking lanes" were initiated by a smartphone store based in the city. The rationale behind what some might perceive as a PR stunt is that a significant number of mobile phone breakages are said to happen because of "text walking" collisions. It remains to be seen how effective the lanes are for avoiding collisions, and if the temporary "text walking lanes" will become permanent.



13. Proposal for a partnership with the industry on cybersecurity in the area of technologies and solutions for online network security.
14. Actions under **Pillar III** – Maximising the growth potential of the digital economy:
15. Proposal for a 'European free flow of data initiative' to promote the free movement of data in the European Union.
16. Definition of priorities for standards and interoperability in areas critical to the Digital Single Market, such as e-health, transport planning or energy (smart metering).
17. Support for an inclusive digital society where citizens have the right skills to seize the opportunities of the Internet and boost their chances of getting a job. A new e-government action plan will also connect business registers across Europe.

The European Commission plans to deliver on these 16 key actions by the end of 2016.

http://europa.eu/rapid/press-release_IP-15-4919_en.htm



Welcome to the robot hotel

Have a nice automated stay



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The automation of services formerly performed by humans knows no limits and progresses steadily. Think of the (human) teller who was replaced by the teller (machine). Or the (human) washer who was replaced by the washing machine. Until recently, there have been some areas where the widespread assumption was that human touch was needed to provide a good service. Some people in Japan, however, disagree. In Sasebo, a town in the Nagasaki Prefecture, they will open a hotel based on automation and service robots.

The opening of the smart hotel called 'Henn na Hotel' is scheduled for 17 July 2015. It is located on the grounds of a compound with the Dutch-sounding name Huis Ten Bosch – probably something that is supposed to appeal to Japanese travellers as very exotic; Dutch travellers might perceive it this way, too.

The Dutch name probably has not been chosen by accident, as the declared goal of the project is to offer an entirely new type of low-cost hotel that would make even the most parsimonious travellers from the Netherlands beam with joy. The hotel operators promise to provide “a comfortable stay and world-class productivity”. This will be achieved through energy-efficient construction and operation as well as a massive effort to reduce labour costs. And this is where the robots come in.

Robo-concierge

As in any decent hotel around the world, travellers will be greeted at the 'Henn na Hotel' with a fake smile and a phony welcome phrase. The only difference will be that the cheerful welcome is not uttered by a human, but by a robot.

This has several advantages. First, robots don't need payment, food, or breaks, and they don't organise in trade unions to get more of the above-mentioned. Second, the robots all look the same, like a young Japanese model, which



Ms Iwazume, the friendly robot concierge from Japan

makes any complicated considerations unnecessary, whether you want to queue at the desk of the grumpy old concierge or the good-looking young concierge.

Considering the low pay for hotel clerks in most hotels in Europe, it is hard to understand for a European how replacing an underpaid Rumanian with an expensive high-tech puppet could save any money in the foreseeable future, even considering wage increases and a long lifetime of the puppet. I am not familiar with the Japanese job market and can only speculate that the wages are high and the influx of low-paid foreigners is low. Or Japanese just prefer to be served by a Japanese-looking robot rather than a foreign-looking human.

In any case, the robot staff performs more functions than just greeting guests at the front desk: they act as porter, perform locker services, and room cleaning. And what is not done by a robot will be done through automation. The hotel in Sasebo, for example, has machines at the reception for checking out, while the smiling concierge robot is watching you.

The automated check-out appears to be very useful to me and could avoid queueing at check-out. There are other useful automation features emerging in the hotel business. Already four

years ago, the Comfort Xpress Hotel in Oslo, implemented a solution by Ariane Systems, France, which combined check-in with room door technology, which meant you could enter your hotel room just with your smart phone and the hotel app, without ever speaking to a member of staff. Other hotels, like the US chain Starwood hotels, also offer smartphone apps for keyless access to the hotel room.

Lack of human touch

It seems, hotels are finally arriving in the 21st century, and getting access to your hotel room via a machine will become as normal as drawing cash from a teller machine. The philosophical question in this context is to what extent we carbon units would miss the human touch in the bright hotel future without visible human service staff. Would I really like to get a correct invoice at check-out within seconds, instead of arguing for 10 minutes with a clerk how my company's name is spelled and why breakfast should be listed separately? Will I enjoy a useless conversation about the weather as much with an ever-smiling robot instead of a human concierge?

According to the “uncanny valley” hypothesis, we find robots weird when they almost look and



Smart-Hotel-Lobby

behave like human beings. The term “valley” in this context refers to the dip in a graph of experienced comfort level when people are confronted with different levels of naturalness and human-likeness in other beings. Thus, hotel robots need to be significantly improved to either make them more or less human, in order to get out of the uncanny valley.

Another question is, whether there is any real need for robots in hotels outside of Japan. On a global level, the ever-increasing world population of already more than 7.3 billion does not make it very likely that we will run out of prospective service staff. Or will the majority of them be servicing robots who are servicing other humans?





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