

CELTIC News 1/2020

The newsletter of EUREKA Cluster CELTIC-NEXT

CELTIC Chair's Corner

Let's invent together a smarter and safer world

Project Highlights

ReICOvAir – Reliable Industrial Communication
Over the Air

Startup Success Stories

CELTIC results used by medVC to fight COVID-19

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IMPRINT

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

CELTIC-NEXT Call for Project Proposals – Deadline: 19th October 2020

Do not miss the opportunity to participate in CELTIC-NEXT, the industry-driven European ICT and telecommunications research programme under the umbrella of EUREKA. Submission deadline for the next call for project proposals is 19th October 2020.

CELTIC-NEXT projects are collaborative private-public partnership R&D projects. All EUREKA member countries and associated countries can financially support them. More information on public funding and national contacts per country can be found on the CELTIC-NEXT Public Authorities Website. Please talk to your national contact early in the process.

Easy proposal process

Preparing and submitting a CELTIC-NEXT project proposal is easy. Just register on the CELTIC-NEXT online proposal tool, fill in the Web forms, and upload your proposal in pdf. Access to the proposal tool and to a proposal template is available via our Call Information page (<https://www.celticnext.eu/call-information>).

Benefits of participating in CELTIC-NEXT

- › 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 – see CELTIC-NEXT Scope and Research Areas.
- › CELTIC-NEXT projects are close to the market and have a track record of exploiting their results soon after the end of the project.
- › High-quality proposals have an excellent chance of receiving funding, with an average success rate higher than 50 %.
- › The results of the evaluation will already be known in December 2020.

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

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Let's invent together a smarter and safer world

It is more than ever time to invest in ICT



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I hope all readers of CELTIC News are well. My feeling is that going through a pandemic changes us and makes us think differently. It makes us understand what is crucial and what is only nice to have. We also learn that we can adapt, do things differently and fast. Not only AI will pave the way for a smarter world, even if for sure AI will play an important role there.

Despite all difficulties, most of us have still been able to telework and communicate thanks to digital tools, telecom networks and the cloud.

AI, telecom and IT tools have proved to be critical assets

First of all we can be proud of our telecom and IT assets. As an example, the dimensioning of networks allowed the unusual traffic peaks during the first weeks of the crisis. Working for the research of a big telecom operator, Orange, I am proud of my colleagues in the operational units and of all the working forces which allowed the continuity of services of the critical infrastructures.

Most importantly, the telecom infrastructures connected the hospitals and the businesses during that strained period. What would have been our daily life during the social distancing measures and home office without the telecom infrastructure? Without the digital applications? Without news from the remote family, talking to friends, allowing grandparents to see the younger ones, exchanging and getting information, making online food shopping? As a mother, I also appreciated that my children could do their lessons online, even if it is not always easy for a ten-year-old boy to organize his daily screen time around math, English and geography

instead of using it for Fortnite, FIFA or "The Legend of Zelda".

When I helped our au pair to get her first online medical teleconsultation from home, I thought of the CELTIC eHealth projects HIP-ERMED and E3, which created novel solutions for teleconsultation and telesurgery.

Some results from other CELTIC projects have also been very valuable, like VIRTUOSE, which created solutions for multi-party video communication and video analysis, area management and security. Or the UNICRINF project, which developed novel solutions for improving emergency communication.

Continuous support by the CELTIC Office

At the time I wrote this article, the CELTIC office was busy as always supporting proposers and CELTIC projects at any stage. For running projects online reviews have been organized. A first joint call between the CELTIC and the EURO-GIA communities has been organized during the first trimester of this year. On 31st of March the CELTIC office has held a successful AI proposer's webinar with a large audience – around 200 registered participants from 24 countries, many of them joining from home.

EUREKA Clusters AI call

At a time when the COVID-19 crisis has created more solidarity, more connections, even if we

needed to be physically distant, the Clusters CELTIC-NEXT, EURO-GIA, ITEA, PENTA and EURIPIDES² have been cooperating more than ever to define the first EUREKA Clusters AI call.

When defining this first common call, the EUREKA Clusters have learnt a lot on how to streamline processes and make it easier for both applicants and Public Authorities. In particular a single online project submission tool for all participating Clusters has been defined and set up. We proved collectively agile, and I would like to thank the inter-Cluster colleagues for their cooperation in this new adventure.

Conclusion

Going back to the Coronavirus crisis, I hope we will be collectively able to heed all the lessons learned. No doubt our ICT infrastructures, digital tools and the use of AI at different levels have saved many lives since the beginning of the year. Some Asian countries especially reacted very fast, showing us images of what we so far thought was sci-fi. Thanks to Big Data, IA, and global collaboration, the research helped a lot to react as fast as possible to limit the damages caused by the pandemic. That is why, even if the European and world-wide economy will need some time to recover, I am convinced it is more than ever time to invest in ICT. Research should be as fast as possible, to fight such a pandemic or to invent a smarter, safer world. That is what CELTIC and EUREKA should be after in the coming months.



Photo: © Adobe Stock

Smart connected world meets clean energy

Joint CELTIC Eurogia Proposers Day in Madrid



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On 29th January, the first joint CELTIC and EUROGIA Proposers Day took place at Nokia Bell Labs in Madrid. The registered participants from both Cluster communities came together to discuss new projects ideas for ICT-based end-to-end solutions in different vertical sectors (CELTIC) and green energy technologies (EUROGIA). Experts presented new insights on recent technological developments in Artificial Intelligence and information on funding opportunities. Proposers presented twelve new project ideas in a pitching session. The Proposers Day stimulated new project proposals on disruptive technologies in the areas of ICT and energy, which were submitted in the Joint CELTIC Eurogia Call that closed in spring.

The event was opened by the CEO of Nokia Spain, Mr Ignacio Gallego, and Mr Álvaro Villegas from Nokia Bell Labs, Spain. Welcome addresses were given by Ms Juana Sanchez from CDTI, Mr Pierre Besse from EUROGIA, and Mr Jari Lehmusvuori, CELTIC Vice-Chair and head of department at Nokia Bell Labs in Finland, who also moderated the event.

Mr Diego Lopez from Telefonica gave an inspiring keynote on AI with the title "Building the Golden Closed Loop – AI and Networking". He explained that the key issues of AI are not so much the AI engine but the data used to feed it and the resulting action flows – the most intelligent AI engine will only be as good as the data used to analyse.

Pierre Besse, Vice-President of EUROGIA and Peter Herrmann, CELTIC Office director presented how easy it is to submit a project to the Joint Call. Both presented the eligible subjects of their respective Cluster and explained the requirements for a successful



Audience of the Proposers Day at Nokia Bell Labs in Madrid

project proposal and how the online submission tool can be accessed. In addition, they explained the evaluation process for proposals by technical experts and Public Authorities.

Panel of funding bodies

An important part of the Proposers Day was the panel of the funding bodies from Spain, Canada and Luxembourg.

Ms Juana Sanchez from CDTI in Spain explained the CDTI bottom-up approach that is well aligned with the philosophy of EUREKA Clusters. She also explained how the application process for public funding via the open CDTI call works. She recommended that proposers should not forget to check the funding availability for each partner in each country involved in a proposal.

Mr Kasturi Narayanan from the National Research Council of Canada presented his organisation's Industrial Research Assistance Program. This program addresses SMEs with up to 500 employees operating in Canada. The main objective is to generate growth of companies through innovation. Mr Alexander Link explained the EUREKA Perspective program for companies in Luxembourg. This program addresses small and large companies. He explained the key steps for obtaining public funding in the context of EUREKA Calls and gave his recommendations on what companies have to do, to receive public funding.

Business panel session

Ms Maria Luisa Arranz from Nokia, coordinator of CELTIC project UNICRINF, talked about the achievements of the project and about the live emergency demonstration which was shown at the Port of Valencia before the CELTIC Event in June 2019 (see UNICRINF article in CELTIC News 2/2019 and video of the demo at <https://youtu.be/b2w-FQ6eB6Zo>).

Mr Oscar Chabrera Villarreal from ViLynx, Spain presented the SME-led CELTIC project E3 and two other CELTIC projects that have helped ViLynx to get into the AI and video business. Today ViLynx is growing and is also active in the US. The project also allowed the consortium to learn about the needs of the healthcare sector, as four hospitals and one medical institution were participating.

Mr Jari Lehmusvuori from Nokia Bell Labs, Finland presented the CELTIC flagship project SENDATE that addressed secure networking for a data center cloud in Europe. It brought together about 80 partners in four countries, and it had a budget of €70m. Among the highlights are several world records, like the world's first 100 Gb/s safe quantum transport over 2,800 km and the world's first aggregation and reception of 400 Gb/s super-channel with a single photodiode. The project also developed an architecture for the different data center types, the first security architecture ever. It established an open ecosystem for open source



Panel participants (from left): Jari Lehmusvuori from Nokia (Finland), Oscar Chabrera from VilynX (Spain), Sophie Theys from Bureau Veritas (France), Hülya Akinç from Enerjisa (Turkey), Maria Luisa Arranz from Nokia (Spain), and moderator Pierre Besse from EUROGIA

software projects, too. Thanks to SENDATE, European suppliers are back in the business of data centers.

Ms Sophie Theys from Bureau Veritas reported about the benefits of being a member of the Eurogia Board, which is active in building and participating in an industry ecosystem of strategic importance to Bureau Veritas. She also illustrated the impacts of the Eurogia projects, such as CO₂FieldLab, to develop new innovative services, such as new standards for the assessment of CO₂ sequestration sites on society and the environment.

Ms Hülya Akinç from Enerjisa explained her company's active participation in EUROGIA. She showed how Enerjisa gets benefits by proposing projects to the EUROGIA ecosystem in order to develop innovative products and services strategic to Enerjisa. She illustrated this impact by describing the EnergyNext project for the asset management of distribution lines through the country using drones, which considerably improves energy efficiency and costs of maintenance services.

Project idea pitches

Another core element of the Proposers Day was the pitching of project ideas. 12 proposers presented their ideas on a wide range of ICT and energy topics. The presentations led to productive discussions, which were moder-



Highly interactive session on project idea pitches

ated by Christiane Reinsch from the CELTIC Office.

The discussions were continued in the weeks after the Proposers Day via the CELTIC Consortium Building Web Sessions, which led to the formation of new project consortia.

RelCOvAir

Reliable Industrial Communication Over the Air



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The motivation for the RelCOvAir project is the vision to enable the widespread usage of wireless communication systems in industrial environments. This was achieved by creating an innovative verification method as well as initial testing systems relying on this method in order to qualify the reliability of various wireless communication systems.

RelCOvAir concentrated on the fact that there is no common way of measuring the quality of wireless communication systems in industrial scenarios. The purpose of RelCOvAir was to provide the required methods and testbeds to carry out a quality assessment of wireless communication systems in industrial environments.

Approach

The prerequisites to recreate RF signal propagation characteristics from industrial environments in the lab are two-fold. Firstly, a valid parameter database for the propagation channel conditions in industrial environments has to be established. Secondly, a channel model supporting the relevant use cases in the factory also needs to be in place. Therefore, great care was taken planning the QuaDRiGa channel model update and the required propagation measurements in industrial environments.

Based on the updated QuaDRiGa channel model, software simulation and hardware emulation environments were designed and implemented. They allow non-expert users to apply the sophisticated channel model to simulations, as well as RF-transmissions, and real devices via a hardware channel emulator and a data traffic emulator (see Figure 1).

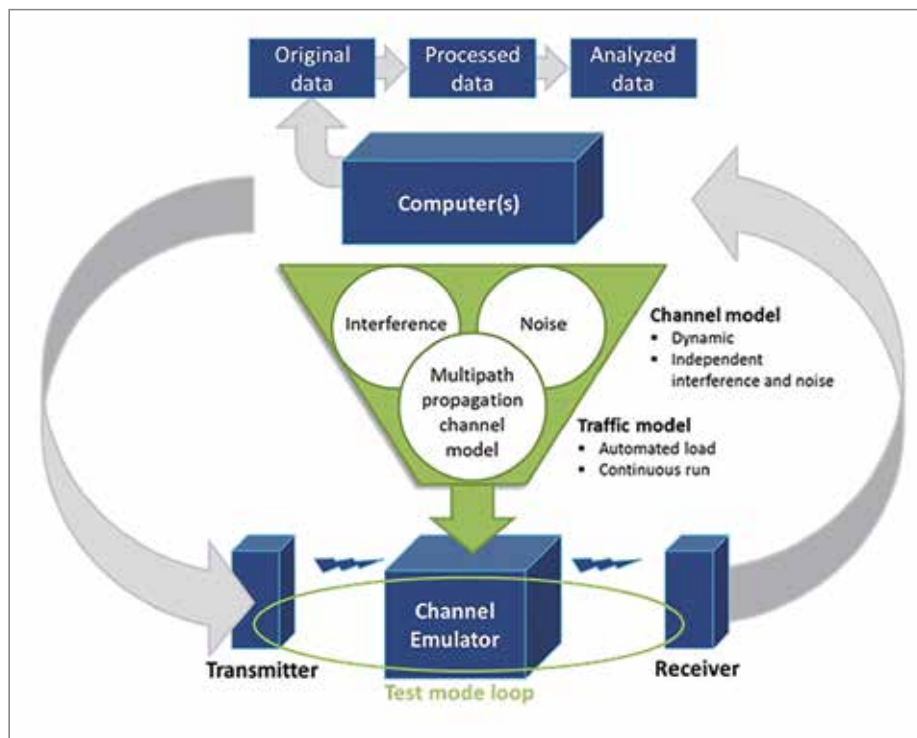


Figure 1: RelCOvAir test concept

Achieved results

The project's main achievement is providing the key enabling factors in order to prove the reliability of wireless transmission systems in industrial environments.

In a first step, the propagation parameters of industrial environments were characterised via extensive measurement campaigns at 2.4 and 5.3 GHz in live production sites in Finland and Germany (see Figure 2). The measurement results highlight the differences compared to the formerly used channel model for office indoor environments. This is the initial step for a realistic recreation of an industrial propagation environment in the lab.

In a second step, the necessary tools for practical use were developed. The core of these tools is the enhancement of the QuaDRiGa channel model that now supports simultaneous movement of transmitter and receiver. Additionally, it provides the expected correlation in reception conditions of two collocated devices. With regard to the predecessor model, by incorporating the sum-of-sinusoids method into the model, a reduction of the required processing effort

was achieved making the system much more manageable for high numbers of users and large areas.

The channel model supports detailed software simulations as well as hardware emulations. These two approaches provide proof-of-concept solutions for testing services, allowing the qualification of an ideal software model, assuming no implementation losses, as well as the testing of real devices. This achieves the vision of "bringing the factory into the lab".

To make the results valuable for the industry, the QuaDRiGa channel model was released as open source, thus building trust by allowing independent in-depth analysis of the model.

The project has so far generated various publications and contributed to national (VDI, DKE) and international standardization bodies (5G-ACIA, IEC, 3GPP).



Figure 2: Measurement site at Siemens, Germany

Conclusion and outlook

The state-of-the-art QuaDRiGa channel model was enhanced to enable the realistic simulation of radio wave propagation within industrial environments. The major enhancements are: obtaining a set of propagation parameters for industrial environments, the support of a fully mobile system, where transmitter and receiver can move at the same time, as well as the establishment of a simulation and emulation lab testbed. Based on these results, it is now possible to simulate the wireless communication behaviour of an entire factory and apply this behaviour to real devices. Great care was taken to disseminate the results and provide the findings to standardization bodies such as 3GPP.

The project results advanced the required testing of wireless communication, as realistic assessment of the behaviour of wireless transmission systems such as 5G, both in standardization and in the industrial sector for specific use cases, now becomes possible. Ultimately, the results of the project will enhance the industrial sector's confidence in relying more on wireless transmission systems and will lead to a change in the design of future factories.

> Further information

> ReICovAir project page –
www.celticplus.eu/project-reicovair

H-OPTO

Reducing the Investment Uncertainty for Optical Access Networks



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The Celtic Next project H-OPTO aimed at establishing best practices and creating new knowledge in the installation, operation and maintenance of optical access networks. Until recently, most of the research effort on optical networks has mainly focussed on increasing capacities and developing new optical components. Less research has gone into analysing the overall deployment costs and the operations and maintenance costs. H-OPTO has focused on these costs with the ambition to build up practical knowledge and stay ahead of industry needs when deploying and operating such networks. While optical access networks are currently still far from ubiquitous, deployments are rapidly increasing. As these networks grow and start to age, quality and operation issues become progressively important. It is this network rollout and operational holistic view that H-OPTO brings to the world of optical fibre access.

The project set out to answer some specific questions such as: "How do optical networks age?" and "How do we transform network maintenance into a data-driven business?" These questions have largely been answered

by the project. Cost savings in network maintenance have been achieved both for the optical access network and for fibre-fed commercial indoor wireless networks. The combination of optics and wireless expertise within the project has led to some notable results, including a new business model for one of the project partners, which significantly reduces both costs and the environmental impact for in-building mobile distribution. The project also had two successful forward-looking innovation strands, one looking at the techno-economics of optical access deployment (eventually this model will add 5G transport cost analysis capability) and the other looking at methods to secure a disturbance-free Wi-fi in-door environment.

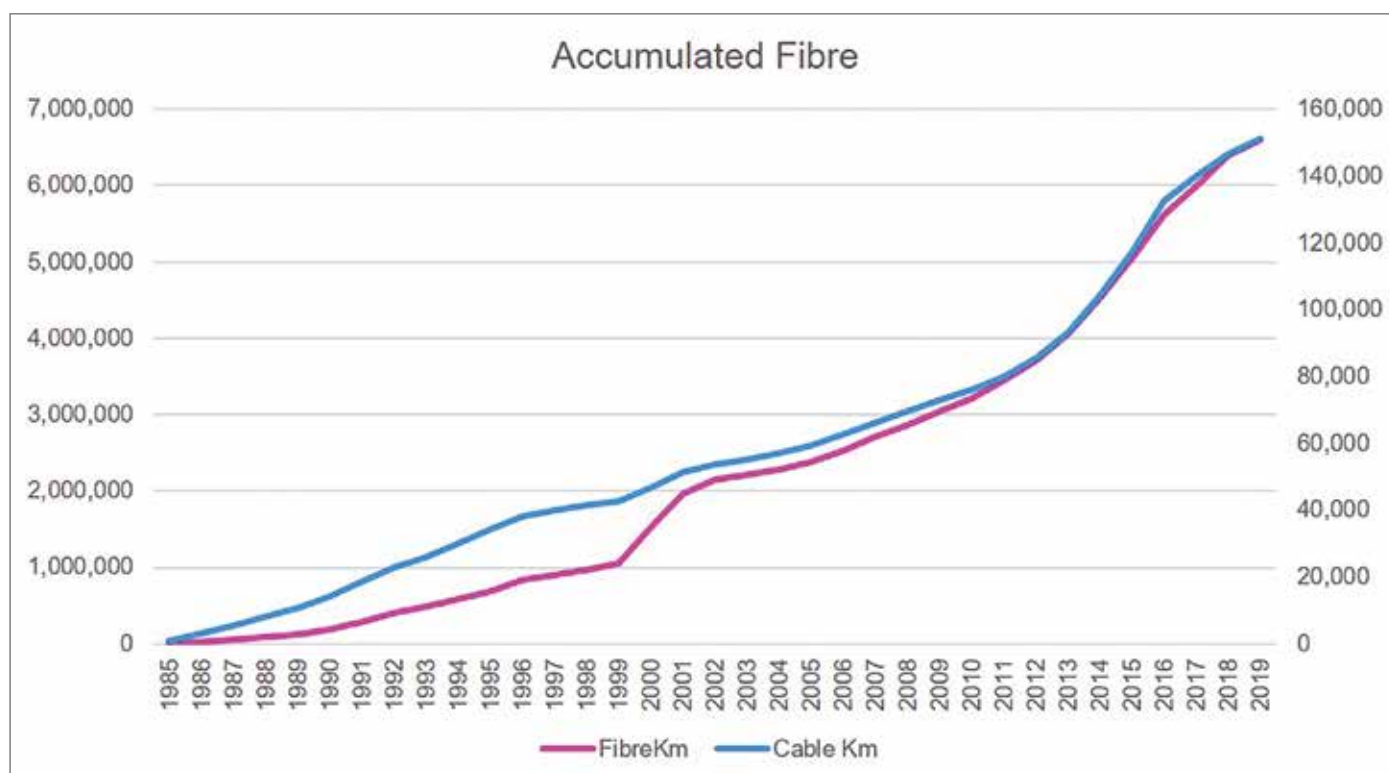
On the optics side, the project has brought together the main actors in Sweden, bringing with them their experience and expertise they have gained in deploying optical fibre networks throughout the country. Almost every home, even in rural areas, now has a fibre connection in Sweden. This expertise was combined with that from the Polish optics industry that maintains a global position in the production and testing of

optical components. From the UK, BT added experts on optics, networks and techno-economics. And partners from Turkey and Sweden added further proficiency in the area of in-door wireless solutions including international standards experience. The success of this project is a direct result of the competence and engagement of all the participating partners. Figure 1 shows the deployment of fibre and fibre cable by Telia from 1985 until 2019 throughout Sweden.

Cables, connectors and ducts were extensively examined during the H-OPTO project, with the aim of identifying the significant reasons for network faults, which were extracted from fault logs using data mining techniques.

Summary of the estimated aging of optical component results

Cables used during the past 25 years have not undergone any significant degradation. Cable lifetime is mostly dependent upon cable size (i.e. fibre count) and if a cable has needed to be replaced due to under-capacity. Problems noted for old cables have been related to ma-



Fibre and fibre cable deployment in Sweden

terial compatibility, which is now prevented by implemented aging tests in the qualification test programme.

Connectors are generally a weak point and cause problems for customers when high quality components are not used. However, aging has not been found to be an issue. Problems are most likely to arise due to poor fibre cleaning methods used by technicians.

Ducts: cost-wise the ducts are the most important component in a network, as re-trenching should be avoided whenever possible. Internal friction increases over time after a cable has been installed inside a duct, which can make removing cables and installing further cables difficult. However, this friction has been found to be reversible with the correct cleaning and lubrication techniques.

Conclusion and outlook

H-OPTO has been a driver in creating a new forum for technical discussions involving several different network owners in Sweden. Telia and other partners in the project have

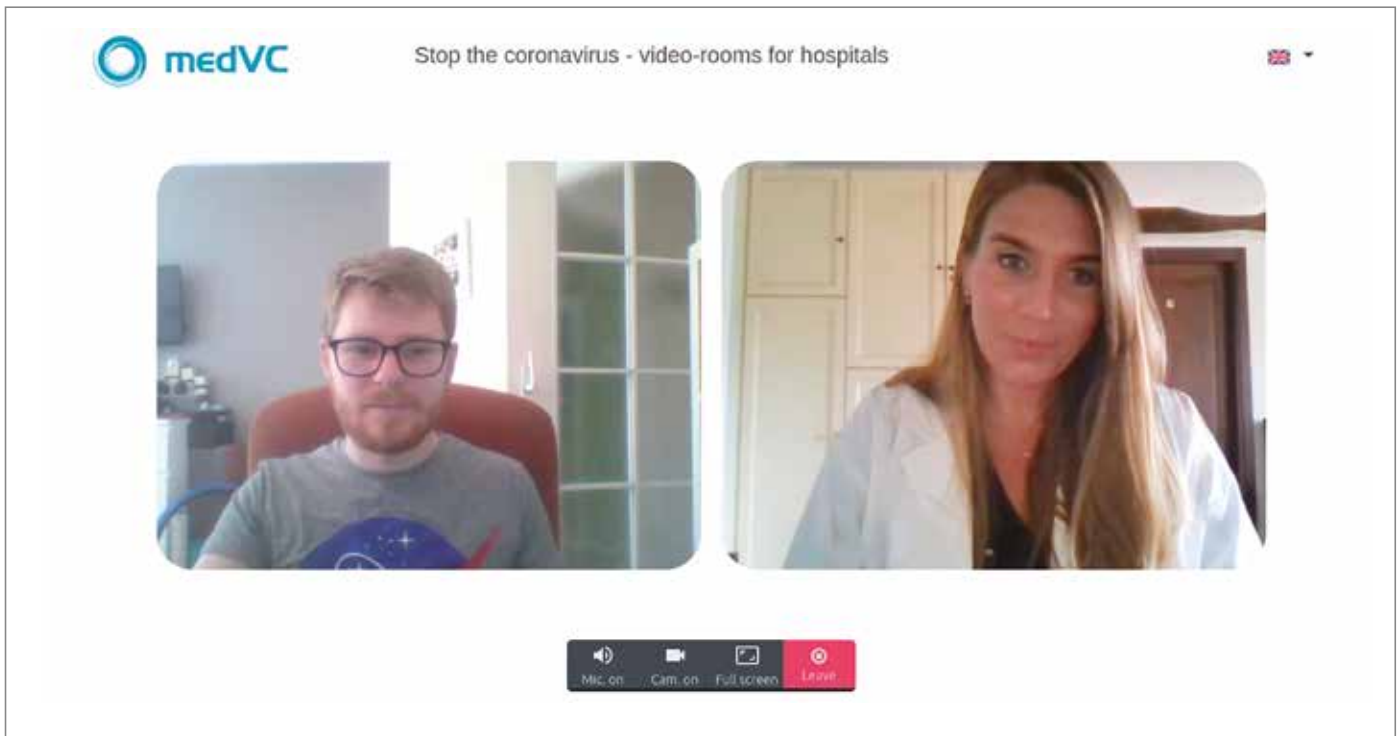
shared experience, data and quality requirements. This Swedish cooperation is expected to continue in the future, which will be beneficial for everybody connected to a fibre network within the Swedish market. In addition, other parts of the project have developed analytical cost models, investigated future network architectures based upon white-box hardware and open source software, in-home wireless interference mitigation techniques and developed remote headend mobile distribution equipment. The H-OPTO project will be continuing under the Celtic-Next banner with additional partners under the name A5gard.

> Further information

> H-OPTO project page - www.celticnext.eu/project-h-opto/

CELTIC results used by medVC to fight COVID-19

HIPERMED-based telemedicine service STOP-CORONA



Sometimes it takes a few years until you see the full benefits of research results. CELTIC project HIPERMED is a perfect example. When it ended in 2013, nobody would have thought that seven years later its results would contribute to a telemedicine solution which is used in the fight against the COVID-19 pandemic. However, that is exactly what has happened, due to the work of medVC, a Polish SME located in Poznań. MedVC has already connected 35 Polish hospitals with patients at home via its free video service STOP-CORONA, in order to contain the spread of the coronavirus.

More hospitals in Europe will follow. There are already inquiries for using STOP-CORONA from hospitals in France, Germany, Italy, and Spain. MedVC is expecting also demand from hospitals in Central European countries and beyond.

The STOP-CORONA service

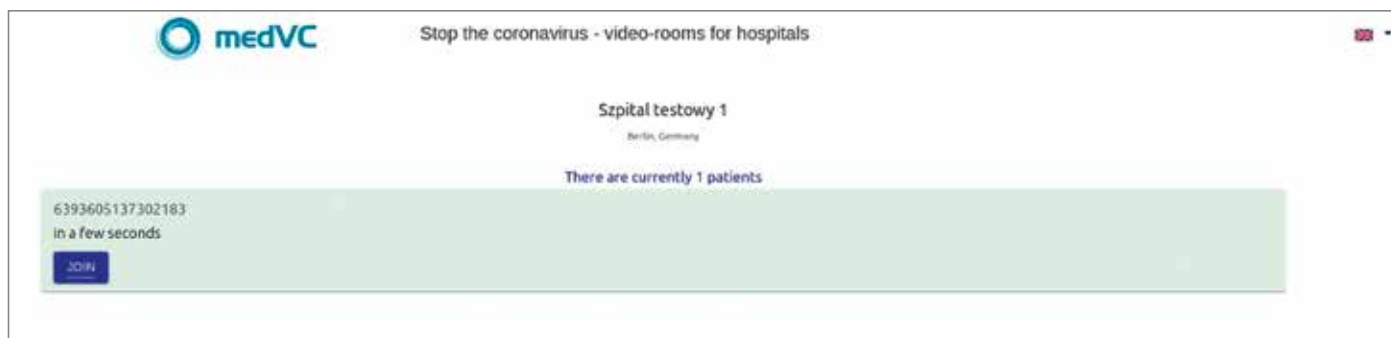
STOP-CORONA is an easy-to-use patient-to-hospital video communication service, which is offered by medVC free of charge to hospitals around the world. "We want to help by giving all hospitals the possibility to unblock their telephone lines, reduce the need for ambulances to go to patients, and stop patients from overcrowding the emergency rooms," explained Piotr Pawałowski, CEO of medVC.

The service enables each hospital that registers to let its doctors see the patients using videoconferencing. The main benefit of the STOP-CORONA system is to keep the patients at home by allowing them to have audio-visual contact with the hospital. The doctor not only hears, but, above all, sees the patient. In this way doctors can initially assess the patients' health status. Patients stay at home, not spreading the virus.

The system is intuitive and very easy to use. The patient only has to press the link on the hospital's website to enter the system's virtual waiting room. The solution is browser-based and uses WebRTC. Thus, no other software needs to be installed, which makes the system easy to use for less technically inclined and elderly patients. MedVC ensures that the STOP-CORONA system is secure and encrypted, and no data is being recorded.

Background on medVC

MedVC goes back to a group of engineers from the Poznań Supercomputing and Networking Center, Poland (PSNC), who founded the company in 2014. They had participated in the award-winning CELTIC project "HIPERMED – High Performance Telemedicine Platform" and its successor project "E3 – E-health ser-



vices Everywhere and for Everybody". Using CELTIC project results as a basis, medVC developed a commercial remote collaboration tool for medical professionals, which allows real-time audio-visual communication.

› Further information

- › STOP-CORONA system by medVC – <https://stop-corona.medvc.eu>
- › HIPERMED project page – <https://www.celticnext.eu/project-hipermed/>
- › E3 project page – <https://www.celticnext.eu/project-e3/>



About CELTIC-NEXT

CELTIC-NEXT is the EUREKA Cluster for next-generation communications enabling the inclusive digital society. CELTIC-NEXT stimulates and orchestrates international collaborative projects in the Information and Communications Technology (ICT) domain. The CELTIC-NEXT programme includes a wide scope of ICT topics based on new high-performance communications networks supporting data-rich applications and advanced services, both in the ICT sector and across all vertical sectors.

CELTIC-NEXT is an industry-driven initiative, involving all the major ICT industry players as well as many SMEs, service providers, and research institutions. The CELTIC-NEXT activities are open to all organisations that share the CELTIC-NEXT vision of an inclusive digital society and are willing to collaborate to their own benefit, aligned with their national priorities, to advance the development and uptake of advanced ICT solutions.

www.celticnext.eu

