CELTIC-NEXT
∑eureka Cluster

CELTIC News 1/2025

The issue of Eureka ICT Cluster CELTIC-NEXT

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CELTIC-NEXT
Eureka Cluster

Join the Industry-Driven Research Programme of next-generation communications for a secured, trusted, and sustainable digital society

CELTIC-NEXT Autumn Call 2025 for Project Proposals – Deadline: 24 October 2025

Here is the opportunity to participate in CELTIC-NEXT, the industry-driven European ICT and telecommunications research programme under the umbrella of EUREKA. Do not miss the submission deadline for the next call for project proposals, on the 24 October 2025!

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 via 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 **January 2026.**

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

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Words from the Director

What CELTIC-NEXT Cluster has delivered in the first half of 2025 and what is coming next?

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For CELTIC-NEXT, 2025 is a year of renewal. The 2nd EUREKA Clusters' Programme starts in July 2025, and a new, updated SRIA will enable future successful innovation support and change. Let's look at what was achieved in the first half of 2025 and what we plan for the rest of the year.

2025's first half's achievements

It was an intensive first half year for many reasons. As the Director of our Cluster, I had to prepare our application for a renewed license to operate as EUREKA Cluster. With the support of our Chairman, David Kennedy, we delivered a high-quality application. We are confident that we will be authorised to act further under the EUREKA license from July 2025 onwards. CELTIC-NEXT has strongly contributed to the new EUREKA Clusters' Programme (ECP) Arrangement framework documents redaction and the Clusters' operations license form. This intense engagement will continue with taking the lead on the ECP Handbook of processes, working with the other clusters and the Public Authorities. This work is essential as it will define more harmonised processes between clusters and with the Public Authorities to address current challenges of the ECP, such as the time to start a project after it has been labelled. Finally, I have the honour to have been chosen to represent the ECP Clusters as spokesperson to the new EUREKA Presidency of Switzerland from the 1st of July 2025 to the 30th of June 2026.

The EUREKA Network is currently under Canadian and German co-presidency until the beginning of June 2025. Switzerland will then take over for one year, until June 2026!

The dual presidency of Canada and Germany was new in EUREKA's history; it has shown how excellent international and inter-continental R&D&I cooperation is. Canada wishes to have more projects with CELTIC-NEXT in the coming years. We have started discussions on how to make it possible for Canada to bring companies to CELTIC-NEXT brokerage events. This means that we will integrate this into our event planning as it requires time to assemble such delegations to travel to Europe.

We have started collecting our community's feedback on our strategic research and innovation roadmap (SRIA), which we are currently updating. The target is to provide this new SRIA as input to our participation in the new ECP period starting July 2025. The duration of the new ECP is still under discussion but it is already decided to make it longer than the original four years, à priori seven years. We will incorporate this new SRIA in our Launch Events and Proposers' Brokerage Days, starting second half 2025, to allow consortia to propose innovative projects in a more extensive variety of technologies, services, applications, and verticals. This reinforces our traditional bottom-up approach. We will continue to run our Spring and Autumn Calls based on our successful legacy. This is a unique selling point of CELTIC as a Eureka Cluster compared to other international funding schemes.

Running Calls

When this edition of the CELTIC-NEXT's News is published, the Spring Call 2025 would have closed. Therefore, it is already time to announce the Autumn Call 2025! The Autumn Call 2025 will be launched in July 2025 via an online event. The Proposers' Brokerage Day will take place in a physical presence at the beginning of September 2025. The precise date and location will be announced via our Newsletter and website. The submission will close on the 24th of October 2025 for a labelling decision before mid-December 2025. Forecasted possible start period for labelled projects would be the first half of 2026. We can also happily say that more countries support CELTIC-NEXT, like Chile, Lithuania, and soon Brazil.

Flagships
SUSTAINET is started!

The new flagship, SUSTAINET, was labelled for its initial application in June 2024. Its central theme is network resilience, energy efficiency, sustainability, high-performing end-to-end networks, and network security. In the meantime, SUSTAINET and its three sub-projects have started. Despite being in the ramp-up phase, SUSTAINET has already begun its dissemination work, notably by attending the Hannover Messe .

More detailed information on SUSTAINET is provided in the corresponding article in this CELTIC-NEXT News issue.

The CELTIC-NEXT office is happy to connect with potential new additional partners interested in joining the flagship during the ramp-up phase. Please contact us at office@celticnext.eu.

Acquiring new Core Group memberships

The director of CELTIC-NEXT has the mandate from CELTIC-NEXT's Core Group to propose and integrate new industry members into the existing Core Group. Some discussions are ongoing for some industrial companies.

Outlook for 2025 second half

2025 is the year of the renewal of CELTIC-NEXT as EUREKA Cluster under the new EUREKA Clusters Programme (ECP). The new ECP is foreseen to last seven years, providing the EUREKA Clusters with extended visibility into the future and, therefore, elaborating a stronger path for growth. 2025 should be a year of growth, starting with the upcoming new ECP framework arrangement, the renewed trust and support of existing partnering Public Authorities, and new incoming funding countries like Lithuania, Chile and Brazil!

2025 will continue to be the year of the new flagship(s) implementation, a strong collaborative effort from all stakeholders, consortia participants, the CELTIC-NEXT Office, and the involved Public Authorities!

Stay tuned by visiting our Call Calendar page: *https://www.celticnext.eu/call-calendar/* and/or by subscribing to our Newsletter under *https://www.celticnext.eu/news-subscription/*

› Further information

Project launch:
https://www.celticnext.eu/sustainet-showcased-at-hannover-messe-2025/

Shaping the Future: CELTIC-NEXT Proposers Day in Barcelona

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On February 24th, the CELTIC-NEXT Community gathered once again for the highly anticipated CELTIC Proposers Day in Barcelona, kindly hosted by the Universitat Autònoma de Barcelona (UAB).

The day commenced with a warm welcome from Ian Blane, the Dean of the School of Engineering at UAB, along with a welcome from Mrs. Juana Sanchez of CDTI, Spain, and Mr. Xavier Priem, CELTIC Director, who highlighted key aspects of international collaboration within the CELTIC-NEXT Eureka Cluster.

Keynote and Public Funding Bodies Session:

The opening remarks were followed by an inspiring keynote, kindly presented by Mr. Mustafa Karakoc, Regional Network Operations Director and Head of the 6GEN.LAB and Next Generation R&D teams at Turkcell. He shared valuable insights from an operator's perspective on adapting autonomous networks with 6G-enabling technologies.

Mr. Karakoc's vision for 6G revolves around AI-native network design, which aims to provide high-performance, energy-efficient computing platforms to support future services for businesses and consumers. Central to his presentation was the GSMA's Reliable AI Maturity Roadmap, showcasing early adopters of technologies such as graph neural networks, reinforcement learning, distributed learning, and generative AI.

The following session featured insights from public funding bodies supporting CELTIC participants representing Spain, Portugal, Finland, Türkiye, France, and Chile. This discussion illuminated the funding landscape and set the stage for potential collaborations and groundbreaking CELTIC projects, which would be explored further in the afternoon's pitching session.

Business Impact Session:

Following the funding discussions, we featured a lineup of esteemed speakers who presented their groundbreaking work on timely CELTIC projects:

- **fiQare:** Prof. Enrique Alba from the University of Malaga (ES) and Manuel Gimenez Medina, Chief Innovation Officer/R&D at Ayesa (ES), highlighted their innovative approaches to enhancing code quality through artificial intelligence, contributing to the development of a reliable hyperconnected world.
- **CISSAN:** Alberto Doval Iglesias, CTO of Councilbox (ES), provided valuable insights into the CISSAN project, which targets pressing cybersecurity issues within Internet of Things (IoT) networks.
- **UNICRINF & IMMINENCE:** Victor Pascual Ávila, Head of Security and Standards at Nokia Spain, discussed the UNICRINF emergency platform and the successful implementation of the IMMINENCE project.

Business Impact Session

Pitching Session

ETHICA proposal presenters during the poster session

› **F4iTECH:** Ismail Uzun from Inosens shared the latest progress on the F4iTECH project, which focuses on federated learning solutions aimed at building trust in the Industry 4.0 environment.

The Business Impact session was skillfully moderated by our GOE Member, David Castells-Rufas. During this interactive exchange, panelists and attendees were encouraged to engage in thoughtful discussions on several compelling questions.

One key topic centered on the Draghi Report's insights regarding Europe's regulatory challenges, prompting questions about how regulations can also foster innovations such as Digital Video broadcasting (DVB) and Universal Serial Board-Connector (USB-C)). Panelists shared their perspectives on this dynamic in their respective fields.

Another area of discussion was the impact of the growth of IoT and machine-to-machine (M2M) communications, and whether the resulting traffic levels will continue to lag significantly behind those of video on demand in the near future.

Additionally, the conversation explored the anticipated role of AI in addressing cybercrime, with panelists and attendees considering whether they expect to see enhanced defenses, an increase in the complexity of attacks, or perhaps a blend of both outcomes.

A significant conclusion drawn from the discussions was that education and the sharing of knowledge and expertise across different vertical sectors and future enabling technology fields are crucial for advancing toward a secure and resilient connected society.

Pitching Session:

In total, 15 new project ideas were presented during the pitching session, led by Mrs. Christiane Reinsch, CELTIC-NEXT Programme Coordinator, who also moderated the day's proceedings.

The session addressed critical challenges presented by the pitch presenters, focusing on solving current and future issues in a hyperconnected, sustainable world. Topics included advancements in Zero Touch Greenhouse connectivity services, automatic recognition and adaptation technologies for 6G, the development of Drone-as-a-Service solutions, the creation of digital passports to comply with new EU regulatory requirements, the exploration of emerging AI agents within the 6G landscape, and innovations aimed at enhancing AI transparency and interpretability.

The audience actively engaged with the presenters, inquiring about ways to contribute to the further development of these project ideas.

Consortium Building Sessions were announced during the pitching session and were successfully conducted the following week, attracting around 10 to 15 experts per session.

This diverse lineup of projects reflected a strong commitment to collaboration and innovation within the CELTIC community, addressing key challenges and opportunities in technology and sustainability.

The CELTIC-NEXT Proposers Day was a resounding success, fostering collaboration and innovation within the vibrant CELTIC community.

EMBRACE — for Efficient Multi-Band Network Architecture and Components for Petabit/s Elastic Networks

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EMBRACE (for **E**fficient **M**ulti-**B**and Networ**k** **A**rchitecture and **C**omponents for Petabit/s **E**lastic Networks) aimed to demonstrate the feasibility of a metropolitan/regional multi-span optical transmission system operating in the S+C+L-band between 1460 nm and 1620 nm with all the required multi-band components and devices, including the Wavelength Division Multiplex (WDM) transceivers, multi-band optical amplifiers and the associated band/wavelength (Multiplexer/Demultiplexer) MUX/DMUX. A study was also carried out on the impact of opening new wavelength windows on the operation of an all-optical multi-band transport network.

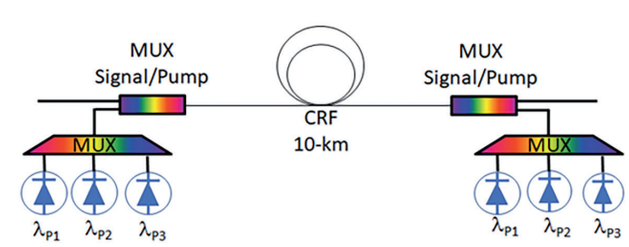
To reach these ambitious objectives, the CELTIC-NEXT EMBRACE project gathered a consortium of five French and Canadian partners, i.e. Orange (Leader), Ekinops, MPB Communications, EXAIL and IMT Atlantique. The project funded by BPI France, the Britanny Region, Lannion Trégor Communauté and the National Research of Canada started in October 2021 and finished in last December 2024 by a demo of the operation of the targeted S+C+L-band WDM transmission system. The demo was performed in front of the supporting (CELTIC Office, Pôle de Compétitivité Images & Réseaux, Pôle de Compétitivité ALPHA RLH) and funding organizations.

Multi-band optical transmission faces complex challenges, the most important of which is Stimulated Raman Scattering (SRS), which generates energy transfer from high-frequency (or low-wavelength) bands to low-frequency (or high-wavelength) bands. EMBRACE introduces an innovative optical amplification technology that combines distributed Raman amplification in the line fiber and discrete/lumped S-band Raman amplification in a specially designed nonlinear fiber (CRF) prototype to counteract inter-band energy transfer. SRS control in combination with periodic gain equalization (every N spans) is mandatory to allow the combination of multiple standard single-mode fiber (SSMF) spans and enable metropolitan/regional transmission applications. With this, the consortium was able to transmit 240 channels (considering the 50 GHz ITU grid) between 1480 and 1610-nm over 4 x 100 km standard single-mode fiber (SSMF) spans. Multi-band optical transmission is very useful to maximize the use of existing fiber optic infrastructures and to optimally fill loaned fibers in regions where Internet Service Providers (ISPs) do not own their fiber infrastructure. Multi-band technology is also an opportunity to make optical transport networks more flexible.

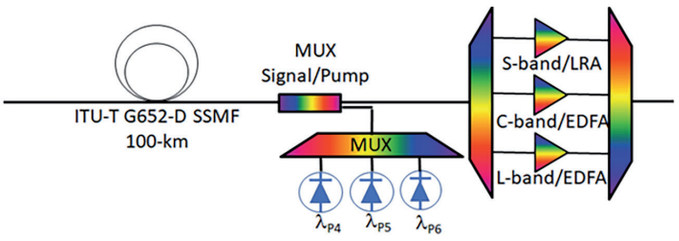
During the project, four multi-band distributed Raman amplifiers with multi-pump wavelengths were built and delivered for the final demo. Five lumped / discrete Raman amplifiers using multi-pump wavelengths were also manufactured to amplify the S-band at different points in the set-up. These amplifiers are particularly flexible in shaping the gain and have better performance in terms of noise figure compared to standard amplification technology for the S-band (i.e. Thulium-doped fiber amplification). Multi-band (S+C+L-band) and wavelength (O-, E-, S-, U-band) MUX/DMUX were also designed and built. Finally, a multi-band WDM transponder prototype able to operate between 1460-nm and 1640-nm was realized and used with success during the final demo. The final demo combined these various elements in a S+C+L-band transmission set-up of 4x100-km of SSMF with successful transmission of 240 channels at 33-Gbaud (on 50-GHz ITU grid). 600-Gbps channels were successfully transmitted in the C- and L-band by switching off 33-Gbaud dummy channels (to insert the 96-Gbaud channels) and 100-Gbps channels were propagated in the S-band.

After preliminary tests of some crucial components requested by the various elements of EMBRACE and the specification definition, **EKINOPS** looked for the possible integration of the requested functions inside the existing platforms or in new platforms. Following the **Orange INNOV** recommendations, **EKINOPS** developed the ad-hoc architecture of a multi-band WDM coherent Muxponder operating between 1460 and 1640-nm at 100/200-Gbps, as well as defined the design of a discrete/lumped Raman amplifiers operating on the S-band. Finally, **EKINOPS** manufactured one prototype of the 100/200-Gbps multi-band WDM coherent Muxponder (following the design previously defined) as well as an optical gain block per prototype for a total of 5 prototypes, with many iterations for an improved amplification performance.

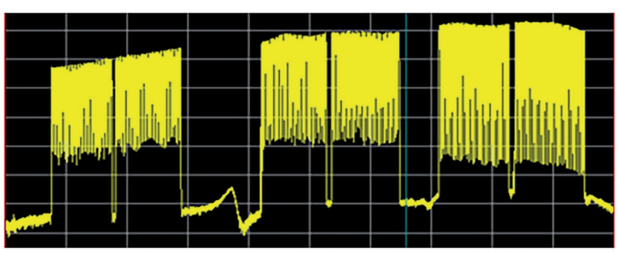
One of the main goals of the distributed Raman amplification (DRA) at the end of each 100-km span was to compensate for the transmission penalty experienced by the short wavelength channels due to the SRS-induced power transfer to the longer wavelength channels. It was therefore important to determine the optimum combination of pump wavelengths and powers for the DRA pump sources. **MPB Communications** carried out simulations of the transmission of 192 channels running from 1480 to 1610-nm over a 100-km SSMF span. The iterative simulations began with launching a flat channel spectrum and then optimizing the wavelengths



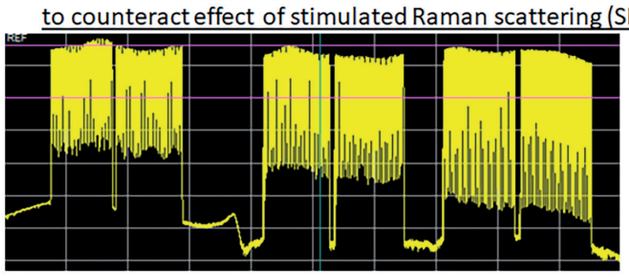
EMBRACE S-band Discrete / Lumped Raman Amplifier (LRA)



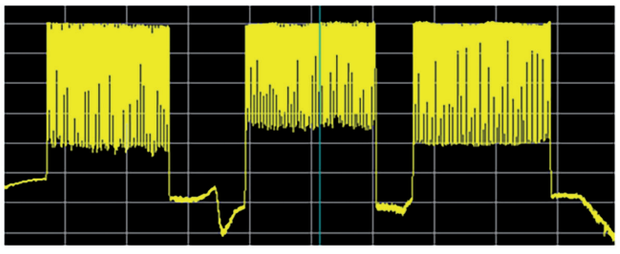
EMBRACE Amplification Strategy
to counteract effect of stimulated Raman scattering (SRS)



S+C+L-band WDM comb with SRS
after one 100-km SSMF span



S+C+L-band WDM comb with SRS compensated
at the output of the EMBRACE amplifier



S+C+L-band WDM comb after the gain equalization stage

Hereafter are described some examples of the work performed by the various partners of EMBRACE.

and powers of a multi-wavelength DRA pump source to obtain the flattest possible received channel spectrum. The next step involved inverting this received channel power profile and applying it as a pre-emphasis launch profile into the 100-km SSMF span instead of the flat profile. With the same composite signal launch power and the same Raman counter pump powers, the simulation confirmed that this strategy resulted in a flat received channel spectrum. The optimum pump wavelengths and powers were determined through simulations and confirmed experimentally. The required powers were provided by two interconnected modules built by **MPB Communications**. The 600-mW output of a VERSA2-N2-LDP-600-13XX was fed into a VERSA2-N2-LDP-850-14XX/14XX where it was combined with the required powers at the other wavelengths.

Since the pump powers launched into the span for the DRA are well above the Hazard Level 1M limit, the fiber path integrity must be confirmed prior to the turn-on of the pumps and must be continuously monitored during system operation so that, if there is a fiber break or connector disconnect, the pumps will immediately be automatically shut down. To provide this vital fiber integrity monitoring (FIM) function, the 13XX-nm pump unit is equipped with an out-of-band OSC laser diode transmitter at 1624 nm and both units have an OSC receiver. The WDM signal channels are combined with the FIM OSC signal and then launched to co-propagate down the span, as shown in the figure below. Receipt of the OSC signal by the Raman pump units at the far end confirms the integrity of the incoming fiber and is a necessary condition for the high-power pumps to be turned on. Once turned on, any subsequent interruption of the received OSC signal will trigger an ALS.

Multiplexers / Demultiplexers (MUX/DEMUX) are developed for more than 25 years by **EXAIL, Integrated Systems Activity**. They are historically linked with common telecommunication systems; thus, their conventional design is focused on C- and L-band. The specificity of **EXAIL** demultiplexers lies in the highly customizable frequency grid on a rather high number of channels. Frequency spacing range can be tuned from 10-GHz up to 400-GHz for up to 48 channels. This agility is the result of a free-spaced fabrication process containing a diffraction grating providing the dispersive function of the MUX/DEMUX. Any frequency spacing of this range can be accessible by tuning the incidence angle on the diffraction grating and choosing its groove spacing. In EMBRACE, **EXAIL** designed the band/wavelength MUX/DMUX able to operate on each of the targeted amplification bands of EMBRACE (i.e. S-, C- and L-band). But, to address the demand of existing and future customers, **EXAIL** also performed the design of O-, and S-band components, covering a band going from 1260-nm to 1620-nm. **EXAIL** manufactured for the project some prototypes in the O- and S-band.

IMT Atlantique worked on the evaluation of network scenarios for the introduction of multi-band WDM transmission systems on the existing fiber cable infrastructure for the different network segments and transport applications, both in terms of technical and techno-economical aspects. The problem is quite prospective as new types of optical fibers offering much more capacity are likely to

VERSA2-N2-LDP-600-13XX (top) and VERSA2-N2-LDP-850-14XX/14XX (bottom)

appear in the mid-long-term future and could be a game changer, especially for short and medium distances. In the short-medium term perspective, the maturity of EDFA-based C+L-band transmission systems is likely to be generalized in long-haul transport network. In the metro/regional area network (MAN) domain for distances up to 400 km, a third band (S or U) could be added later when corresponding transponders and amplifiers will be available. Finally, the MAN is by far the easiest place for the use of four or more amplification band but deployment is strongly dependent on the price of equipment with respect to conventional solutions such as additional fiber deployment. In parallel, EMBRACE funded a PhD work at **IMT Atlantique** on improving the planning tools for multi-band WDM optical networks by embedding QoT constraints, added to the existing spectral constraints, within the linear programming procedure used for the resolution of the routing and spectrum assignment problem. In particular, the OSNR constraint using the Gaussian Noise (GN) model has been linearized in order to be included in the ILP optimization code. This allows to dramatically reduce the number of possible solutions and selects only routes that are optically feasible by real WDM systems. Hence, this integrated QoT-aware ILP finds realistic optical channel routing solutions in much more reasonable computation times and is proven to be faster and more accurate than the combined method where the found routes are a posteriori assessed by a third party GN model calculation software. However, this latter method based on existing software remains a robust back-up for multi-band optical network planning.

Orange INNOV led the project since the preparation stage in 2019 up to the final demo in December 2024. **Orange INNOV** proposed the optical amplification strategy of EMBRACE (that is at the core of the project) with the combination of DRA in the SSMF spans and discrete/lumped optical amplifier per band at the end of fiber spans, to control as accurately as possible the accumulation of SRS between the various bands (span after span). One of the key ideas of EMBRACE was also to carry out multi-span WDM transmission on the S+C+L-bands to be compliant with the MAN topology. **Orange INNOV** proposed the overall system architecture of EMBRACE, designed in partnership with **EKINOPS** the discrete/lumped Raman amplifier operating in the S-band, performed all the numerical simulations to check the viability of the EMBRACE system and confirm the design of both the distributed and discrete/lumped Raman amplifiers used in the EMBRACE demo. Finally, with the support of all the partners, EMBRACE built between September 2024 and December 2024 the final demo that has been shown to all the supporting/funding organizations on last December 17th, 2024. **INFINERA** (now NOKIA) has kindly made available for EMBRACE two C- and L-band 600-Gbps WDM Muxponders which were used to assess the performance of the corresponding amplification band.

In summary, EMBRACE demonstrated the possible use of metro/regional legacy fiber infrastructure for multi-band WDM transmission by keeping under control the inter-band SRS. EMBRACE has experimentally demonstrated that WDM transmission in S+C+L bands is possible over a multi-span fiber infrastructure (at least four 100 km amplifier spans) while keeping the inter-band SRS under control. EMBRACE gives a reassuring signal to the optical communications industry that investing in components and devices addressing bands other than C- and L-bands is a future-proof position that can potentially generate new revenues in the years to come.

› Further information

Project web site:
www.celticnext.eu/project-embrace/

CISSAN – Collective intelligence supported by security aware nodes

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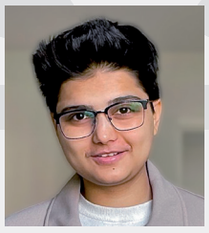

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Motivation

Interconnection of devices in critical infrastructures plays a major role in our everyday life. However, "when everything is connected, everything must be protected."[1] Given both growing scale and the heterogeneity of Internet of Things (IoT) and Operational Technology (OT) systems and networks, it becomes practically impossible or at least it is very complicated to protect them against, for example, Distributed Denial of Service (DDoS) attacks[2] and new malware techniques and toolkits targeting Industrial Control Systems (ICS)[3] by using centralized security systems. Countering the security threats against IoT and OT is the primary objective of the three-year CELTIC-NEXT project CISSAN started in May 2023 with the participation of Austria, Finland, Spain, and Sweden. Cybersecurity solutions for IoT and OT environments are traditionally managed centrally, i.e., most security analytics and decision-making take place in so-called security backends (servers controlled by security providers). However, the project CISSAN employs multiple forms of local and collective intelligence gathering and collaboration among network nodes to enable more decentralised and distributed security and operational monitoring, event tracking, and attack detection in IoT and OT networks (see Fig. 1). CISSAN targets networks the maturity of which ranges from the design stage to the operational stage and aims to enable more reliable and earlier detection of malicious activities, graceful handling of the losses of connectivity with security backends, and saving on data transmission costs.

In this short article, we present several examples of the CISSAN's activities in the first half of the project.

Synthetic network traffic data generation

Essentially any modern solution for security monitoring, cyberattack detection and response include AI-based or other data-driven algorithms. Given the scarcity of real-world attack data (or data with other desired non-trivial properties), tools for generating high-quality synthetic network traffic are pivotal for developing and testing IoT and OT cybersecurity solutions. In CISSAN, we focus on generative adversarial networks (GAN)-based approaches, leveraging their ability to capture the intricate patterns of real network traffic. Our comparative analysis of AI and non-AI methods has demonstrated that GANs achieve superior fidelity and utility over diffusion models and variational autoencoders (VAEs). The next step is to refine domain-specific GAN architectures tailored to SCADA traffic, which involves Supervisory Control and Data Acquisition (SCADA) data characteristics analysis, data quality assessment, and adaptation of generative models to reflect real-world anomalies and attack patterns. Additionally, we are exploring hybrid ap-

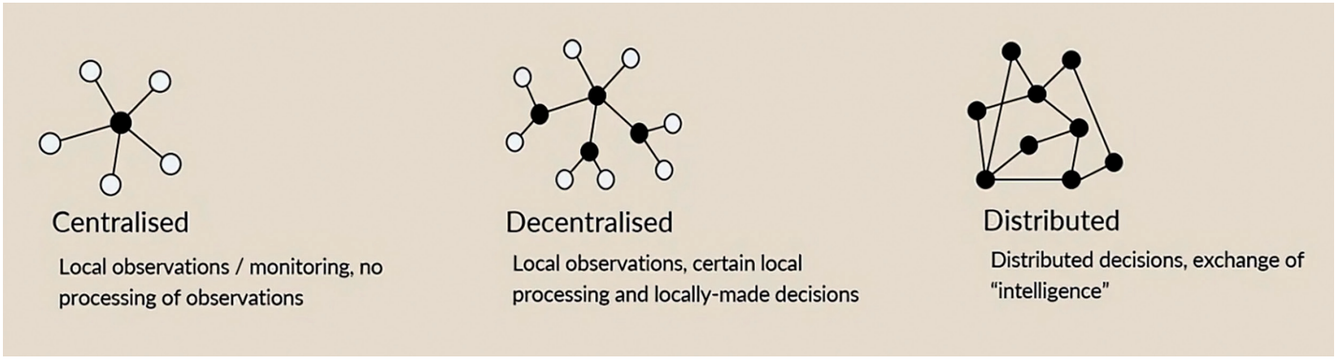

Figure 1: CISSAN as a transition enabler: from centralised to distributed paradigms

proaches, integrating GANs with diffusion models and Large Language Models (LLMs) for enhanced context awareness in synthetic data generation. This work is expected to improve and validate anomaly detection-based algorithms in the project.

Collective intelligence proof-of-concept solution in CISSAN Lab

To support the research in local and collective intelligence, the partners established CISSAN Lab – an experimental environment specifically designed to mirror real-world energy distribution and control systems (see Fig. 2). Incorporating industry-standard IT and OT equipment – including Remote Terminal Units (RTUs), network switches, routers, and SCADA servers – and simulating or replaying relevant data traffic, the CISSAN Lab provides an ideal setting for developing, testing, and demonstrating innovative security solutions.

Unsurprisingly, the first CISSAN's collective intelligence proof-of-concept (PoC) algorithm was built and demonstrated in the Lab. The lightweight, distributed, and cooperative PoC algorithm was designed and implemented for ARM 32-bit microcontroller architecture, a typical platform for resource-constrained industrial devices. By monitoring RTU data structures for unauthorized changes, the algorithm triggers a coordinated response across multiple interconnected devices instead of relying on centralised security mechanisms. Importantly, this PoC demonstrated that modern industrial IoT and OT devices can support lightweight solutions improving cybersecurity without leading to operational disruptions or adding significant data transmission and computational overheads. Furthermore, the insights gained from the first PoC effort are helpful in the ongoing assessment of security-to-functionality trade-offs in other potential collaborative security algorithms. The CISSAN Lab is expected to play a key role in the project, serve as a bridge between theoretical research and real-world solutions and foster collaboration among the partners.

Use cases

The CISSAN efforts are guided by and evaluated in the three main project use cases: smart transportation, energy grid monitoring and control, and underground construction monitoring. In addition to the technical research and development efforts, the project agenda also includes the facilitation of security compliance and governance for the owners and operators of IoT and OT networks.

Smart transporation

The project partners aim to analyze Global Positioning System (GPS) coordinates of buses to understand the data, its properties, and the types of anomalies present. We collect bus coordinates from a Message Queuing Telemetry Transport (MQTT) broker, and use various additional variables such as speed, acceleration, distance travelled, and proximity to bus stops to enhance anomaly detection. Initial findings indicate that Machine Learning (ML) algorithms are effective in identifying anomalies in large datasets. Future work involves determining what additional data sources could enhance our understanding of public transportation systems, how to better handle and clean large volumes of GPS data, what new variables or features could improve anomaly detection, and whether it is possible to make machine learning findings more interpretable and actionable.

Anomaly detection in energy grid control devices

The project partners are exploring AI-based anomaly detection methods for both network traffic data (including Internet protocol headers) and operational data (such as physical sensor signals), with the anomaly detection models training and running locally in smart energy grid substations. These methods are instrumental in detecting cyberattacks and operational failures. To improve the reliability of detection, we are pursuing a hybrid approach, combining the local analytics at substations with subsequent centralised aggregation and analysis. This approach helps us extend the benefits of local intelligence mentioned earlier with a network-wide view available in grid monitoring centres. Using synthetic anomalies injected into real (captured) energy grid data, we evaluated and demonstrated the effectiveness of the CISSAN's lightweight AI models running in Remote Terminal Units (RTUs) in identifying security and operational issues. Building a scalable framework for centralised aggregation of the output of local models is part of the future project work, as well as adding explainability features for providing grid operators with deeper insights into detected anomalies and network behaviour.

Sensor data verification in mining and construction projects

In today's mining and construction projects, huge amounts of monitoring data are collected from sensors of diverse types. Their numbers range from a few to several ten-thousands, e.g., in complex urban metro projects. The monitoring data are acquired manually or automatically and then transferred via different gateways and networks to IoT platforms where they are managed, analysed, and used to support operator decision-making and even to automatically control construction machinery. The integrity and high quality of monitoring data are therefore of utmost importance for the efficient execution and safety of projects.

To verify that sensor data are unchanged, a data signing method is developed in CISSAN. The method employs a specially designed security chip, which can be connected to sensors and/or embedded in gateways, for signing data at creation. This enables data integrity verification before the use of the data. Furthermore, a data quality assessment solution is developed to compute the "believability" scores of monitoring data by applying empirical rules (which involve relevant sensor

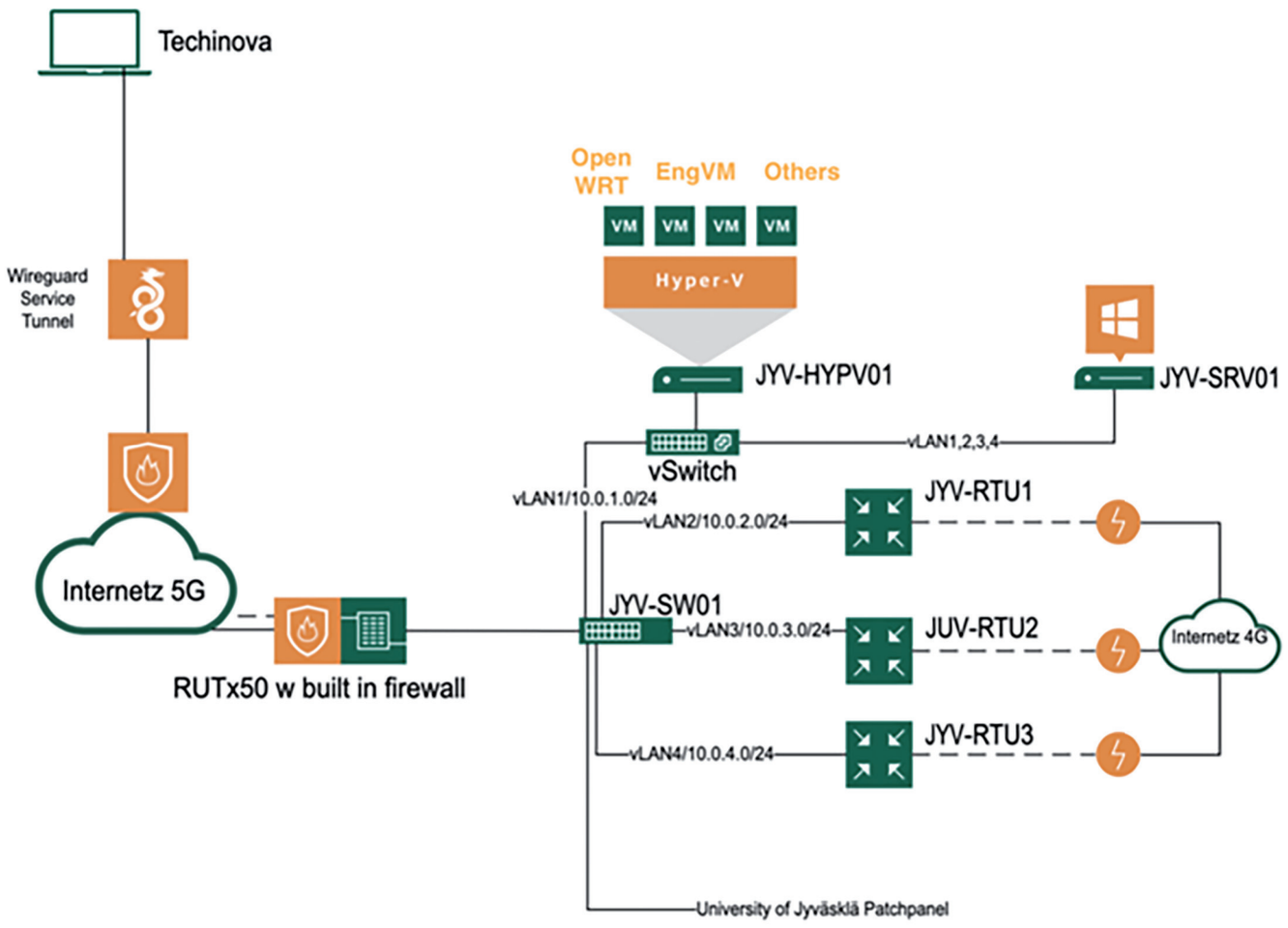

Figure 2: CISSAN Lab setup

statistics and similarity metrics). Depending on the scores, the data are either rejected or accepted, and this information is communicated to the users before they access the data.

Conclusion

In the first half of the project, CISSAN produced a set of innovative algorithms and technologies for countering IoT and OT security and operational threats. The project aims to improve them, and develop new algorithms and technologies. These efforts will be complemented by integrating and validating the CISSAN results in the project use cases, the CISSAN Lab, and other relevant environments.

Acknowledgements: This work was supported by the Austrian Research Promotion Agency (FFG), Business Finland, Centre for the Development of Industrial Technology (CDTI), and Swedish Agency for Innovation Systems (Vinnova) (BF) within the EUREKA CELTIC-NEXT project CISSAN (www.celticnext.eu), coordinated by the University of Jyväskylä (Finland)

› Further information

CISSAN (C2022/1-3)

- CISSAN project webpage – *https://www.jyu.fi/en/projects/cissan*

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F4iTECH Revolution: Transforming Industry with Federated AI

Enhancing Data Privacy and Resource Management in Industry through Decentralized AI Solutions

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The F4iTECH (Federated AI Platform for Industrial Technologies) project revolutionizes the manufacturing and airport industries by integrating Federated Learning (FL) and advanced AI technologies. Through a decentralized platform, F4iTECH enhances operational efficiency, ensures data privacy and optimizes resource management while addressing hidden challenges and reducing costs. With six pilot implementations showcasing transformative impacts, this innovative approach promises a more intelligent, resilient and sustainable future for industrial environments.

Building on its innovative approach, the F4iTECH project not only improves operational workflows but also tackles critical industry challenges such as data transmission, security and privacy. By leveraging FL-based AI, the platform enables real-time monitoring and decision-making without centralizing sensitive data, thereby enhancing compliance with regulatory frameworks and preserving data sovereignty. The integration of blockchain technology further secures data sharing through smart contracts, fostering collaboration among stakeholders while maintaining individual data ownership. The project's success is evident in its six pilot implementations, which demonstrated tangible benefits like reduced operational inefficiencies, improved resource allocation, and enhanced resilience in both manufacturing and airport sectors. The Figure 1 shows the system approach and user interaction.

Achieved Results

The project successfully demonstrated significant benefits for the manufacturing and airport industries by integrating FL-based AI into production and operational workflows. A major achievement is the development of FLactionTM, a scalable and privacy-preserving federated learning platform that enables decentralized AI training across multiple edge devices with a user-friendly approach for data scientists. FLactionTM supports seamless model aggregation while ensuring data remains on local devices, addressing privacy concerns and regulatory requirements in industrial applications.

In the airport use case, the project delivered solutions that provide stakeholders with highly accurate, real time predictions of passenger flows for specific time windows. By leveraging advanced machine learning models, these insights enabled airports, airlines, and ground handling services to optimize resource allocation, staffing, and facility management, leading to smoother operations and improved passenger experiences. As a result, the project significantly reduced operational inefficiencies stemming from outdated or inaccurate forecasting methods, minimizing delays, overcrowding, and resource mismanagement. Furthermore, the integration of FL-based AI tackled critical industry challenges, particularly in data transmission, security, and privacy. By enabling decentralized data analysis, the solution eliminated the need for large-scale centralized data repositories, thereby enhancing compliance with stringent regulatory frameworks while also preserving data sovereignty for participating stakeholders. This approach not only ensured the confidentiality of sensitive passenger information but also fostered greater collaboration among stakeholders by allowing them to access valuable insights without compromising individual data ownership.

The results of the project are expected to have a lasting impact on different sectors, enhancing operational efficiency, reducing costs and improving stakeholder collaboration. The technologies developed may serve as a foundation for new product developments, standardization efforts, and further research. Additionally, the outcomes of the project, including methodologies and findings, have the potential for publication in major papers, fostering wider adoption and refinement of FL-based AI in industry applications.

Impact

F4iTECH delivers significant benefits to the manufacturing, retail and airport industries by seamlessly integrating FL-based AI solutions into industrial processes. Utilizing distributed ledgers, the project securely records all relevant events and transactions within the Industry 4.0 ecosystem, enabling stakeholders and end consumers to intuitively verify data and establish smart contracts. Through systematic AI-driven predictive maintenance

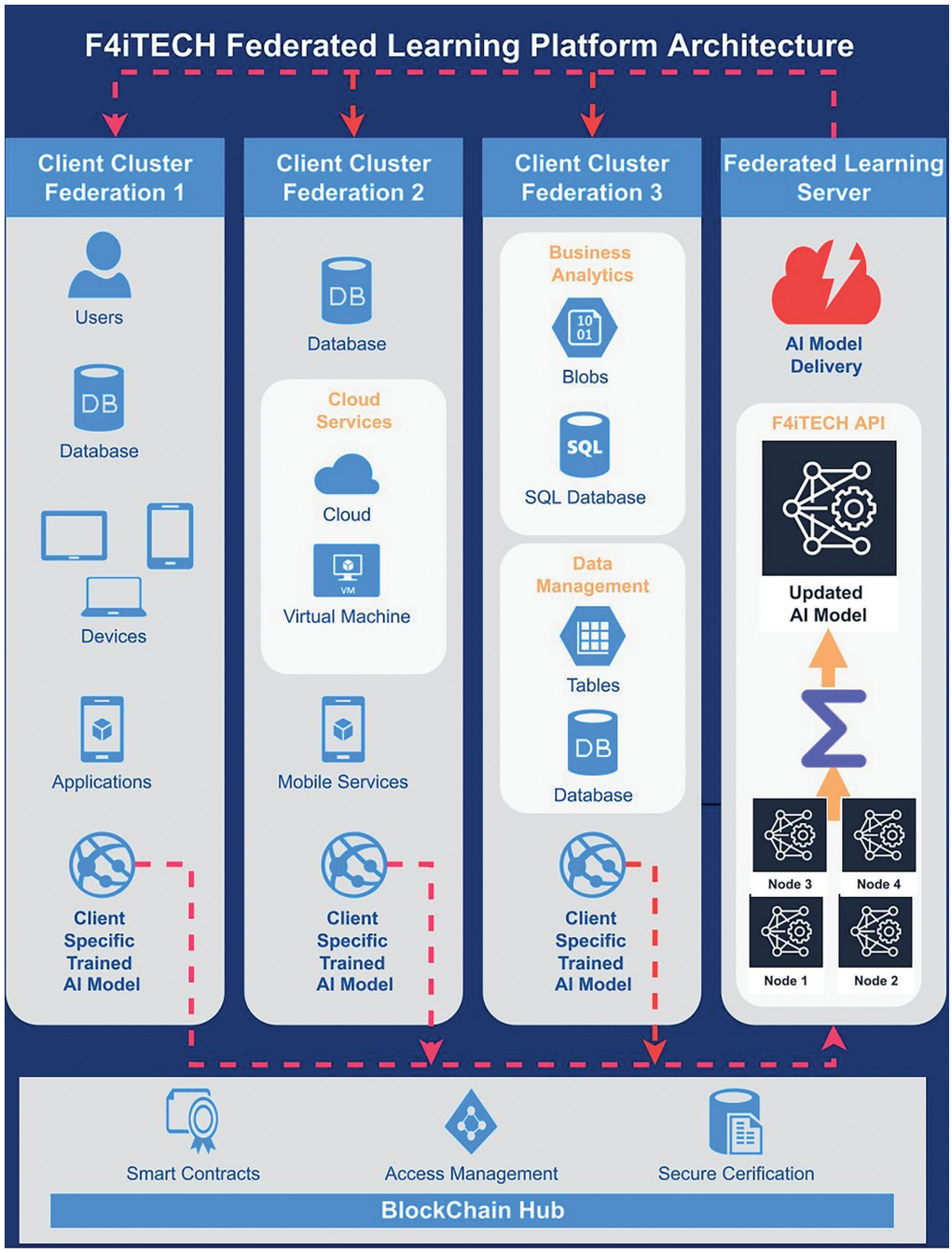

Figure 1: F4iTECH Federated Learning Platform Architecture

and machinery inspection, F4iTECH enhances equipment performance and reduces deterioration rates by 20%. By addressing and resolving hidden operational challenges, the project aims to cut invisible and internalized costs by 15%, contributing to more efficient and cost-effective industrial environments.

Conclusion

The F4iTECH project demonstrates how Federated Learning (FL) and advanced AI technologies can transform industrial sectors by enhancing operational efficiency, data privacy, and resource management. The project's decentralized approach not only solves hidden challenges but also reduces costs and improves resilience. Future projects/products could build on F4iTECH's methodologies to explore broader applications of FL-based AI in other industries, advancing data-driven innovation while maintaining stringent privacy standards.

› For more information, visit:
https://www.celticnext.eu/project-f4itech/

fiQare: Advanced Intelligent Quality Assurance for Release Enhancement

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The fiQuare project pioneered the development of intelligent methodologies for automated software repair, significantly enhancing the dependability and operational resilience of IoT-based software infrastructures. By integrating artificial intelligence and advanced fault-detection paradigms, the initiative focused on automating defect localization, correction, and validation, thereby reducing human intervention and optimizing software quality. This note delineates the theoretical underpinnings, technical implementations, and empirical evaluations conducted throughout the project lifecycle, presenting key insights into its impact and scalability in real-world deployment scenarios.

The field of automatic software repair has witnessed substantial academic and industrial attention, with notable contributions leveraging semantic-driven correction techniques and generate-validate paradigms. The fiQare project extended this body of knowledge by integrating these methodologies into a domain-specific framework tailored for IoT-driven software maintenance, enhancing their applicability and efficacy within large-scale distributed environments.

The methodological approach employed in fiQare encompassed several structured phases. A comprehensive examination of state-of-the-art techniques in automated software repair was conducted through a systematic literature review. Existing defect localization methodologies were categorized and analysed to develop a taxonomy of fault-detection mechanisms. Algorithmic design and optimization efforts focused on developing AI-augmented heuristics for source-code fault detection and rectification. Experimental validation was performed through the deployment of the developed techniques in controlled environments, followed by iterative performance evaluation.

The technical realization of fiQare involved the construction of a robust, AI-powered software repair framework seamlessly integrated into IoT ecosystems. The computational infrastructure comprised high-performance computing nodes featuring dual Intel Xeon processors and Ubuntu-based deployment environments. The development toolchain utilized Java-centric repair algorithms, engineered within the Eclipse IDE and reinforced with continuous integration (CI/CD) pipelines. Automated defect correction models were implemented using AI-driven pattern recognition for dynamic patch generation and automatic validation.

The developed repair mechanisms underwent rigorous validation across multiple dimensions. Performance benchmarking assessed computational overhead, fault detection accuracy, and automated correction efficacy. Industrial-scale deployment within FIWARE Generic Enablers, such as Perseo CEP and IoT Agent UltraLight 2.0, demonstrated notable improvements in fault tolerance and system resilience. A comparative analysis against traditional manual debugging processes highlighted substantial efficiency gains and defect-resolution acceleration.

The fiQare project successfully established a novel paradigm in AI-driven software repair for IoT infrastructures much before the age of LLMs, significantly reducing the operational complexities associated with defect management. Future research directions include extending quality-and-safety by design methodologies to heterogeneous computing environments and refining predictive models for proactive fault prevention.

Acknowledgments

This research was conducted under the auspices of the fiQare consortium, comprising Ayesa, the NEO research group from UMA, and industrial partners TIGA, Ubiwhere, and Secmotic. The project was supported through funding under CDTI project code INNO-20171027 C2017/2-2.

Spain strengthens its support to CELTIC-NEXT Programme

CDTI Centre for the Technology Development and the Innovation

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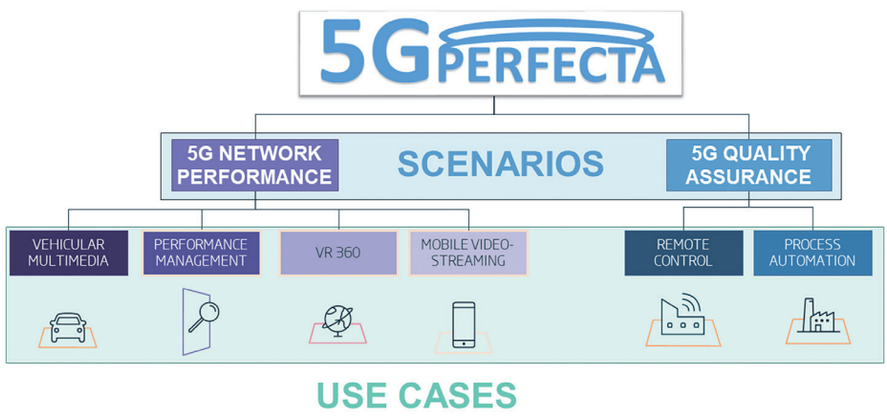

CDTI is a Business Public Entity under the Ministry of Science, Innovation and Universities that promotes innovation and technological development of Spanish companies. This is the entity that engages applications assistance and support R&D&I projects of Spanish companies at national and international level.

Therefore, the aim of CDTI is to contribute to the improvement of the technological level of Spanish companies through the development of the following activities:

- Technical and economic evaluation and awarding of public aid to innovation through subsidies or aid partly refundable R&D projects developed by companies.
- Management and promotion of the Spanish participation in international programmes for technology cooperation.
- Promotion of the international transfer of technology and business support services to technological innovation.
- Support for the establishment and consolidation of technology-based enterprises.

The bulk of its infrastructure is in Madrid but, in addition, CDTI offers to Spanish companies a strategic network of offices and representatives abroad (SOST OFFICES - Spain Office of Science and Technology), specifically in Belgium, Brazil, Chile, China, India, Japan, Korea, Mexico, Morocco and USA, to support them in their technology activities abroad.

News on Funding in Spain

CDTI launches its first **INNOGLOBAL** Call with FEDER (European Regional Development Fund) funds to reinforce the support in International Cooperation projects labelled from January to October 2025. Projects labelled under **CELTIC-NEXT Spring Call 2025** are eligible for this Call. The beneficiaries are Spanish SMEs and mid-caps (up to 500 employees). Subcontracting is possible (not mandatory) up to 50% (70% in Health sector).

Spanish companies that belong to the eligible regions (Andalusia, Balearic Islands, Canary Islands, Castilla-La Mancha, Castilla y León, Valencian Community, Extremadura, Galicia, and Murcia) will be able to benefit with grants up to 80% of the budget.

The fundable activities are industrial research and/or experimental development. The eligible costs include personnel, instruments / material, subcontracting, general expenses, audit, travel and indirect costs. The minimum budget is €175,000 per company/project. The projects must start in 2025 and end by June 30, 2028, at the latest.

INNOGLOBAL opens from May till June 2025. An international funding request (EUREKA funding request in case of CELTIC-NEXT) will be required before applying.

For the rest of the non-eligible regions, CDTI offers a mix of loan and grants under the "Proyectos de Cooperación Tecnológica Internacional" funding line.

CELTIC Spanish successful project 5G-PERFECTA

5G-PERFECTA project is a good example of CELTIC-NEXT success, which aim has been to develop the technology to assure the 5G service quality based on data processing, that is, to guarantee that the quality of 5G networks is aligned with the expectations of bandwidth, latency and other key performance indicators. The project has contributed to the analysis of the 5G performance, the supervision of 5G networks, technologies for monitoring 5G networks, supervision of services and applications as well as 5G monitoring and measurement devices.

The project has developed a 5G performance compliance testing assurance solution that calculates KPIs (Key Performance Indicators) to show the real behaviour of 5G network and services. In addition, 5G-PERFECTA has developed automated processes, tools and mechanisms ensuring 5G service quality based on data processing and analytics approaches, under two main project scenarios and six use cases. The 5G Network Performance scenario provides the performance monitoring information and includes the testbed and measurement scope for 5G network performance analysis. The 5G Quality Assurance scenario provides the quality of service monitoring information, including the time sensitive networking mechanisms, the deployment of critical services with performance guarantees and the QoS observability

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5G-PERFECTA wins the 2024 CELTIC-NEXT Excellence Award for Services and Applications.

for 5G. The following figure shows the project scenarios and use cases.

In addition, 5G-PERFECTA has developed a monitoring platform to deliver real measurements over the new generation mobile networks, tested on a real infrastructure. These performance indicators are helping to determine the suitability of new mobile infrastructure, including 5G to support next generation applications in mobility.

The project, led by Minsait, has benefited greatly from a well-balanced consortium, involving 5G operators, vendors and system integrators with small and medium-sized enterprises and academia from Spain, Sweden, Türkiye, Portugal and Poland.

The overall quality is perceived as high objectively measured by the amount of valuable contributions outside the project group (86) to the technology related to 5G-PERFECTA, in which the main innovations have been transferred: 44 papers in most relevant international journals symposiums and conferences (IEEE ISCC, IEEE INFOCOM, JCOMSS, IEEE Access, IEEE Transactions, Elsevier Measurement, etc.); 10 contributions to standardization bodies (ITU-T, VQEG and TM Forum); 10 PhD theses & Master theses; and 22 other exhibitions, dissemination events and activities.

5G-PERFECTA project has received the CELTIC-NEXT Excellence Award for Services and Applications in 2024.

Conclusion/Outlook

Spain has strongly supported CELTIC programme since it started in 2003. Telecommunications sector in Spain has an experienced and high added value community at national and international level.

CDTI strengthens its support to CELTIC programme with FEDER INNOGLOBAL Calls. Participants of CELTIC Spring Call 2025 can benefit from the FEDER INNGLOBAL Call 2025.

› Further information

› CDTI website – *https://www.cdti.es/en*
› 5G-PERFECTA – *http://www.5gperfecta.eu/*

CELTIC-NEXT Services Portofolio

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Figure 1: CELTIC-NEXT Tools Set

Operating CELTIC-NEXT as an EUREKA ECP Cluster means that the Office delivers an extensive portfolio of services to our ICT Community and to the EUREKA Network of National Funding and Innovation Agencies.

CELTIC-NEXT's project calls:

The operation of a CELTIC NEXT call for bottom-up project proposals involves several specific actions:
The first action is to prepare for the call – this means preparing the support for the management of the calls and proposals in terms of Office human resources and system tools, from application preparation to evaluation and labelling. This includes:

- Announcing the call on the Cluster's Website: *https://www.celticnext.eu/*
- Defining and opening the call portal: *https://cluster-projects.eurestools.eu/index*
- Updating the Brokerage tool: *https://www.celticnext.eu/brokerage-tool/*

Once the systems are prepared, the online or physical events for the call must be orchestrated:

- Launch event (online) – how and what to propose
- Brokerage event (physical or hybrid) – presentation of public authorities funding, proposers pitches and consortia participants matchmaking

The office staff facilitates these events by offering pitching preparation support before the event and running Consortium Building Sessions in the days following the brokerage and matchmaking.

The office must also allocate a set of qualified experts for the technical assessment of proposals. Should a proposal be labelled, its participants can expect help from the office for the negotiation with the different Public Authorities and coordination of preparation activities up to the project launch.

CELTIC-NEXT's Flagships

These involve a similar process to the Project construction, but it is initiated in response to the convergence of industry demands and national interests.

CELTIC-NEXT's Promotion Events

CELTIC-NEXT showcase events are planned, wherever possible, to maximise the exposure and value to the projects and the authorities. These are usually planned in coordination with other major events to ensure good audiences and to control costs.

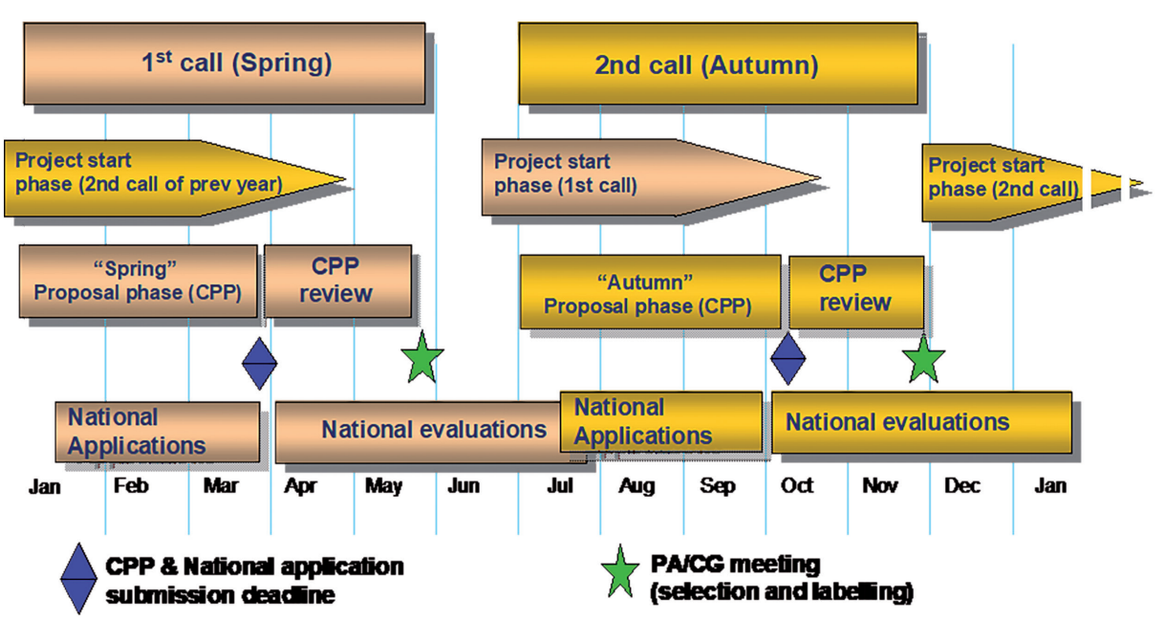

Figure 2: CELTIC-NEXT Calls Timeline

CELTIC-NEXT's Support to Projects:

CELTIC-NEXT oversees the running projects to ensure they are working to plan and can deliver the expected results. This is achieved by frequent interactions between the project officer and the project leader and several formal reviews (mid-term, final) during the project life.

Typically, a CELTIC-NEXT project can expect:

- Comprehensive support for reporting, dissemination and collaborative working through the CELTIC-NEXT tool set
- Assistance, coaching and monitoring support from the Project officer
- Advice and guidance from experts and project officers during the project's lifecycle (on demand) and in particular at review times (by default)
- Simple processes for Project Change Request management, providing flexibility and resiliency to projects when plans need to change

CELTIC-NEXT provides also support for Dissemination activities to the project by inviting them to present at CELTIC-NEXT's Events, nominating speakers and participations at international events like EUCNC, EGIS,... and highlighting the major achievement of the projects via CELTIC-NEXT's media channels: LinkedIn, Newsletter, CELTIC News...

The number of calls per year and regularity

The CELTIC-NEXT community, in consultation with the national authorities have decided that their dynamic domain is best served by having two opportunities in the calendar year to present their project ideas for consideration. Accordingly, two bottom-up calls are organised each year, one in Spring (deadline end of April) and one in Autumn (deadline end of October). For these calls. proposers are free to define their project ambitions according to their ICT research interests and can submit them via our Online Project Portal.

In addition to bottom-up calls, CELTIC offers the opportunity to generate "Flagship" projects/calls at any time if there is an agreed interest. These special interest initiatives can emerge if the industry and PAs share a strong interest in collaborating on a Special Flagship initiative to address a key theme. The CELTIC office will facilitate the flagship by having an agreed submission date, which can differ from the above schedule by specific agreement with the involved PAs, and organising the review and project preparation process around this. These projects are usually in the range of several tens of million Euros for a 3–5-year duration.

Flagship projects are, by their nature, very successful because they are a balance of bottom-up and top-down approaches.

It is important to mention that CELTIC-NEXT operates exclusively thanks to the fees it collects from projects that got labelled and started. This is the only revenue source enabling all the aforementioned services. CELTIC-NEXT Office neither receives public funding from EUREKA Countries nor private money from its Core Group

From historical flagships to flagships programme

What are CELTIC-NEXT Flagships?

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CELTIC historic flagship programme started with 100-Gigabit Ethernet Transport Technologies (100 GET), Safe and Secure European Routing (SASER), Secure Networking for a data center cloud in Europe(SENDATE) projects, and Accellerating digital transformation in Europe by Intelligent NETwork automation (AI-NET) flagship. The ramping-up Sustainable Technologies for Advanced Resilient and Energy-Efficient Networks (SUSTAINET) flagship is the successor of those highly successful flagship projects. This is a clear success track record. And they also create highly collaborative communities, as you can take from the AI-NET song ! Those flagship projects were and are still possible because Industry and National Funding Innovation Agencies jointly recognise(d) the absence of adequate funding support in addressing a particular area of the CELTIC-NEXT's ICT Strategic and Innovation Road Map (SRIA).

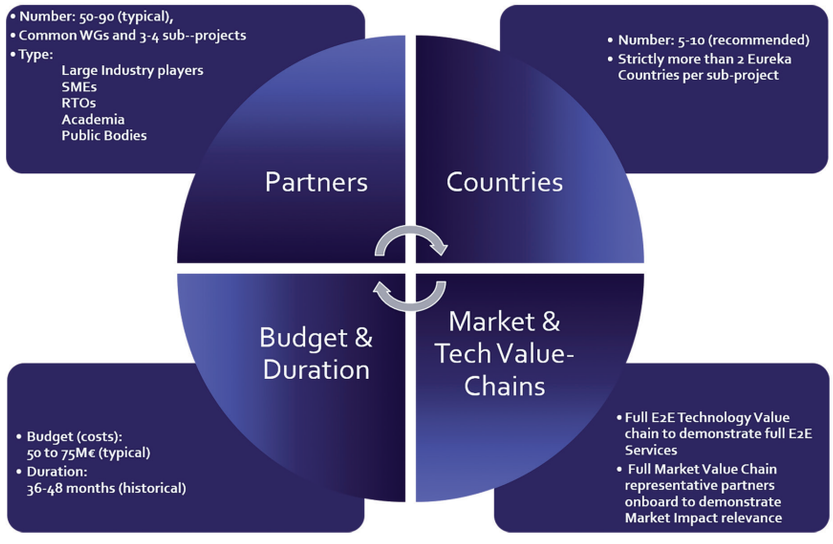

Figure 1: Typical Flagship Characteristics

Preparing and launching a Flagship project requires a concerted approach between a core group of large industry players and a core group of public funding agencies. This small core team delimits the relevant R&D&I area of the flagship, the overall approximative budget envelope to be targeted, and the agenda for

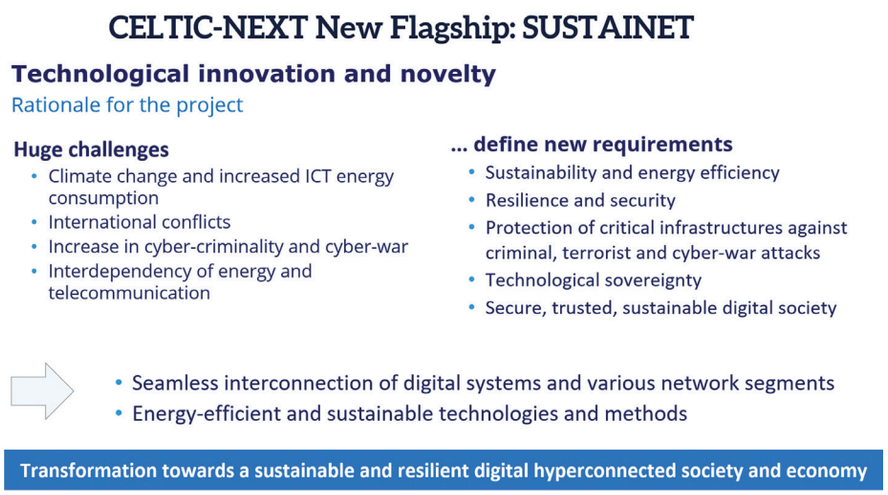

Figure 2: CELTIC-NEXT New Flagship: SUSTAINET

developing the project proposal. This is the first preparation phase, consisting of a top-down approach in terms of thematic area and budget envelope. Then, once this is designed, the core industrial consortium will open the flagship proposal to more participants, enabling a considerable number of industry players, SMEs, RTOs, and academics to join the consortium. This is the phase of bottom-up growth within the agreed SRIA area. This is also potentially a growth in terms of budget needs.

Due to the accrued number of participants (up to 100) and subtopics, the Flagship project is then organised around three to four subprojects and an umbrella project that contains all common cross-subproject topics. Another form of maintaining coherence for the horizontal topics is to have a common Work Package with joint tasks across the subprojects (also called vertical projects in the flagship jargon).

Once the horizontal and vertical project proposals are ready, they are submitted to CELTIC-NEXT and the Public Authorities like regular project proposals made in the two-yearly bottom-up calls. They must fulfil the same rules, evaluation criteria, and KPIs.

Flagships are a unique selling point of CELTIC-NEXT in the Eureka Cluster Programme (ECP). There is a strong demand from National Funding & Innovation Agencies to join either in the current topical area of our flagships or in other areas of our SRIA. We aim to reproduce that success in several of them, clearing streams of flagships.

Preparing flagships demands a high intensity of preparation work as they are like mini-programmes. This means that a strategy needs to be put in place to develop them in time and quality. As they target kind of European "funding" market failures, they need also to be well explained to gather the EUREKA national funding agencies support.

Recall of SUSTAINET high-level description: "In the midst of global crises and geopolitical challenges, Europe is charting its course towards a digital, sustainable future. However, with its share of the global ICT market declining, urgent actions are required to ensure technological sovereignty. This project addresses this multifaceted challenge by focusing on network resilience, energy efficiency, sustainability, high-performing end-to-end networks, and network security.

Achieving seamless interconnection of digital systems, essential for future high-performance communication networks, demands research in ICT hardware and control software. The transition towards a "Digital Society" necessitates increased dependence on ICT for power supply control, emphasising the need for resilient, scalable networking technologies combined with the support of new services such as cognitive and complete context awareness.

Network resilience is paramount in such interconnected networking for critical infrastructures and requires new concepts to ensure communication continuity during errors or disasters. Such networking will also call for secure networks with robust cybersecurity measures to combat evolving threats.

Furthermore, network sustainability is vital for realising a climate-neutral future. Telecommunications networks must prioritise connectivity and serve as platforms for a sustainable society. Operators must adapt to fluctuating renewable energy availability, transitioning from consumers to prosumers in the energy market.

Collaborative R&D efforts are imperative to achieve these objectives and regain technological sovereignty. Government support and industry initiatives must converge to drive innovation in key technologies, fostering industrial cooperation and joint R&D initiatives.
This project proposes a holistic approach, integrating research in frictionless network performance, resilience, security, and sustainability to propel Europe towards a sustainable, technologically sovereign future."

How does it translate into a tangible project?

Here are some KPIs for SUSTAINET :

- 8 Countries at labelling time, over 10 now, with some still joining during the ramp-up phase
- Over 90 participants of all types, Telcos, Large Industry, SMEs, RTOs, Academia
- Over 70 M€ budget,
- Over 500 FTEs, split into 3 vertical projects and one umbrella set of horizontal tasks
- 36 months duration (indicative depending on funding decisions timing)
- High expected impact and visibility in standards & markets

Further information

- SUSTAINET flagship information: *https://www.celticnext.eu/project-sustainet/*
- AI-NET flagship song video: *https://youtu.be/SCz-BA9ja5E?si=AolQIcYkJ9EgxLLf*

CELTIC-NEXT
eureka Cluster

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