



Celtic-Plus

Newsletter 1/2017

Celtic-Plus Event in Barcelona

Start-up Stories: Cumucore and 2operate

E3 project – First live retransmission of awake
brain surgery



Editorial

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Dear reader,

This issue of the Celtic-Plus Newsletter includes a new section about start-up companies that were created after successful Celtic projects. For the premiere of this section, we have chosen the oldest and the newest start-up company we know about. The Celtic project Gandalf, which received the Celtic Excellence Award in 2008, was at the origin of the Danish 2operate company that resulted from a real start-up adventure involving three successive start-up companies. Our other start-up success, Cumucore, is a direct spin-off of the SIGMONA project, which received the Celtic Excellence Award for Network Technologies in 2017. The article in this issue tells the story of how Cumucore has already been operating successfully in an international environment.

Shortly before the deadline of this Celtic-Plus Newsletter edition, we received great news from Celtic-Plus project E3. They had enabled the first live retransmission of an awake brain surgery, which took place in Nancy, France. I would like to congratulate the E3 team on their impressive achievement and feel proud that we at Celtic-Plus have facilitated their success.

You will also find in this issue a Project Highlights from another excellent Celtic-Plus project that has won the Celtic-Plus Excellence Award 2017 in the category Services & Applications, NOTTS.

In this issue, you can also read about our Proposers Day in Berlin, which was hosted by Deutsche Telekom, where we had 80 participants from 14 different countries. 14 was also the number of interesting projects ideas that have been presented and that allowed interesting discussion

in the networking session.

This year’s Celtic-Plus Event was exceptional. It took place in Barcelona, where we had 570 registered participants. Like last year, our event was collocated with the EUREKA Innovation Week, which was organized this time under the Spanish EUREKA Chairmanship. The event allowed us to show in the exhibition the results of 14 commercially relevant Celtic-Plus projects. Other highlights were the four keynote presentations in the fields of Automotive Telecom, M2M, IoT and Industry 4.0. In a round table we witnessed small meets big: the representatives of the above-mentioned start-up companies discussed about business impacts together with the Celtic-Plus innovation Award 2017 winning projects Co-MoSeF and SASER. On the second day, government representatives of nine EUREKA member countries explained their national research agendas and opportunities for public funding in their respective country. In the networking session the participants presented their expertise and project ideas in 24 project pitch presentations to find new collaborations for the projects that will shape the technologies of the future.

As you can see in this issue, the Celtic-Plus community is vibrant and dynamically developing into new areas. If you are not yet part of the community and would like to join, there are ample opportunities, like, e.g., our proposers days – the next one on “FinTech meets ICT” is planned for autumn 2017 in Luxembourg – and, of course, the next call for proposal, which ends on 16 October 2017. Feel free to talk to me or any other colleagues at the Celtic-Plus Office – I look forward to hearing from you.

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Funding opportunities and business impact

Celtic-Plus Event in Barcelona

This year's Celtic-Plus Event took place under the Spanish EUREKA chairmanship in Barcelona, Spain, on 18 – 19 May 2017. It was held in conjunction with the EUREKA Innovation Week, which attracted more than 1,000 participants from 41 countries.

Opening session

The Celtic-Plus Event was opened by the Coordinator of the Spanish EUREKA Presidency at CD-TI, Oscar Fernandez Moyano, and Celtic-Plus Chairman Jacques Magen. The event presented achievements of Celtic-Plus projects and provided a glimpse on the future of information and communications technologies. The major annual event of EUREKA Cluster Celtic-Plus also offered ample matchmaking opportunities for developing new project ideas and partnerships in the area of ICT.

Keynotes

In the first keynote, Alessandro Coda, Chief Technology Officer of CLEPA, the European Association of Automotive Suppliers, presented the upcoming trends in automotive telecoms. He explained that the automotive telecoms of the future will combine Intelligent Transport Systems (ITS) and the next mobile network technology (5G). As a result, according to Mr Coda, connected and automated driving will become a reality, using short-range, cellular and satellite communications together.

In the second keynote, Riza Durucasugil, R&D Director at Turkish ICT solution vendor Netaş, talked about the future of M2M and IoT. According to Mr Durucasugil, new IoT ecosystems need a new security and privacy paradigm, which he considers an open challenge in IoT. He is convinced that automation drives security and vice versa. In order to underline the importance of security, he pointed out the target of 5G to provide an infrastructure for connecting 7 trillion things.

Industry 4.0 was the topic of the next keynote speaker, Jordi Hernandez, Senior Consultant for Digital Manufacturing at Atos. According to Mr Hernandez, Industry 4.0 is an evolution in manufacturing that involves connectivity and interaction of work processes. He reported that more than 300 million security alerts were managed by Atos during the last Olympic Games of Rio 2016 with zero impacts.

In the final keynote on the second day, Jean-Pierre Tual, VP Industrial Relations at ICT security firm Gemalto, talked about how to connect and securely monetize IoT. According to Mr Tual, M2M brings IoT into a new phase of business transformation and a new value chain. In this context, establishing trust in IoT is key. Mr Tual is convinced that IoT can provide a reliable framework for secure connectivity and will result in agile monetization of this emerging ecosystem.



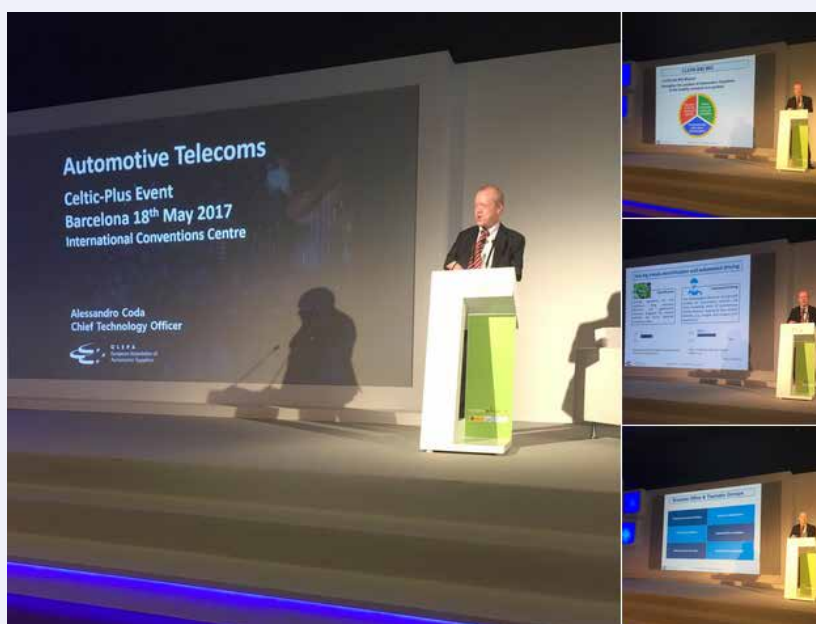
Riza Durucasugil, R&D Director at Netaş and Vice-Chair of Celtic-Plus



Jordi Hernandez, Senior Consultant for Digital Manufacturing at Atos



Jean-Pierre Tual, VP Industrial Relations at Gemalto



Alessandro Coda, Chief Technology Officer of CLEPA, the European Association of Automotive Suppliers



Panel on business impacts of Celtic-Plus projects

The keynotes were followed by a panel on business impacts of Celtic-Plus projects, which was moderated by Randy Zadra from NRC Canada. A number of start-ups that emerged from Celtic-Plus projects were represented in the panel.

One of them is the newly funded start-up Cumucore, which is a direct spin-off from Celtic-Plus project SIGMONA. Costa Requenta, CEO of Cumucore, said that his company focuses on niche markets and realizes pilots in Africa to grow. Cumucore offers a disruptive solution that integrates Network Function Virtualization (NFV) and Software Defined Networking (SDN) to deliver flexible and affordable mobile services to truly connect the world.

Another start-up that benefited from Celtic-Plus is ViLynx. According to ViLynx CEO Oscar Chabrera, the company is improving their technology and adapting it to the e-health sector thanks to Celtic-Plus projects HIPERMED and E3. The solutions developed in these projects allow professionals to directly access the relevant video content, which saves time and improves medical diagnostics.

Celtic-Plus flagship project SASER (Celtic-Plus Innovation Award winner 2017) has led to three start-up companies, according to Marco Hoffmann from Nokia. In addition, the 80-million-euro project generated 27 new products and 28 improved products that are commercialized by the 61 project partners.

Patricia Ortiz from Innovalia highlighted the fast commercialization of new products in the automotive telecoms area based on Celtic-Plus project CoMoSeF (Celtic-Plus Innovation Award winner 2017). The solutions developed in Co-MoSeF enable the communication of traffic-related information between cars, road infrastructure, transport agencies and others to warn drivers of upcoming hazards and keeping the traffic flow smoother.

The panel session was followed by a Best of Celtic-Plus Projects session, moderated by Celtic-Plus Chairman Jacques Magen, and the Celtic-Plus Awards (see next article).

Round table on national funding and research topics

The second day of the Celtic-Plus Event started with a session moderated by Celtic-Plus Vice Chair Valerie Blavette from Orange. The session was dedicated to funding and research topics in different EUREKA countries and included the Public Authorities (PAs) of nine EUREKA countries – Belgium, Canada, Spain, Finland, France, Korea, Portugal, Sweden, and Turkey.

One of the main messages from the panel was that Celtic-Plus projects are bottom-up but need



Round table on national funding and research topics at the Celtic-Plus Event – from left: Valerie Blavette (Vice-Chair Celtic-Plus, Orange), Ricardo Migueis (ANI, Portugal), Cheon Kyo Park (KIAT Europe Office, Korea), Serge Bodjrenou (DGE, France), Jessica Swennebring (VINNOVA, Sweden), Hannu Nurmi (Tekes, Finland), Juana Sanchez (CDTI, Spain), Geert Thorrez (VLAIO, Belgium), Randy Zadra (NRC, Canada)



Celtic-Plus project idea pitches in Barcelona

to fulfil the national research strategies of the different countries that are involved in the projects. Thus, it is important that proposers contact their national authorities to check beforehand, if the idea matches the national priorities.

In addition, each PA representative explained specific conditions in their respective country.

Geert Thorrez from Belgian PA VLAIO explained that there is no change and enough money available for Flanders and the Brussels region.

Randy Zadra from Canadian PA NRC said that NRC is funding mostly SMEs. NRC's partner search platform for SMEs can be used by the Celtic-Plus community.

Hannu Nurmi from Finnish PA Tekes explained the research priorities of Finland, which include the following topics: Industry 4.0, 5G and bits of e-health. As in other countries, there is no dedicated Celtic-Plus budget reserved, which means proposers are competing with projects from other EUREKA or national programmes.

Serge Bodjrenou from French PA DGE said that there are two funding possibilities in France, direct funding by DGE or funding through FUE, which is a national cluster.

Ricardo Migueis from Portuguese PA Agencia Nacional Inovação (ANI) said that many companies and research infrastructures in Portugal are aligned with Celtic-Plus. There is a small state budget and the possibility of structural funds available in Portugal. A larger state budget will become available soon, the funding process will take about two months. In general, he said, there is a streamlined and fast decision procedure for funding in place. Research Institutions can also apply, provided the project is led by an SME. There is no maximum time after labelling to apply for funding.

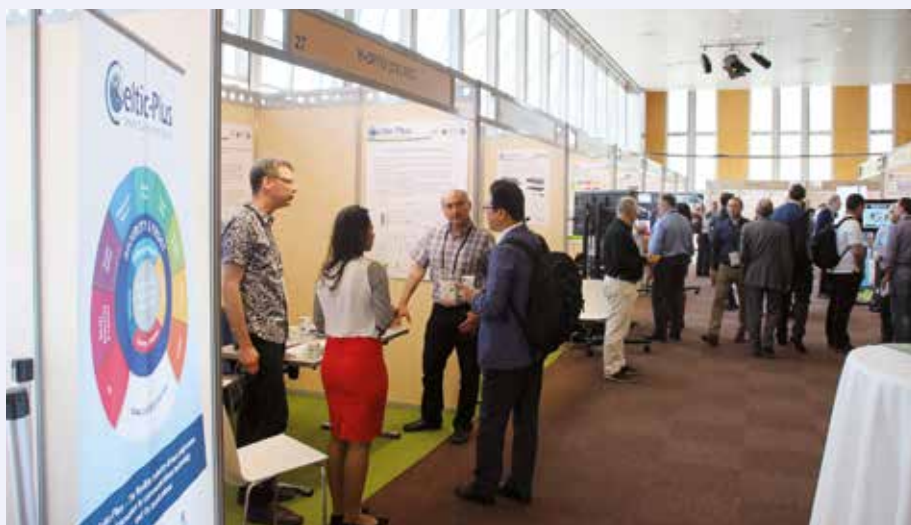
Peter Herrmann from the Celtic Office explained the German funding situation. The BMBF and BMWI are the main funding sources but not the only ones, as also the ZIM for German SMEs is very attractive. In addition, funding from DFKI (German Research Center for Artificial Intelligence) is available for German research participants.

Cheon Kyo Park, Head of the European Office of KIAT, the Korean PA, said that there is no big difference along the funding system. There are four different programs in Korea as well as bilateral and multilateral programmes, with a total budget of 62 million euro. Collaboration of Korean partners in Celtic-Plus is dramatically increasing. The global collaboration budget in Korea might increase as well.

Jessica Swennebring from Swedish PA VINNOVA said that the funding in Sweden increased from 3 to 6 million euro and that there is a fast funding decision process in place.



Discussing new proposal ideas at the Celtic-Plus Event 2017



14 Celtic-Plus projects presented their results in the exhibition

Juana Sanchez from Spanish PA CDTI said that the Innoglobal call is eligible for funding, if the Celtic-Plus label is obtained until this year October. At CDTI, projects can also apply to an open call without restrictions. There is also MINE-TAD research funding available. CDTI provides a partner search template, which proposers are asked to use and send back to CDTI to foster their partner search.

Mete Karaca from Turkish PA Tubitak said that Tubitak funds 75 % SMEs and industry with 16 % of eligible costs. There is no dedicated funding for Celtic-Plus in Turkey, but also no budget limitation, which means all good projects can be funded. Submission should be done one month after receiving the Celtic-Plus label. Research areas include IoT and telecoms, and this will stay for the upcoming years. Usually 90 days after national application submission the decision is taken. 40 % of the current Celtic-Plus projects include Turkish participants showing that Turkish organisations have been more successful over the last 2 years. The funding process in Turkey will become easier and quicker this year.

Pitches of project ideas

Inspired by the funding opportunities presented in the panel, the Celtic-Plus Event later on the second day featured 24 short elevator pitches of innovative project ideas for the next call of Celtic-Plus.

14 Celtic-Plus projects in the exhibition

The Celtic-Plus Event was complemented, as usual, with an exhibition of projects. The exhibition included 14 Celtic-Plus projects that presented their results, which attracted many participants who engaged in intensive discussions and networking. The project booths showed real prototypes that were either hardware or software implementations.

- Further information on the Celtic-Plus Event 2017, including the presentation and pitch slides is available at <https://www.celticplus.eu/event/celtic-plus-event-in-barcelona/>



Five Winners at Celtic-Plus Awards 2017 in Barcelona

At the Celtic-Plus Event in Barcelona on 18 May 2017, five projects were awarded for their outstanding work. Three projects received the Celtic-Plus Excellence Award and two projects the Celtic-Plus Innovation Award.

The awards were presented to the winners by Celtic-Plus chairman Jacques Magen and by representatives of the public authorities of coordinating countries – Finland: Hannu Nurmi (Tekes), France: Serge Bodjrenou (DGE), Germany: Andrea Hesse (DLR) and Spain: Juana Sanchez (CDTI). The Celtic-Plus Event was part of the EUREKA Innovation Week that was organized by the Spanish EUREKA chairmanship.

Celtic-Plus Innovation Award CoMoSeF – Co-operative Mobility Services of the Future

CoMoSeF provided safer driving via new traffic information solutions. COMOSEF's solutions are able to disseminate traffic-related information between cars, the road infrastructure, transport agencies and others to warn drivers of upcoming hazards and keeping the traffic flow smoother.

The driver is now able, for example in foggy weather, to have a clear view of the street and get warned of pedestrians crossing the road ahead via his mobile device.

Project leader: Mobisoft Oy, Finland
Duration: July 2012 – June 2015
Website: <http://www.comosef.eu/>

Celtic-Plus Innovation Award SASER – Safe and Secure European Routing

SASER, which stands for “Safe and Secure European Routing”, achieved a plethora of results that have contributed to making communication networks in Europe faster, more cost-effective, safer and more secure.

SASER set the basis for secure communication, as it is required for future industry 4.0 needs, while keeping excellent market results for cybersecurity needs.



Winners of the Celtic-Plus Awards 2017 and officials from Finland, France, Germany, Spain and Celtic-Plus

Many of the latest developments regarding Smart Cities, digital mobility services, etc. would not have been possible without cyber security.

Project leader: Alcatel-Lucent Deutschland AG (now Nokia), Germany

Duration: August 2012 – December 2015

Website: <http://projects.celticplus.eu/saser/>

Excellence Award for Network Technologies: SIGMONA – SDN Concept in Generalized Mobile Network Architectures

SIGMONA's software-defined networking and network function virtualization architecture lowers the initial network investment, energy consumption, and network management costs for mobile operators. SIGMONA's solution provides network managers the flexibility to configure, manage, secure, and optimize network resources to adapt to changing business needs.

SIGMONA was on the forefront of emerging 5G technology providing operators the facility to adapt 5G technology by themselves without the need to wait for features embedded in vendors' proprietary and closed software environments.

Project leader: Nokia Oy, Finland

Duration: June 2013 – April 2016

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

Excellence Award for Services and Applications:

NOTTS – Next Generation Over-The-Top Multimedia Services

NOTTs developed a scalable and robust video-over-the-top streaming solution able to deliver adapted contents to heterogeneous devices and networks.

One highlight of this project was the fine-granular analysis of the Quality of Experience in different European countries to achieve high customer's satisfaction.

Project leader: INDRA Sistemas, Spain

Duration: May 2013 – March 2016

Website: <http://projects.celticplus.eu/notts/>

Excellence Award for Multimedia: H2B2VS – HEVC Hybrid Broadcast Broadband Video Services

The project combined the broadcast network with the broadband market by providing enabling technology. One highlight is the standardization of the TEMI protocol enabling the synchronization mechanisms for hybrid networks.

Project leader: Thomson Video Networks, France

Duration: January 2013 – November 2015

Website: <http://h2b2vs.epfl.ch/>

Focus on Mobility and Industry 4.0 at Celtic-Plus Proposers Day in Berlin

On 21 February 2017, Celtic-Plus organised a Proposers Day in Berlin, together with Deutsche Telekom, who hosted the event. Celtic-Plus Chairman Jacques Magen and Riccardo Pascotto from Deutsche Telekom welcomed 75 participants from 14 European countries on the 20th floor of the Telekom Innovation Laboratories tower. The Proposers Day provided information on funding opportunities and project topics. This time the focus of the presentations was on mobility and Industry 4.0.

Mobility

The first session was dedicated to automotive telecoms. Luc Jansseune from EATA, the European Automotive Telecom Alliance for Connected and Automated Driving, presented first-hand information on the newly established Alliance, which brings together major telecoms operators and telecoms system suppliers as well as major car manufacturers and suppliers. He provided a timeline towards the full-scale launch of semi-autonomous driving. In contrast to fully autonomous driving, the driver must still be able to take over control of the car. According to Mr. Jansseune, we can expect semi-autonomous cars driving through the Brandenburg gate in the early 2020s.

Mobility needs powering – that was the key topic of Heiko Lehmann from Deutsche Telekom. In ICT-managed powering, mobility, energy and ICT systems are combined. According to Mr Lehmann, load levelling using the batteries of thousands of electric cars is not the conclusive way forward. Multiple control criteria need to be taken into account, and ICT is needed to manage the flow of electrical energy in the power grid for future mobility needs. Decentralised power generation, micro-grid controllers managing the power flows, and 5G will transform ICT networks to adapt to new business processes, said Mr Lehmann.

Industry 4.0

The second key topic session about Industry 4.0 was presented by Marlene Gerneth from Deutsche Telekom. She focused her keynote presentation on digitalization of production and the digitalization of products. Today industry automation and ICT are still two different worlds. She explained how the complementary areas of highly resilient but isolated local networks of factories will merge with global Cloud-based networks. A key for this will be the convergence of the related standards. Deutsche Telekom focuses not only



The skyline of Berlin, seen from the Telekom Innovation Laboratories tower.

on customer applications but also on smart logistics, smart energy using several horizontal services, and different connectivity solutions and devices.

Project funding and ideas

Dimitar Kroushkov from VDI/VDE informed the audience about the funding conditions of the German ministry of education and research (BMBF), and Matthias Kuom from DLR explained the funding conditions of the German ministry of economics (BMW). Both underlined that it is important to contact the German authorities as early as possible in the submission process of a

new Celtic-Plus project.

Another core element of the Proposers Day was the pitching of projects. 14 proposers presented their ideas on a wide range of ICT topics. They included 5G-related technologies, automotive telecoms, smart agriculture, security, and gamification for learning. The presentations were followed by productive discussions with the audience. Some of these discussions could lead to interesting new Celtic-Plus project proposals.

The presentations are available at <https://www.celticplus.eu/event/celtic-plus-proposers-day-in-berlin/>



Speakers at the Celtic-Plus Proposers Day (from left): Jacques Magen, Celtic-Plus chairman; Riccardo Pascotto, Deutsche Telekom; Dimitar Kroushkov, VDI/VDE; Marlene Gerneth, Deutsche Telekom; Luc Jansseune, EATA; Matthias Kuom, DLR, and Heiko Lehmann, Deutsche Telekom.



Numerous audience at the Celtic-Plus Proposers Day in Berlin

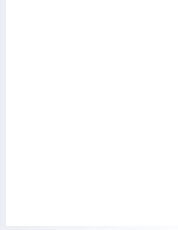


Combining SDN and NFV for unique network solutions

How startup Cumucore emerged from Celtic-Plus project SIGMONA



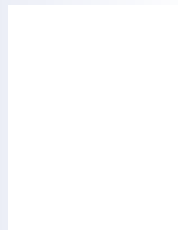
José Costa-Requena



Vicent Ferrer

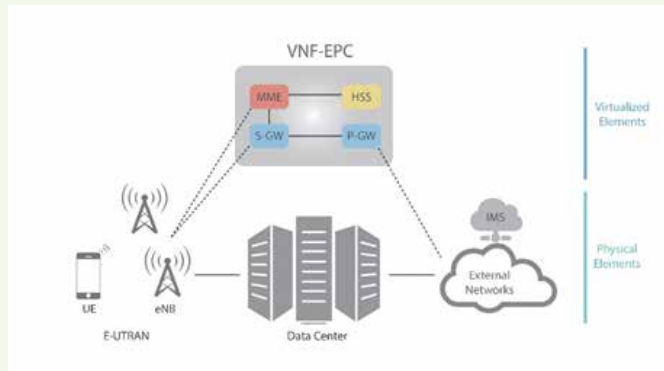


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Novel mobile network architecture based on NFV and SDN technologies

Novel network ideas

The logical next target for the Aalto team in SIGMONA was to develop the proof of concept for a virtualized Evolved Packet Core (vEPC) using NFV. In addition to that, José Costa-Requena proposed to integrate SDN in the access network (mobile backhaul) and remove GTP (GPRS Tunneling Protocol). The main goal of this second concept was to provide more fine-grained quality of service (QoS) to operators.

An innovative mobile network architecture based on NFV and SDN technologies as designed and deployed by our team is shown in the figure.

Standards contribution to ETSI

One of the best outcomes of the project was the contribution to ETSI. The PoC named “virtual EPC with SDN Function in Mobile Backhaul Networks” was submitted to the ETSI Industry Specification Group for Network Functions Virtualization (ETSI ISG NFV) in 2015.

Cumucore is a good example of a successful spin-off from an R&D project. The core idea of our start-up based in Espoo, Finland, is to combine SDN and NFV to boost operators’ businesses. It all started with Celtic-Plus project SIGMONA.

In October 2012 a team of researchers at Aalto University, Finland, were successfully completing Celtic-Plus project MEVICO (Mobile Networks Evolution for Individual Communications Experience). Nokia, one of the main research partners in MEVICO, expressed their interest in doing further research in this area. This triggered the SIGMONA project (SDN Concept in Generalized Mobile Network Architectures), in which major mobile technologies power houses (Aalto University, Nokia, Ericsson, Coriant, EXFO, etc.) joined forces to create a common testbed, which was used as first proof of concept of SDN mobile backhaul in ETSI standardisation with the collaboration of an external mobile operator (Telecom Italia). The aim of this new project was to look towards 5G by testing two hot technologies: Network Function Virtualization (NFV) and Software Defined Networking (SDN).

Validation of ideas

In March 2015, José Costa-Requena and his team successfully presented their proof of concept at the Aalto University premises. The main results were:

- Aalto researchers designed and implemented a cloud-based vEPC with the help of Nokia and other industry partners. This vEPC allowed the deployment of a LTE network with the key network elements in just 3 minutes.
- SDN mobile backhaul implemented with OpenFlow switches that allowed enforcing of fine-grained QoS, per tenant or user.

A start-up is born

Once the Aalto team technically validated the concept, the team members realized that nobody in the market was offering such a solution. The opportunity was tremendous given the added value to operators, and it was worth to commercialize the concept. In January 2015 the team decided to establish the start-up as a limited liability company in Finland under the name Cumucore to bring the best of cloud-based software to empower core networks. The SIGMONA project helped through enabling research to become a tangible commercial solution including the concrete development of components.

Today Cumucore is gaining traction as a trusted partner for mobile operators in Europe and Africa. We are very proud of being part of the Cumucore team, currently seven people, and of helping the company to expand its business globally. The opportunities are out there for us to capture them all.



Aalto’s SIGMONA team at a Celtic-Plus event

- Further information
 - CUMUCORE website – www.cumucore.com
 - SIGMONA website – www.celticplus.eu/project-sigmona/



Artificial intelligence in mobile network operations

How Celtic project GANDALF enabled the 2operate start-up



Lars Moltsen
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In 2003, after four years at Nokia, I wanted to start my own company. Celtic project GANDALF became the enabler for the successful launch of my start-up 2operate in 2009.

My career as an entrepreneur started in 2003, when I launched my first one-man consultancy company. In the beginning, I primarily utilized my own technical skills in telecommunications and software development, working on short-term contracts for local companies in Aalborg, Denmark, including my former employer, Nokia, as well as Texas Instruments.

Joining GANDALF against all odds

The GANDALF project consortium was gathering in 2004. I learned about it through friends at Malaga University, with whom I had worked at Nokia. The project proposed to investigate aspects of multi-technology network operations, including better quality-of-service monitoring. This was very close to the work in which I had been involved at Nokia, and I was very interested in joining the project.

Unfortunately, the financial conditions were not good, as national Danish funding was not an option for EUREKA projects. In spite of that, I wanted to get started developing a real product, and GANDALF was the perfect environment for testing prototypes. Thus, I decided to reduce my contractor activities and allocate two days per week for R&D work in GANDALF.

The project was approved by Celtic, and the other partners – Orange Labs, Telefonica I+D, Ericsson Ireland, Malaga University, and University of Limerick – had their funding secured. The formal kick-off meeting took place in April 2005.

Artificial intelligence

One of the elements which I brought to the project was an artificial intelligence methodology used for network element diagnostics. At Nokia, I had been working on new ways to automate operational processes at network operators together with researchers at Malaga University. One idea was to apply algorithms originally used for automated medical diagnostics for speed-diagnosing network elements with performance degradations. Alarms and performance data from the network elements would serve as “symptoms” and a range of known faults were “diseases”.

The concept was developed during the GANDALF project, and a prototype solution was tested on data from an advanced simulator at Orange Labs and live data from Telefonica. Results were promising, and shortly after the end of the project in early 2007, I sold my company, which now had three employees, to the Danish telecoms-software company Wirtek.

Celtic-Plus award and financial crisis

In 2008, the GANDALF project received the Celtic-Plus Excellence Award for great project results and its impact on the telecommunications industry. Wirtek had allocated a strong team of developers and sales staff to commercialise the auto-diagnostics solution. Unfortunately, Wirtek almost went bankrupt in 2008 as a direct result of the financial crisis. Three main business activities of the company died in less than 6 months, and the team around the auto-diagnostics project were made redundant.

Two former colleagues and myself secured the rights to the activity, raised 300,000 euro of start-

up financing through an incubator investor, and launched a new company called 2operate in early 2009.

Expansion beyond Europe

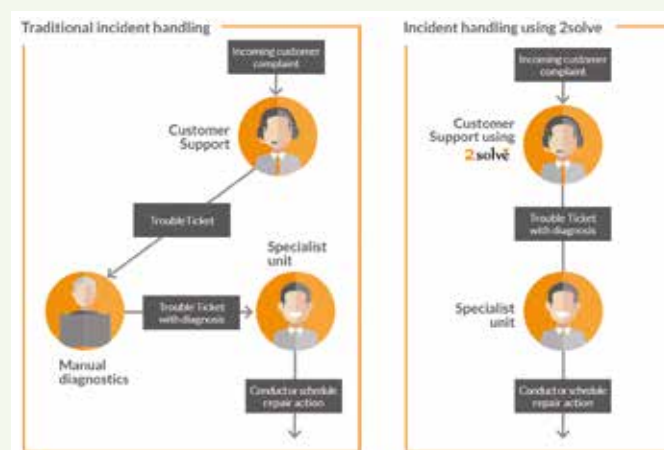
Today, 2operate has 10 employees and a growing customer base of 8 network operators, and it has been profitable since 2015. 2operate made its first sale outside Europe to the Bangladeshi satellite operator BTTC in 2016 and in early 2017, 2operate made its first sale in the Americas to a small mobile network operator, TelCell, operating in Sint Maarten in the Caribbean.

When asking customers, the main benefit of the auto-diagnostics solution, now branded as 2solve, is increased network visibility and understanding. Traditional network management tools only present raw data (alarms and KPIs), which can only be interpreted by engineers. 2solve presents conclusions such as “interference”, “transmission problem”, and “antenna fault”, which can be understood by non-technicians in customer support and management. This speeds up incident management processes significantly, and engineers can focus more on new technology (see figure).

2operate’s growth is still mainly generated from the auto-diagnostics solution based on the GANDALF project. However, the company has recently also started to develop new products, which will reach the market in 2017 and 2018.

■ Further information:

- 2operate website –www.2operate.com
- GANDALF website –www.celticplus.eu/project-gandalf/



2operate concept for better incident handling



First live retransmission of awake brain surgery

Performed by Celtic-Plus project E3



Oscar Chabrera
E3 project coordinator
ViLynx
oscar@vilyn.com

On 26 May 2017, Celtic-Plus project E3 enabled the first live retransmission of an awake brain surgery. The transmission from Nancy, France, was done in collaboration with the Nancy University Hospital, the Faculty of Medicine of Nancy, the TELECOM Nancy engineering school, the CRAN laboratory in Nancy, and medVC from Poland.

Surgeons use awake brain surgery to teach students to decide, which parts of a brain tumour can be removed at an operation. Up to now, this has never been done via live transmission, which limited the number of students who could watch

it to those present at the operation theatre. The transmission by E3 has changed this. In the future, live retransmission of an awake brain surgery could be watched by thousands of medical students around the world.

Professor Jean Marie Moureaux, Assistant Director of TELECOM Nancy engineering school and researcher at CRAN laboratory in Nancy, France, explained that neurosurgeons perform awake brain surgery for tumours that have spread throughout the brain. Awake brain surgery is based on real-time brain stimulations and can shrink these tumours, allowing neurosurgeons to remove most of the brain tumour while preserving a high-level quality of life of the patients.

Dr Fabien Rech, neuro-surgeon at Nancy University Hospital, said that the only way to really understand brain anatomy and function is to see it live. Awake surgery provides a unique access for students to see how the brain is working. However, nowadays it is not possible to give physical access to the operating room to every medical student. Thanks to the E3 videoconferencing solution, awake surgery can now be diffused to large group of students via multisite, live transmission.

This solution allows live interactions between students and surgeon throughout the surgery thanks to high-definition video streaming, which

leads to a new way to teach anatomy, and especially functional anatomy. This connected living anatomy gets closer to the new generation of medical students helping them to better understand a very connected organ.

The awake surgery retransmission scenario is based on the medVC telemedicine platform as well as video coding and video quality assessment developed in E3. It relies on the transmission of 6 simultaneous HD and Full HD encoded video streams over the IP network, in this case to three different locations: an auditorium of TELECOM Nancy engineering school, a surgery room, and an auditorium of Nancy University Hospital.

E3 is a multinational cross-domain project including 12 partners from 5 countries (Spain, Finland, France, Poland, Turkey) who represent both the ICT and the health sector, who collaborate in all project stages from definition to validation. The E3 project aims to facilitate the deployment of e-health solutions everywhere and for everybody by including the medical actors from definition to validation, thus preparing the ground for future go-to-market activities.

- Further information about the E3 project is available at <https://www.celticplus.eu/project-e3/>



The awake brain surgery was transmitted live to three locations.

NOTTS

Next generation over-the-top multimedia services



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Celtic-Plus project NOTTS (Next generation Over-The-Top multimedia Services) has been a product-oriented R&D project that gathers the main stakeholders on OTT (over-the-top) technologies in order to establishing an ecosystem for assuring OTT content delivery.

20 companies and institutions from Spain, France, Sweden, Poland, Finland and Portugal collaborated in NOTTS from 2013 to 2016 under the coordination of Spanish IT company Indra.

The project developed a scalable and sustainable integrated solution to guarantee OTT content delivery from the customer's perspective for the whole content distribution chain, which includes:

- New media distribution architectures, including peer-assisted solutions and local caching, were analysed, using real traffic data from our partners, and a context-aware and media-aware delivery platform was developed.
- Novel cross-disciplinary approaches to optimize the distribution of OTT contents were explored.
- User demand patterns have been analysed, and the impacts of new consumption patterns have been investigated in terms of OTT traffic analysis.
- Methods for QoE estimation and Quality Assurance monitoring tools for CDN/OTT were developed.
- Models where traditional network operators get their share of the raising OTT business have been investigated.

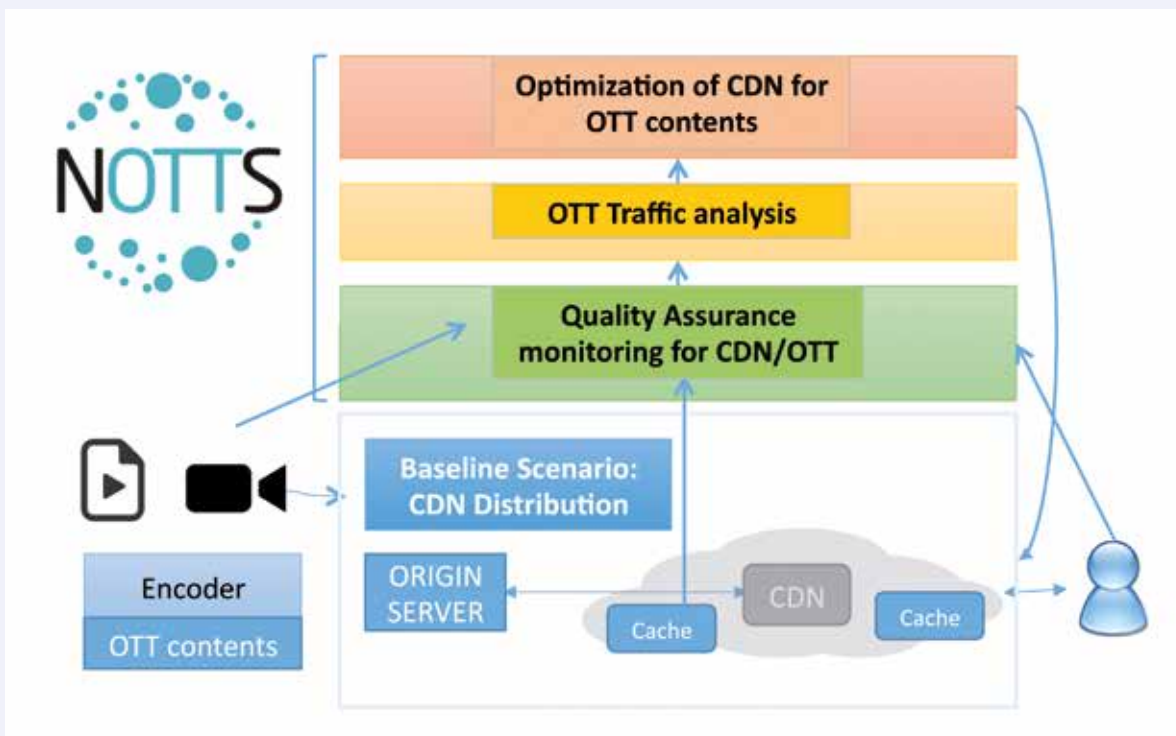
The figure shows the overview of the ecosystem developed in the NOTTS project.

Business impact

NOTTS has provided technological solutions that involve a new business line for all stakeholders so that as a result of this project a NOTTS prototype has been provided. This way, NOTTS supplies the European OTT service providers with opportunities to take revenue from the improved business. The project has also investigated business models in which traditional network operators can be part of the OTT business. NOTTS contributes to this objective with a combination of technical network solutions and business development.

In addition, the advanced methods for content distribution and technology for monitoring and controlling QoE of OTT services developed by NOTTS have a direct impact on the end users. Given that the contents and services they demand will be offered with a better quality, it directly impacts on customers' satisfaction.

The main objectives have been achieved: a scalable and robust video streaming solution able to deliver adapted contents to heterogeneous devices, and networks that include quality assurance technology to improve customer satisfaction of OTT contents.



NOTTS ecosystem



The project has developed methods to monitor and analyse detailed content demand patterns of over-the-top media services. Results have been produced in academic submissions and project deliverables. 27 products from four product lines have been impacted by the project. In addition, all partners reported that NOTTS has significantly improved their business position in comparison with their direct competitors.

Business and dissemination outcomes

NOTTS generated 7 contributions to standardization bodies (ISO MPEG/DASH Ad-hoc group, DASH Industry forum, VQEG and TM Forum), 77 scientific publications in leading international

journals and magazines (15), conference publications (46) and book chapters (16). In addition, 17 PhD & MSc theses have been realized and the project participated in 10 dissemination events (Celtic Event, Conference Organizations, NEM, FN&MS and IWQM).

Finally, we had very good feedback from customers, partners and end users during the exhibitions and booths carried out, such as the Celtic Events, and the commercial presentations we made for main European telecommunication operators. Besides, NOTTS has demonstrated a high level of innovation and business relevance by winning the Celtic-Plus Excellence Award 2017.

Outlook

The successful joint business impact achieved by the consortium has led to new research projects, such as the EIT Digital project NFMD (Networks for Future Media Distribution), where NOTTS partners have consolidated their activities in this research line. In addition, the collaboration between the partners is continuing in a new research line under the Celtic-Plus project MONALIS, where most NOTTS partners will develop new activities.

You can find more information on NOTTS at <https://www.celticplus.eu/project-notts/>



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.

