CELTIC-NEXT

Next Generation Telecommunications for the Digital Society

WHITE PAPER

ECSEL 5828 Celtic-Plus

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approved by
Celtic Industry Core Group

CELTIC & CELTIC-PLUS
15 years of success

900+ products commercialised

150+ R&D projects

1 B€ invested in R&D

40% SME participation

900+ PhD and Master Thesis

Why CELTIC-NEXT?

Applications and services available to businesses and citizens have become increasingly accessible anywhere and anytime, thanks to broader mobility and to the deployment of cloud technology. At the same time, security and privacy issues have become primary concerns.

Those critical technological and societal issues need to be addressed in the coming years. They are not addressed by other EUREKA instruments, and only partially by other instruments in Europe.

In an increasingly digital society, CELTIC-NEXT is the key to the development of the next generations of enabling telecommunications technologies and services, that will reflect the evolving needs of businesses in all sectors and citizens in Europe and beyond, for a broad range of applications and solutions.

What is CELTIC-NEXT?

CELTIC-NEXT will be based on the core values that have been supporting the Celtic community for 15 years, i.e. a bottom-up industry-driven approach, along with large "flagship" projects aimed at solving issues of strategic importance through a combined effort and coordinated approach of public authorities and industry.

CELTIC-NEXT will continue to expand the Celtic community within and outside Europe, in line with the EUREKA globalisation strategy.

CELTIC-NEXT will dedicate more effort to supporting start-ups and spin-offs. Already established SMEs will be more stimulated towards growth.

CELTIC-NEXT will further strengthen its ties with the national Public Authorities, as well as with Clusters and Competitiveness Poles that address similar issues at national or regional level.

Atos · BT · Deutsche Telekom · Ericsson · Eurescom · gemalto · indra · ITALTEL · NETAS · Nokia · imec · orange · RAD · Telefónica · telenor · THALES · TURKCELL · Türk Telekom

CELTIC-NEXT
Background and Rationale

Celtic-Plus and its fellow Clusters have contributed significantly to the growth of the annual turnover of firms involved in Cluster projects (+13% compared to non-participating firms) and to the development of employment (+7% employment growth compared to non-participating firms)[1].

In 2003, all the major European telecommunications vendors and operators decided to work together and create an ambitious European intergovernmental R&D programme providing the means to tackle issues related to an end-to-end approach in communications. This was the best option to address a "system view" of communications to complement the other existing Clusters at that time. The Celtic Initiative, which was the outcome of their common effort, was granted the EUREKA Cluster label, as many countries shared the objectives of this new programme. Celtic was a key milestone in initiating ambitious and innovative projects dedicated to end-to-end communications solutions.

Eight years later, in 2011, the EUREKA High-Level Representatives decided to renew the label for the Celtic-Plus EUREKA Cluster. By then, large-scale data transfer and use was exploding. People were downloading music and videos on their laptops, and businesses were fighting to find large storage facilities in their premises to ensure backup for their employees' data. Today, everyone listens to music and watches online videos on their mobile devices anywhere and anytime, and both businesses and individuals have their data stored in large data centres located all around the world. This creates new technological and societal challenges, primarily related to the security and privacy of data transmission and storage.

Celtic-Plus projects have heavily contributed to enabling this evolution e.g. by providing more bandwidth and more secure and reliable networks for businesses and citizens. Examples include the HIPERMED (High-Performance Telemedicine Platform) and HFCC/G.fast (Hybrid Fibre-Copper connectivity using G.fast) projects, that have been awarded the EUREKA Innovation Awards for their excellent results respectively on remote video for surgeries, and on providing gigabit class broadband access without the need to replace the existing cables to the home. Other examples include SASER (Safe and Secure European Routing), which performed many breakthroughs in secure communications; SIGMONA (SDN Concept in Generalized Mobile Network Architectures), that led the first "Software Defined Network" general solution in the mobile network architecture that is now broadly adopted for 4G and 5G communications; and H2B2VS (HEVC Hybrid Broadcast Video Services), which contributed to boosting video distribution via broadcast and broadband.

The participation of SMEs in Celtic-Plus has continuously increased throughout the years, to reach more than 40%. In 2017, the total budget of SMEs in Celtic-Plus projects overcomes the total budget of large Industry[2].

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[1] "Impact Assessment of EUREKA Network Projects and Cluster Projects – Main findings and recommendations". Berlin/Brussels/Graz, May 24, 2017.

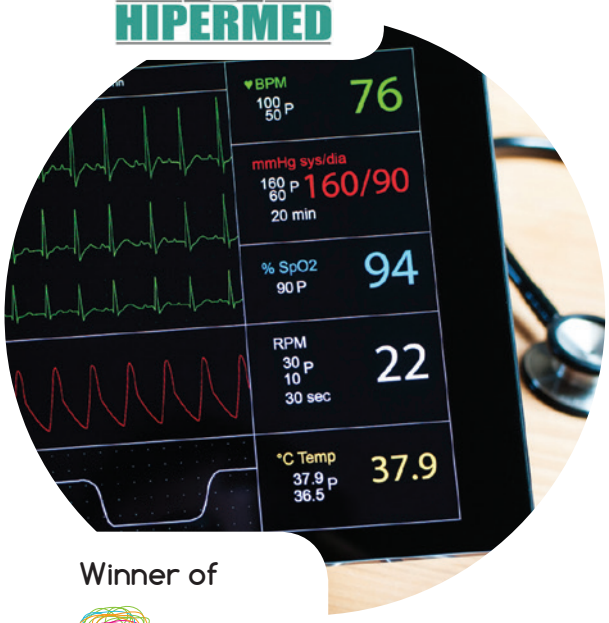
[2] "Industry" in the sense of Celtic-Plus excludes telecommunication operators.

4GBB
HFCC/G.fast

Winner of

EUREKA
INNOVATION
AWARD 2015/16
innovation across borders

HIPERMED



Winner of

EUREKA
INNOVATION
AWARD 2014
innovation across borders

SDN
SIGMONA

SOSER

In EUREKA Clusters, large enterprises serve as 'door-opener' to SMEs. SME participation is desired and supported, and flexible[3].

"Flagship projects" have given the opportunity to some EUREKA countries to share and work together with industry on common strategic priorities leading to the deployment of ambitious and innovative solutions, thus creating major impact for the European economy.

Celtic-Plus projects are fostering the creation of new businesses and new markets. By the end of 2017, 11 start-up companies had been created from completed Celtic-Plus projects. Since the launch of the Celtic initiative, 926 products have been commercialised , and 910 students have done their PhDs or Master Thesis thanks to projects.

The success of the Celtic and Celtic-Plus programmes has increased the European societal and industrial demand for advanced services over high performant networks by showing what is possible. Now we are facing the challenge of scaling up the digitisation of every industrial process and providing secure, reliable and user-friendly communications that can be integrated into every aspect of our lives. This must be done while achieving significant improvements in the equipment performance and security matched by equally impressive reductions in energy consumption and environmental impact of all those new services and infrastructures.

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[3] Extracted from a report entitled "Expert hearing of the [German] Federal Ministry of Education and Research (BMBF) aiming at future perspectives of EUREKA Clusters beyond 2020". Bonn, 6 July 2017.

[4] New and improved products.

CELTIC-NEXT Scope and Research Areas

CELTIC-NEXT with its end-to-end approach is key for allowing the development of dedicated applications using the network with all the required features for a given economic sector.

CELTIC-NEXT will be based on the core values that have been supporting the Celtic community for 15 years, i.e. a bottom-up industry-driven approach, along with large "flagship" projects aimed at solving issues of strategic importance through a combined effort and coordinated approach of public authorities and industry.

CELTIC-NEXT will regularly look at improving the processes and tools in a similar manner as in Celtic-Plus so that they timely match the evolving demands of the overall landscape. It will also refine periodically its scope and orientations, to further strengthen the initiative. Providing more support to newly created start-ups and to growing SMEs, as well as improving the partnering tool, shall help broaden and expand the community. Increasing the flexibility of the programme to cope with the quicker pace of technological and market developments, as well as allowing projects that are closer to the market, up to high technology readiness levels, will increase the impact of the projects and of the programme on economy and society. Providing the opportunity for students and researchers to contribute with innovative ideas shall remain a key asset of the CELTIC-NEXT community.

There are critical technological and societal issues that need to be addressed in the coming years, that are not addressed by other EUREKA instruments, and only partially by other instruments in Europe. From a technological standpoint, Networking and Cloud Enablers addressing and using technology from such areas as cyber security, artificial intelligence, 5G and beyond, FinTech, big data, business analytics, and IoT are considered as important orientations to develop. A special focus of CELTIC-NEXT will be on applications and services serving vertical sectors such as content (video, gaming), e-health, smart cities, agriculture, mobility, energy, automotive, e-commerce, and industry/manufacturing. Those verticals are equally important to advance, along with optimising and improving efficiency and reliability with the best end-to-end connectivity and security. The evolution of ICT services over the next period will be achieved via a partnership model where the vertical sectors collaborate in determining their ICT solutions. This will be a key focus of the CELTIC-NEXT end-to-end perspective.

Another key issue for CELTIC-NEXT will be to develop communications infrastructures and services that can adapt to the requirements of various business sectors. The need of communications between vehicles are indeed quite different than the needs for piloting electrical power in buildings and houses. The same applies to the virtual and immersive reality techniques, that will become a critical element in the health and media industry in the coming years. There will be many unique challenges behind innovative manufacturing processes that must be supported by one ubiquitous infrastructure.

We expect that many of the CELTIC-NEXT projects will define and develop self-adaptable solutions, able to fit the needs of many different sectors and societal challenges. CELTIC-NEXT with its end-to-end approach is key for allowing the development of dedicated applications using the network with all the required features for a given economic sector. Representatives from vertical sectors will be progressively invited to participate in the CELTIC-NEXT Industry Core Group to ensure the continuous cross-fertilisation of ideas.

In parallel, the telecommunications industry shall exploit the full power of cross sectors technologies such as Artificial Intelligence and Big Data, to define and provide customised and smart solutions for the different economic sectors and the whole society.

Key strengths of the Clusters: large community of like-minded people to cooperate with globally; continuous work on prioritised topics is possible; high flexibility; market relevance[5].

[5] Extracted from a report entitled "Expert hearing of the [German] Federal Ministry of Education and Research (BMBF) aiming at future perspectives of EUREKA Clusters beyond 2020". Bonn, 6 July 2017

CELTIC-NEXT in the European Research & Innovation Landscape

Celtic and Celtic-Plus have established a strong global research & innovation community, targeting technological and business areas that are not addressed or addressed only partially by other European initiatives. The Celtic community includes European players as well as organisations from outside Europe e.g. from South Korea and Canada. CELTIC-NEXT will continue to expand the community within and outside Europe, in line with the EUREKA globalisation strategy.

Celtic-Plus has enabled industry to initiate projects addressing the relevant technical and business topics at the time of their choice and has promoted "flagship projects" to solve issues of strategic importance at European level. The flagship approach allows European countries to team up together and to strategically advance on key challenges and key technologies.

Thematically relevant cooperation of bi- and multi-national interest can be limited to a (few) participating countries that have more influence than in other EU instruments[6].

Celtic-Plus is a founding member of the "Inter-Cluster Committee", that is facilitating the work on objectives common to all running EUREKA Clusters, and is making sure that the contributions of the Clusters to EUREKA and to the European Research Area are effective. CELTIC-NEXT will continue to contribute actively to the Committee and ensure together with the other Clusters that activities performed by each Cluster allow an effective complementary coverage of the technological and business areas, that will continue to strengthen the European economy. It will also continue to interact whenever relevant with the telecommunications activities supported by the European Commission.

This has already been done in the past, e.g. when participating in the "Future Network & Mobile Summit" and the "European Conference on Networks and Communications", and when Interacting with the "Future Internet Public-Private Partnership" and the "5G Public-Private Partnership". The NetWorld2020 European Technology Platform is currently working on a new Strategic Research & Innovation Agenda that will without a doubt become a reference for CELTIC-NEXT.

CELTIC-NEXT will further strengthen its ties with the national Public Authorities, as well as with Clusters and Competitiveness Poles that address similar issues at national or regional level. This will help to ensure that innovative ideas developed and tested locally can eventually become global, and that projects addressing similar issues with different solutions, or developing technological and business pieces that could together form a broader solution, can benefit from each other's findings.

CELTIC-NEXT will dedicate more effort to supporting start-ups and spin-offs participating in projects or created thanks to successful CELTIC-NEXT projects. At the same time, already established SMEs broadening and expanding their offer and their market thanks to CELTIC-NEXT, will be more stimulated towards growth. To achieve this, CELTIC-NEXT will utilise cooperations with initiatives such as the EUREKA Eurostars and InnoVest Programmes and make use of tools such as the European Investment Project Portal (EIPP). Other initiatives and tools will be investigated at European and local levels and cooperations and interactions will be supported whenever deemed relevant. Considering the high participation of SMEs in Celtic-Plus projects, it is envisaged to invite SME representatives to participate in the CELTIC-NEXT Industry Core Group.

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[5] Extracted from a report entitled "Expert hearing of the [German] Federal Ministry of Education and Research (BMBF) aiming at future perspectives of EUREKA Clusters beyond 2020". Bonn, 6 July 2017.

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