CELTIC-NEXT
∑eureka Cluster

CELTIC News 2/2025

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 Spring Call 2026 for Project Proposals – Deadline: 24 April 2026

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 April 2026!

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 be known by **24 April 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 second half of 2025 and what is coming in 2026.

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For CELTIC-NEXT, 2025 was a year of renewal. The second EUREKA Clusters' Programme (ECP) Arrangement was signed at the beginning of June 2025, with an effective start date of 1 July 2025. CELTIC-NEXT's EUREKA Cluster's License has been renewed for the next seven years with the strong support from the EUREKA Countries' Network!

Let's review what was achieved in 2025 and what we are currently planning for 2026.

2025 achievements:

On June 12, 2025, I had the honour of defending our CELTIC-NEXT application for a renewed license to operate as EUREKA Cluster. **We received a clear positive vote from all voting countries**, with a single exception (abstention). Beyond the quality of our application, **it is the high-quality work of our community and our Office that has received this highest recognition from the EUREKA Network**. The EUREKA Countries place seven years of renewed trust in us. We can now build on those seven years to develop a powerful new phase of CELTIC-NEXT: a revised and broader SRIA, improved and simplified processes, and expanding our presence across more countries, including beyond European borders (Canada, Brazil, Chile, Singapore, etc.).

Our intense engagement in the overall EUREKA Clusters Programme (ECP) will continue following three principal axes:

1. Pursuing the lead role on the writing of the ECP Processes Handbook, working with the other clusters and the Public Authorities. This work is essential as it will define more harmonised processes between clusters and public authorities to address the current challenges of the ECP, such as the time it takes to start a project after it has been labelled.
2. Implementing the requested changes in our CELTIC-NEXT processes and tools to reflect on point nr. 1.
3. Coordinating Clusters' contributions to the ECP, with CELTIC-NEXT's Director as Clusters Coordinator for the Industry side.

2025 saw the transition from the Canada-Germany Presidency to the Switzerland Presidency

Thank you, Canada and Germany!
The EUREKA Network was co-presided over by Canada and Germany from July 2024 to June 2025. Switzerland has now taken over

Eureka Chair Handover Ceremony: from Germany & Canada Presidency to Switzerland Presidency

for the current EUREKA year, from July 1, 2025, to June 30, 2026. CELTIC-NEXT's Director's assignment as Clusters Coordinator Industry spans over the same period.

In the name of CELTIC-NEXT, I would like to thank Canada and Germany for their outstanding leadership and support in achieving the significant step of renewing the ECP and the five Clusters licenses. This work has exposed CELTIC-NEXT to the Canadian Public Authority Representatives more deeply, which leads us to jointly plan an increased participation of Canadian entities (SMEs mainly) in our cluster's bottom-up calls and flagships.

Welcome Switzerland!

From 1 July 2025 to 30 June 2026, Switzerland, represented by the innovation funding agency **Innosuisse, assumes EUREKA's Chair**. This leadership role coincides with a major milestone: **EUREKA's 40th anniversary**. In this capacity, the Swiss Chair has outlined an ambitious agenda, built around three forward-looking priorities:

1. Strengthening collaboration: among EUREKA's beneficiaries, members, and partner organisations;
2. Amplifying impact: showcasing successes and shaping the future funding portfolio, and,
3. Empowering beneficiaries: through improved support and operational excellence.

More about Swiss Chair priorities and events under
https://www.eurekanetwork.org/about-us/chair/

2025-2026 Running/Upcoming Calls

The Spring Call 2025 was a success, with nineteen valid proposals, from which eleven got labelled and are in the ramp-up phase. It is still possible to join some of these projects while they are ramping up. Please visit *https://www.celticnext.eu/running-projects/* for more information.

When this edition of the CELTIC-NEXT's News is published, the Autumn Call 2025 would have closed (deadline 24 October 2025). Therefore, it is already time to announce the Spring Call 2026!

The Spring Call 2026 will be launched at the beginning of December 2025 in an online event. The Proposers' Brokerage Day will take place in person at the end of January or the beginning of February 2026, probably in Brussels/Belgium (to be confirmed). The precise date and location will be announced via our Newsletter and our website. The full project proposals' submission will close on April 24, 2026, for a labelling decision before mid-June 2026. The forecasted possible start period for labelled projects would then be the second half of 2026.

A new, updated SRIA will enable future successful innovation support and change.
We are still collecting updates from our community on our Strategic Research and Innovation Roadmap (SRIA), which we are currently refining. We will incorporate this new SRIA in our Launch Events and Proposers' Brokerage Days in 2026, 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 this successful legacy. Bottom-up approach is a unique selling point of CELTIC-NEXT as an EUREKA Cluster compared to other international funding schemes (top-down approach). Please contact me *(priem@celticnext.eu*) if you wish to contribute.

Flagships

SUSTAINET is running!
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 kicked-off. Despite being in the ramp-up phase, SUSTAINET has already begun its dissemination work, notably by attending several events like Hannover Messe and the ICOC 2025 Conference.

Canadian companies have now also joined SUSTAINET, extending its boundaries beyond Europe.

The CELTIC-NEXT office is happy to connect with potential new partners interested in joining the flagship during this first phase. Please contact us at *office@celticnext.eu* or directly the *SUSTAINET Consortium sustainet@celtic-next.eu*.

3D-NET is ramping up!
The Spring Call 2021 project 6G-SKY concluded this summer 2025, marking a great success. It's leading partner, Airbus Defence & Space, together with KTH and several participants from 6G-SKY, successfully applied in the Spring Call 2025 and have been granted a new labelled project, called 3D-NET. 3D-NET is the seed of a future flagship strand on Airspace/Non-Terrestrial and Terrestrial Networks convergence. Don't hesitate to get in touch with 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. Discussions are ongoing with several industrial companies.

Outlook into 2026

The new ECP is signed to last seven years, providing the EUREKA Clusters with extended visibility into the future and, therefore, elaborating a stronger path for growth.

2026 will be the year of the new EUREKA Clusters Programme (ECP) ramp-up and more detailed implementation.

2026 will be a year of improvement; Optimization and simplification of processes to increase the programme's efficiency, reducing delays from ideation to proposal submission, evaluation and finally to funding (incl. its synchronisation).

2026 will be a year of growth, starting with the renewed trust and support of existing partnering Public Authorities, and new incoming funding countries, such as Lithuania, Chile, and Brazil.

Finally, in 2026, an increased collaboration with Canada will take place. We have initiated discussions on how to facilitate Canada's participation in 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.

› Further information

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/

Mobility management, cybersecurity and explainable AI for airspace communications in 6G-SKY

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Introduction

The CELTIC-NEXT project 6G for Connected Sky (6G-SKY), brought together 17 partners from Austria, Germany, Hungary, and Sweden between 2022 and 2025. The project aimed to create a holistic framework that integrates terrestrial networks, non-terrestrial networks (NTN), and the airspace domain into one seamless system for the coming 6G era.
The ambition was to ensure that aircraft, drones, and high-altitude platforms can communicate safely, reliably, and sustainably. Applications range from urban air mobility services and logistics to satellite-supported broadband/IoT communications in remote areas.

Architecture and Use Cases

One of the key outcomes of 6G-SKY is a holistic architecture for combining airspace and NTN with terrestrial networks . This architecture supports multiple use case segments, including commercial aviation, rural connectivity, satellite backhaul, and public safety.

The project identified regulatory and spectrum challenges for low-altitude platforms, developed business models including highlighting selected value chains, and examined sustainability aspects, such as the use of non-fossil propulsion systems. In parallel, 6G-SKY partners provided contributions to 3GPP, ensuring that European perspectives are represented in standardisation.

Mobility Management

Keeping drones connected to mobile networks is not as easy as keeping a phone connected. Unlike people on the ground, drones fly at different heights and often "see" many base stations at once. This creates a problem: the drone keeps switching its connection from one base station to another, even when it is not really needed. These constant changes – called handovers – can interrupt the connection and slow down data transfer.

The 6G-SKY project tackled this challenge with two different solutions :

- A smarter rule-based method ("Robust Service Availability Optimization"): This method looks at how much data the drone still has to send (its buffer). If the buffer is nearly empty, the drone can wait before switching to a new base station, avoiding unnecessary handovers. If the buffer is full, the system makes sure the drone quickly connects to the strongest base station, so the data is sent without delay.
- A learning-based method ("Deep Learning"): Instead of using fixed rules, this approach lets the system learn from experience. By trying different options during test flights, the system figures out when a handover is truly necessary and when it is better to stay connected. Over time, it becomes very good at balancing service quality and stability.

Tests showed that both approaches made a big difference. They reduced unnecessary handovers by more than half and improved the overall reliability of the connection, which is especially important for drones that need to send live video or critical sensor data.

Explainable Artificial Intelligence (AI)

Learning-based methods are powerful, but they often act like a "black box" – they make decisions, yet people cannot easily see why. In safety-critical areas like aviation, this lack of transparency is a serious challenge.

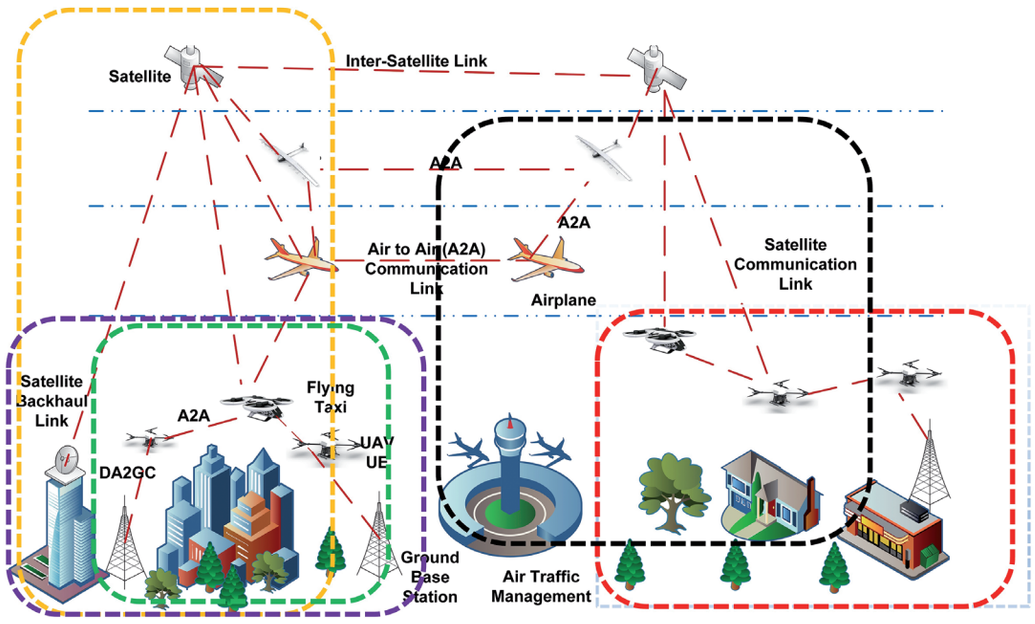
To address this, 6G-SKY introduced explainable AI. The idea is simple: whenever the system decides that a drone should change base stations, it also explains why. For example, it might say: "The new base station has a stronger signal, and the drone's buffer is full, so switching now avoids delays."

This is achieved through a tool that checks how much each factor – such as signal strength, position, or remaining data in the buffer – influenced the decision. On top of that, the system can turn these numbers into clear sentences, so network operators can understand the reasoning without needing to be data scientists.

In real test flights, this approach not only reduced unnecessary handovers, but also gave operators confidence that the system was making the right choices. In other words, it made the AI not only smart but also trustworthy.

Cybersecurity for Sky

6G-SKY also analysed threats in the sky. In future 6G networks, drones and high-altitude platforms will act as part of the communication infrastructure. This raises serious safety and security concerns. Coordinating crewed



(1) In-lab implementation of satellite compliant 5G-gNB and 5G-UE and a channel emulator

(2) DA2GC base station (BS) antenna solution :
Optimized to serve flying Ues at the 5.9 - 8.5GHz band

(3) Multi-connectivity for flying UEs:
LEO+DA2GC+A2A tested in the field in Ottobrun, 0,77 Mbps 10%ile data rate vs outage in single connectivity

(4). For HAPS Demonstration, we have prepared
- Architecture Design
- Core Network emulator
- UE Trace tools
- Airborne User Terminal
- HAPs mounted with exemplary equipment (SDR, NUC, Antenna, Modem) for the demonstration set-up

(5) Sense and avoid system for unauthorized drones:
Skysense's RF-based UAV surveillance system is operational, integrated with the 6G-SKY Twins drone, sense and avoid scenario between two drones was tested in the field in Ottobrun

(6). "drone swarms supporting goods mobility":
- Compute and communicate: Distributed coordination between drones to perform a joint task
- Drone flights have been conducted at the cargo terminal.

and uncrewed aircraft will become more difficult, and having a real-time overview of the airspace, including non-cooperative drones, will be essential to avoid accidents.

6G-SKY suggests that traffic management providers combine information from ground-based detection systems with data received directly from cooperative drones. Today, these systems often rely on signals that are easy to fake, which opens the door to spoofing attacks. To keep the skies safe, stronger safeguards are needed; either by improving existing technologies with integrity checks or by developing new, more resilient methods. Ultimately, because digital and physical risks are tightly linked, safety and cybersecurity must be designed hand in hand.

Combined with explainable AI for decision transparency, these measures contribute to more trustworthy and resilient aerial communication systems.

Demonstrations

The consortium put its concepts to the test in a series of demonstrations, illustrated in Figure 1, which shows both the overall architecture and the different trials carried out:

› (1) Lab emulations to assess link benchmarks and validate connectivity in controlled conditions.

› (2) Innovative antenna design prototypes for direct air-to-ground communication, with lab tests at 7 GHz, simulations, and performance evaluations of new antenna concepts.

› (3) Multi-technology Uncrewed Aerial Vehicle (UAV) platforms combining Wi-Fi mesh, 5G, and satellite links.

› (4) High-altitude platform networking trials for future NTN integration.

› (5) Autonomous sense-and-avoid functions for safe mixed-use airspace.

› (6) Drone swarms inspecting container stacks with cloud offloading and mesh networking.

These demonstrations confirmed that the proposed architecture and algorithms are ready to support real-world operations.

Conclusion

6G-SKY has delivered a blueprint for the 6G-connected European sky and beyond. By combining terrestrial, aerial, and satellite networks, advancing mobility management, and introducing explainable AI, the project has provided both technological and regulatory guidance for 6G-enabled airspace integration. These results not only push forward standardisation in 3GPP but also prepare the ground for sustainable business models and safe large-scale deployment of UAV and aerial platforms.

› Further information

https://www.celticnext.eu/project-6g-sky/

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AICom4Health: 5G-based collective intelligence for health crisis management

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Motivation

The AICom4Health project (2022–2025) grew out of the COVID 19 pandemic and the need for smarter health crisis management. Public health authorities struggled to monitor people's health status and to react quickly when contagion surged. AICom4Health addresses this problem by combining AI, Internet of Things (IoT) devices, edge computing and 5G network slicing. The goal is to monitor individuals and crowds in real time, detect early signs of health threats and provide fast, privacy friendly intervention. The project aims to deliver better healthcare access in smart cities by using sensors and video analytics to observe air quality, mask wearing, social distancing and symptoms, and to send relevant information to health teams instantaneously.

Platform concept and architecture

The AICom4Health platform integrates multiple technologies:

- **5G network slicing and virtualization** – separate slices carry traffic for air-quality sensors, surveillance cameras and city health forecasting; network resources can be dynamically allocated to guarantee high reliability and low latency.
- **Edge and cloud computing** – data from cameras and IoT devices are processed close to the users to reduce latency, while cloud resources provide additional computational capacity.
- **AI and machine learning** – deep learning, natural language processing (NLP), explainable AI and knowledge graphs enable the detection of abnormal situations and the forecasting of health trends.
- **Privacy-friendly AI** – decentralised and federated learning allow models to be trained without sharing sensitive personal data. This framework complies with the EU General Data Protection Regulation (GDPR), ensuring the protection of citizens' health information.

The figure above illustrates the end-to-end architecture. Multiple use-case slices connect sensors (air-quality IoT devices), video cameras and forecasting modules to the 5G radio access network (RAN), transport and core network. An AI module interfaces with a management and orchestration layer to provide collective intelligence across slices. The architecture is designed to be elastic (resources can grow or shrink dynamically) and resilient (network and computing failures can be absorbed without interrupting critical services).

Achievements and innovations

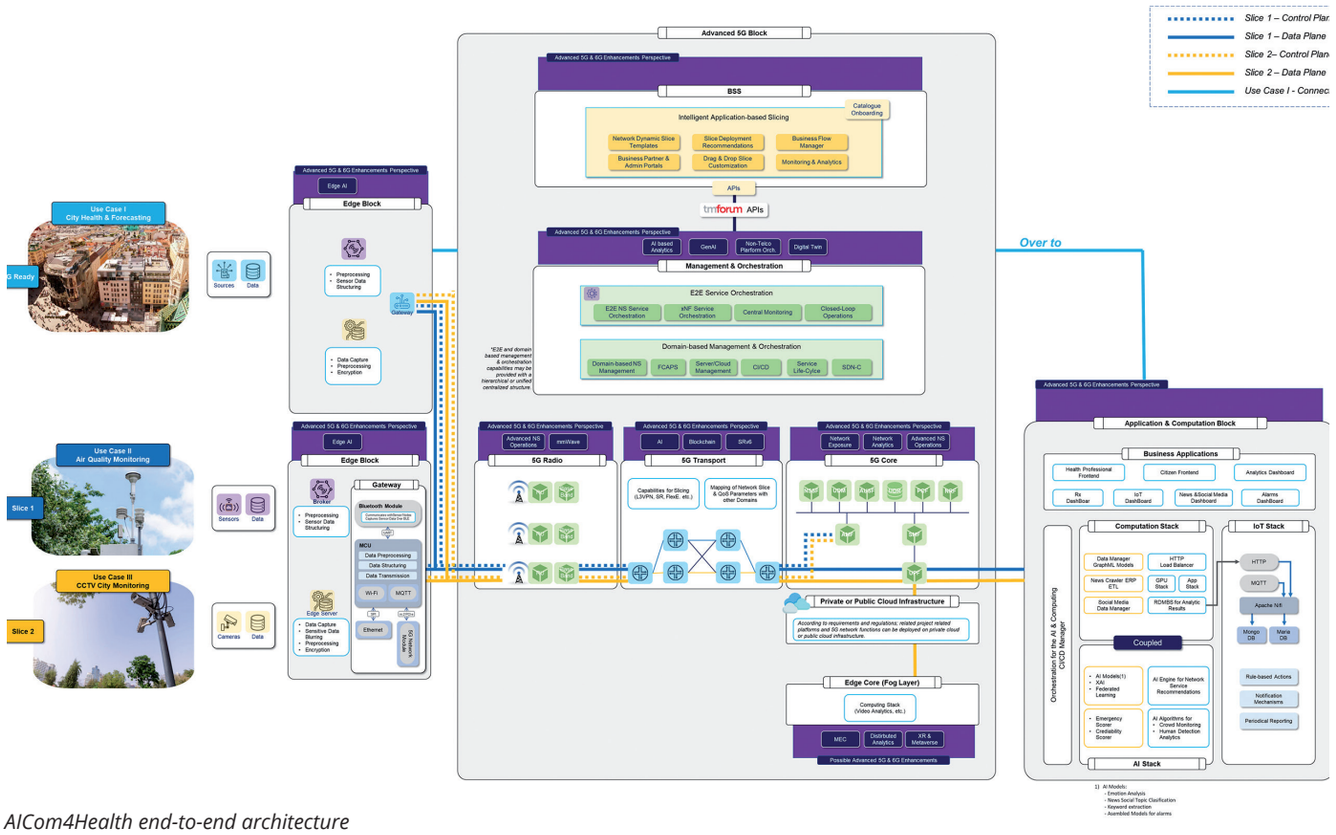
Over its three-year lifetime AICom4Health delivered important innovations:

- **Comprehensive health crisis services** – The platform provides services that require 5G capabilities such as high bandwidth and ultra-low latency. It continuously monitors individuals and crowds using multivariate analysis (air quality, human density, mask-wearing, temperature and other health indicators). During pandemic conditions, sensors and cameras detect poor air quality, social distancing violations, mask breaches and symptoms like fever or fatigue; AI algorithms fuse these data and alert health teams in real time.
- **Privacy-friendly collective intelligence** – A decentralised AI framework enables federated learning for city health monitoring and forecasting. Models are trained locally and aggregated globally, minimizing data transfer and protecting personal privacy. Explainable AI (XAI) and knowledge graphs give regulators and health professionals transparency over AI decisions, improving trust and regulatory compliance
- **Dynamic slicing manager** – The project designed an application-based slicing orchestrator to provision multiple network slices for different services. This solves the lack of standardised slicing APIs and allows the network to automatically allocate resources to critical applications.
- **Integration of data communication and processing** – Edge computing and 5G are combined with AI to process data in near real time while preserving network reliability. The platform was tested in lab and real-world environments.

Business and scientific impact – AICom-4Health opens new business opportunities by enabling companies to offer services that rely on network slicing, federated learning and AI-based health monitoring. The project produced scientific contributions through publications and real-world evaluations.

Partner contributions and collaboration - AICom4Health is a collaborative effort between Turkish and Spanish companies and research institutions. The consortium unites expertise across IoT device manufacturing, telecom infrastructure, AI software, network slicing orchestration and data analytics.

- **IoT & sensing** – Partners specialising in hardware and embedded systems integrate air quality sensors, wearables and smart cameras into the platform. In 2024 the team successfully fused human density detection from cameras with air quality measurements and developed warning software to alert authorities about risky situations (netas.com.tr).
- **Network and orchestration** – Telecom operators provide 5G infrastructure and slicing capabilities; system integrators design the dynamic slice manager to enforce secure, resilient connectivity across slices and support high capacity, low latency data delivery.
- **AI and data analytics** – Software companies and research groups develop privacy preserving AI models, federated learning frameworks and explainable AI



AICom4Health end-to-end architecture

dashboards. These tools enable real time anomaly detection, predictive health forecasting and transparent decision support.

Through this interdisciplinary collaboration the consortium showcases how European SMEs and large enterprises can jointly build a secure, AI powered healthcare platform.

Positioning in the cybersecurity landscape

AICom4Health places cybersecurity at the heart of its design while developing 5G and AI-enabled health solutions. One of the platform's distinctive features is its use of decentralised federated learning; personal health data are processed on local edge devices and only model updates are shared. This ensures compliance with GDPR and minimises privacy breaches that could arise from collecting data on central servers. Recent research shows that blockchain and AI/ML technologies offer significant potential for real-time breach detection, predictive risk assessment and automated compliance monitoring. AICom-4Health's architecture follows these trends by integrating privacy-preserving data analytics; blockchain-based auditing and verification mechanisms are planned for later stages.

Another critical component of the security approach is the secure use of network slicing. In 5G networks, slicing creates virtual network segments dedicated to different applications so that the slice carrying health data operates in isolation. However, literature indicates that cross-slice attacks can occur due to insufficient isolation, SDN/NFV vulnerabilities and multi-tenant architectures. AICom4Health uses a dynamic slice manager that defines separate security policies for each slice and provides continuous visibility to operators. AI-powered analytics detect anomalies across slices and can adjust resources instantly, preventing data leaks or service disruptions.

At the application level, cybersecurity manifests itself through the intelligent health services delivered by the platform. Air-quality monitoring, crowd analysis and mask detection rely on sensor networks and video analytics; therefore, the secure collection and processing of these data are critical. AICom-4Health's edge computing and 5G infrastructure offer millisecond-level reaction times, allowing suspicious activities or anomalies in the data to be detected quickly and relayed to security teams. Experts emphasise that blockchain-based audit logs and AI-driven intrusion detection systems are effective methods for ensuring the integrity of health data and preventing unauthorised interference. The project aims to raise the security bar in healthcare applications by integrating these technologies.

In summary, AICom4Health is not only a platform for pandemic management; it is also an innovative example that incorporates the cybersecurity measures required by emerging AI technologies. The federated learning frameworks, secure network slicing mechanisms and real-time anomaly detection developed by the project provide a solid security foundation for future health technologies.

Conclusion

AICom4Health has delivered a holistic platform for managing health crises in smart cities. By blending AI, IoT, edge computing and 5G network slicing, it offers real-time monitoring of individuals and crowds, privacy-preserving analytics and dynamic resource orchestration. The project's innovations—federated learning, explainable AI, dynamic slicing manager and integrated sensor analytics—provide a blueprint for future digital health solutions. Moreover, AICom4Health's attention to data privacy and secure network slicing positions it well within the cybersecurity theme of the 2nd edition of the 2025 Eurescom's Message and CELTIC News. As the project concludes, partners aim to commercialize the platform, bringing AI-driven health monitoring and secure 5G connectivity to market.

› Further information

https://www.celticnext.eu/project-aicom-4health/

USWA – Enabling Reliable and Scalable Wireless for Industry with DECT-2020 NR

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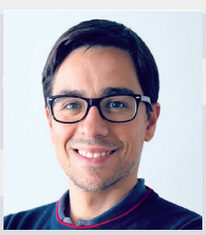

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Introduction

The Ultra Scalable Wireless Access (USWA) project was established to research how to best harness the capabilities of the ETSI DECT-2020 New Radio (NR) standard and its first products in various industrial applications. At the very beginning of the project only very first chipset supporting DECT-2020 NR were appearing. The project also aimed to study potential technology enhancements for future DECT-2020 NR releases, and even to explore possible migration paths towards 6G systems. By September 2025, after three years research, the DECT-2020 NR technology landscape has evolved considerable: ETSI has published second release (Release 2) of the DECT-2020 NR standard, and a variety of chipsets and commercial products have emerged across different application domains. As we now are finalising the USWA project, we present some of our results below.

Main USWA results

System architectures and application requirements

The requirements analysis has prioritized users and stakeholders throughout the adaptation of Volere methodology, ensuring technological innovation is firmly guided by real-world requirements. Employing this user-centric approach, 21 practical use cases were identified and categorized under distinct areas, Figure 1, e.g., Electricity Network Quality Monitoring; Condition Monitoring in Industrial Facilities; Wireless Communication for Robots. From these use cases, several critical technical requirements including latency, reliability, jitter, transmission capacity, mobility, availability, energy efficiency, location accuracy, and security were rigorously analysed across multiple scenarios for the foundation of the system's architectures.

The use cases were further classified into three performance-oriented categories depicted in Figure 1:

- mMTC (massive Machine-Type Communications): Targeted at high device density and data exchange, with less stringent latency and reliability requirements.
- URLLC (Ultra-Reliable Low Latency Communications): Requires maximum reliability and minimal latency for time-sensitive operations.
- Near-URLLC: An emerging classification

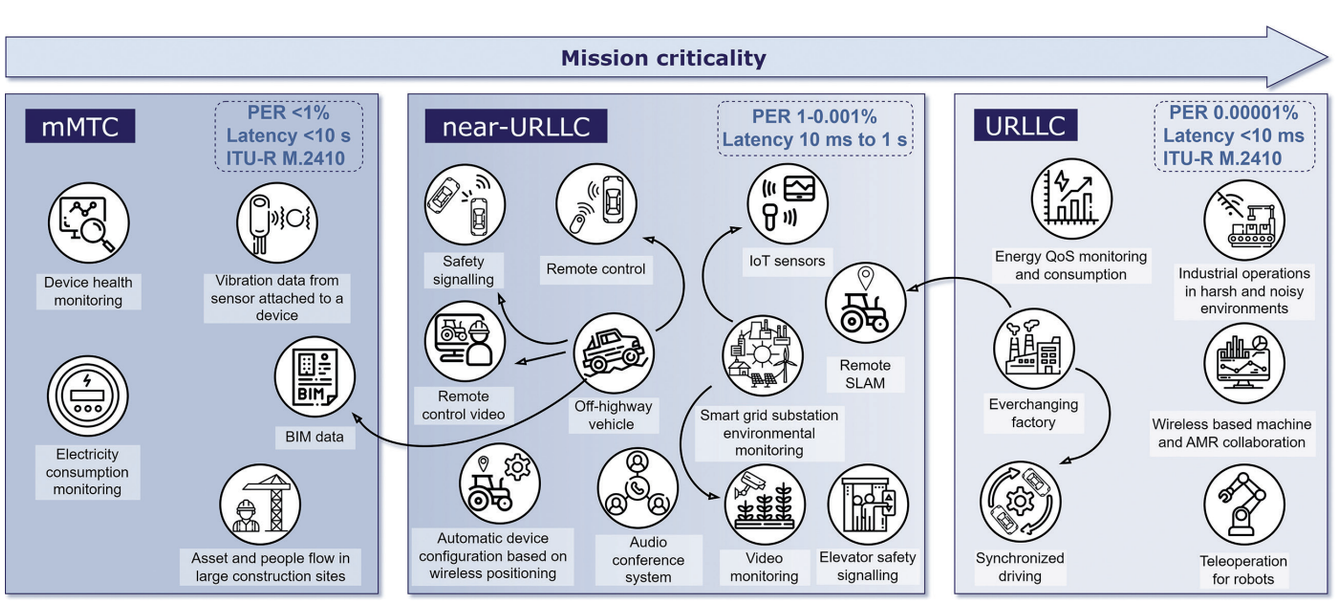

Figure 1: Identified uses cases and their communication requirements

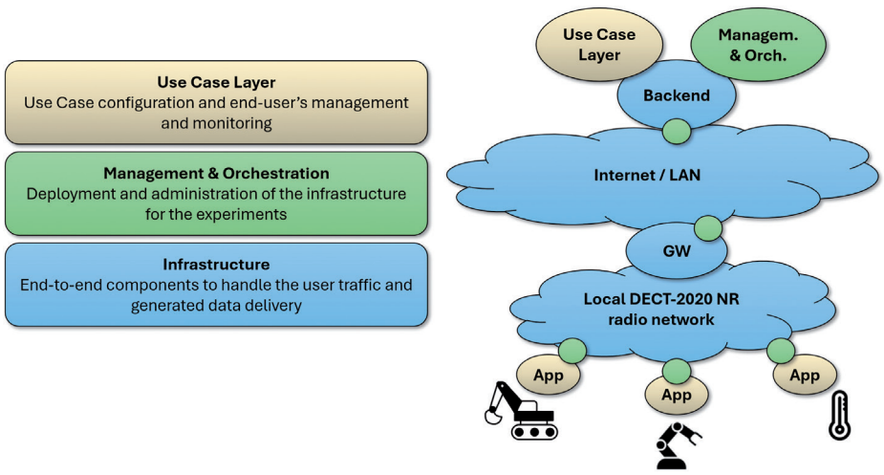

Figure 2: Architecture Layers Schema mapping into generic system architecture

bridging mMTC and URLLC, tailored for evolving IoT demands. These use cases necessitate specific thresholds for latency and packet error rates, supporting new industrial applications where both reliability and flexibility are paramount.

Based on this analysis, a comprehensive Architecture Layers Schema, Figure 2, was developed, aligning each use case's needs with a universal system architecture. Details of this schema delivers architectural recommendations and guidelines for various scenarios, facilitating enhancements to DECT-2020 NR technology via diverse implementations and testing deployments.

The architecture comprises of three principal layers:

- Use Case Layer: Engages with experimenters to coordinate and oversee use cases, manage experimental lifecycles, and validate key performance indicators.
- Management & Orchestration (M&O) Layer: Oversees the deployment, execution, and administration of experiments, including device management and overall system control.
- Infrastructure Layer: Manages user traffic through back-end systems, Internet/ LAN, gateways, and DECT-2020 NR radio networks, integrating with devices and applications specific to individual use cases.

System requirements preliminary identified were directly mapped to DECT-2020 NR features and the intended architecture, guaranteeing that critical needs such as latency and transmission capacity are addressed per scenario. The architecture further defines principal system interfaces and provides implementation guidelines applicable to mMTC, URLLC, and near-URLLC environments.

IoT mesh network solutions

IoT Mesh solutions work focused on developing DECT-2020 NR technology further in massive IoT use cases as well as evaluating system performance with different link and system simulation models in generic massive IoT mesh architecture illustrated in Figure 2. First, an extensive study on Release 1 performance was conducted based on system and link simulation tools including comparison to 802.11ax based Wi-FI systems. It was found that DECT-2020 NR physical layer can operate in a robust manner with high spectral efficiency, low TX powers and limited device activity levels in variable environments and use cases. New improvements were considered to medium access and routing protocol layers, including optimization for downlink packet routing, enhanced channel access for very low power devices, and efficient and reliable distribution of configuration data in mesh network operation to mention few.

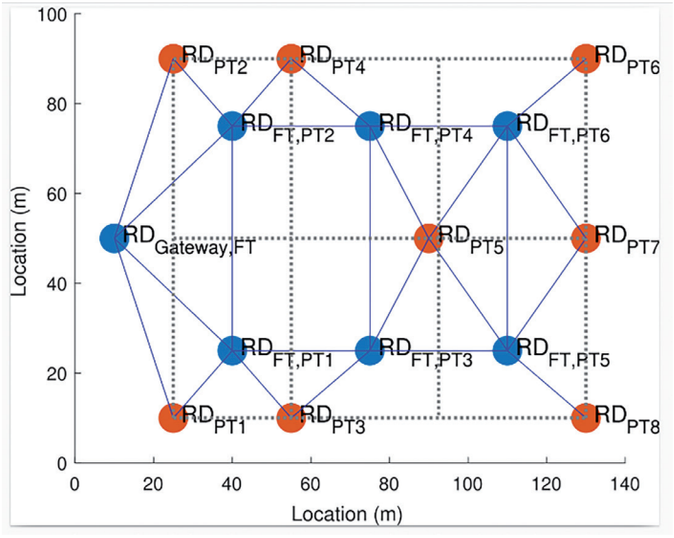

Figure 3: Evaluation scenario of URLLC mesh network

The performance evaluation continued with improved system simulation models focusing on different topics of the IoT mesh communication. Topics included overall energy consumption of the network, uplink and downlink system capacity and co-existence of the IoT system with other systems such as old DECT cordless phones. Further, extensive simulation studies concluded that DECT-2020 NR access method is significantly better than access method required in Unlicensed Personal Communications Service (UPCS) band, 1920-1930 MHz. Finally, a study for DECT-2020 NR positioning framework was concluded, by evaluating performance of several widespread positioning approaches, based on Time-of-Arrival (ToA), Angle-of-Arrival (AoA) Received Signal Strength (RSS) and different hybrid versions of the listed positioning approaches.

Ultra reliable and low latency mesh networks

The URLLC aspect of USWA integrates DECT-2020 NR and UWIN-based radio interfaces to support ultra-reliable communication, to develop a mesh network topology with a packet error rate (PER) of 10−7 while maintaining sub-1 ms transmission latency. Mesh networking plays a crucial role in enabling direct communication between devices, such as robots in smart factory environments and other robotic applications like flexible production and adds further redundancy for improved reliability.

To achieve these goals, system design incorporates the most promising mesh network techniques, AI driven optimization, and security measures to improve network adaptability. This involves researching and selecting suitable PHY and MAC layer techniques and developing a simulator for performance evaluations.

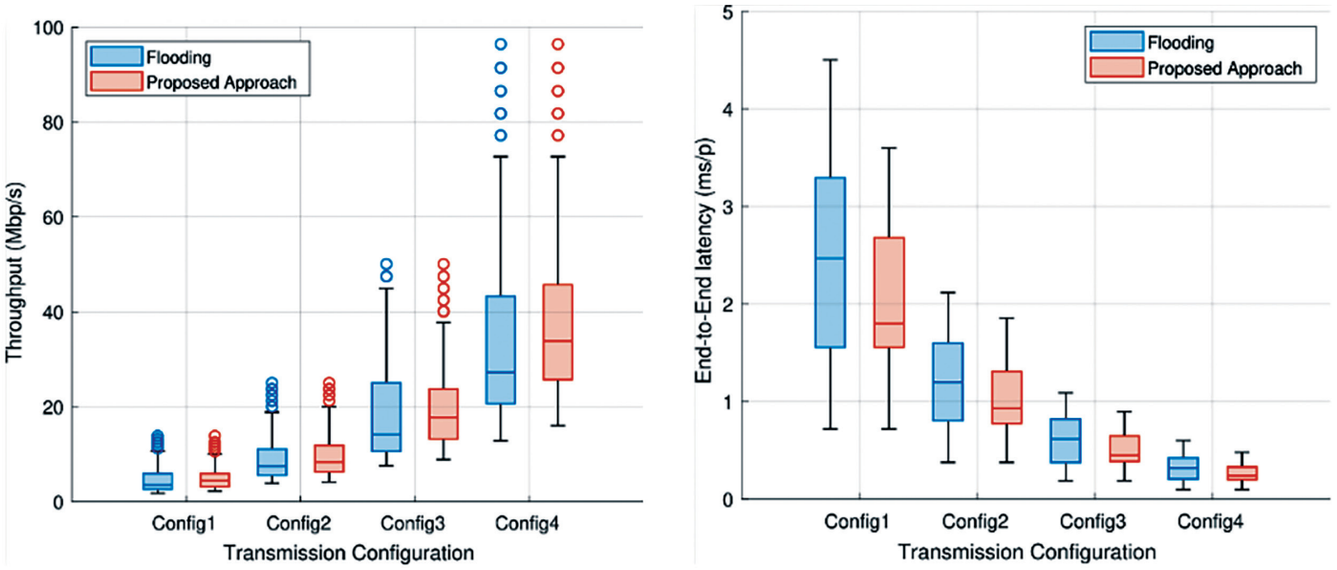

Figure 4: End-to-End latency and throughput evaluation of the proposed data dissemination scheme compared to standard flooding procedure of DECT 2020 NR

For this purpose, MAC protocol enhancements were developed for DECT-2020 NR to reduce the end-to-end transmission latency and by this increase the throughput. The protocol enhancements are verified in various simulated network constellations. One of the considered scenarios is depicted in Figure 3, showing an indoor industrial environment with six radio devices operating as routers, depicted as RDFT,PT, one radio device operating as gateway, RDFT. Finally, eight radio devices are operating as leaf nodes, RDPT. The RDPTs are mobile at the speed of 2 m/s on a predefined path, represented by the dotted lines in Figure 3. Moreover, RDFT/PT and RDGateway,FT are deployed in a static position to provide coverage in the region of interest.

With the proposed scheme the end-to-end latency and throughput could be improved notably as shown in Figure 4.

Especially for URLLC networks in scattered radio environments, a proper allocation of radio resources is crucial to further minimize the outage probability. For this purpose, a channel aware resource allocation method was developed, improving transmission reliability by adding only minimal signalling overhead. Figure 5presents an example of the resource scheduling for the wireless links between a gateway and three robots. Each link needs isochronous transmissions resources. The developed resource allocation method optimizes for each link the allocation of resource blocks by considering the current channel conditions and its time varying nature.

Further developments include the use of network coded cooperation to improve the transmission reliability and the development of Hardware accelerators for Post Quantum Cryptography (PQC) encryption / decryption methods.

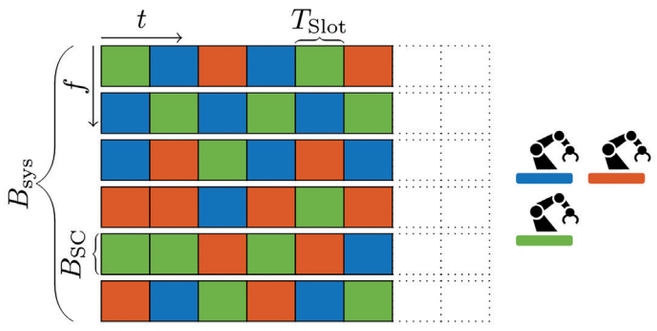

Figure 5: Example of resource allocation for three links where each link gets allocated two resources in each time step

Proof of concepts

Given the wide range of use cases identified during the project, the number of PoCs implemented was equally extensive. One of the initial steps in PoC development was to conduct an extensive link distance measurement campaign in different environments ranging from indoor factory and office to outdoor grid lines, campus areas and open fields to observation tower as shown in Figure 6. The aim of these measurements was to gain practical insights on achievable link distances with different TX powers levels using the first DECT-2020 NR chipset implementations. These measurements were essential to ensure smooth implementation of other PoCs paving the way to real commercial deployments.

To illustrate one proof of concept (PoC) of the USWA project, specifically Energy QoS monitoring, Figure 7 presents the overall PoC architecture. The solution leverages DECT-2020 NR technology to enable modular, low-maintenance deployment of new control, monitoring, and protection components (IEDs) within substations, eliminating the need for rewiring. Furthermore, wireless mesh technologies enhance system resiliency by providing alternative communication paths. The PoC demonstrates how reliable wireless connectivity can replace wired connections while ensuring accurate transmission of energy Quality of Service (QoS) and consumption data from Circuit Monitoring Sensor (CMS) devices.

Standardisation and dissemination

To obtain efficient and strong impact from a research project to wireless technology development, regular participation to corresponding standardization forums is vital. To achieve this USWA project partners have had active participation to ETSI TC DECT, promoting new solutions for DECT-2020 NR. This work has resulted in several improvements to the Release 2 standard of DECT-2020 NR.

Dissemination was an important goal in the project. In addition to several publications obtained, two information sharing webinars were held and YouTube videos of both events were made available. In addition, USWA Winter School was organised for postgraduate students at Ruka, Finland, in February 2025.

Figure 6: Different link distance measurement location in Tampere Finland

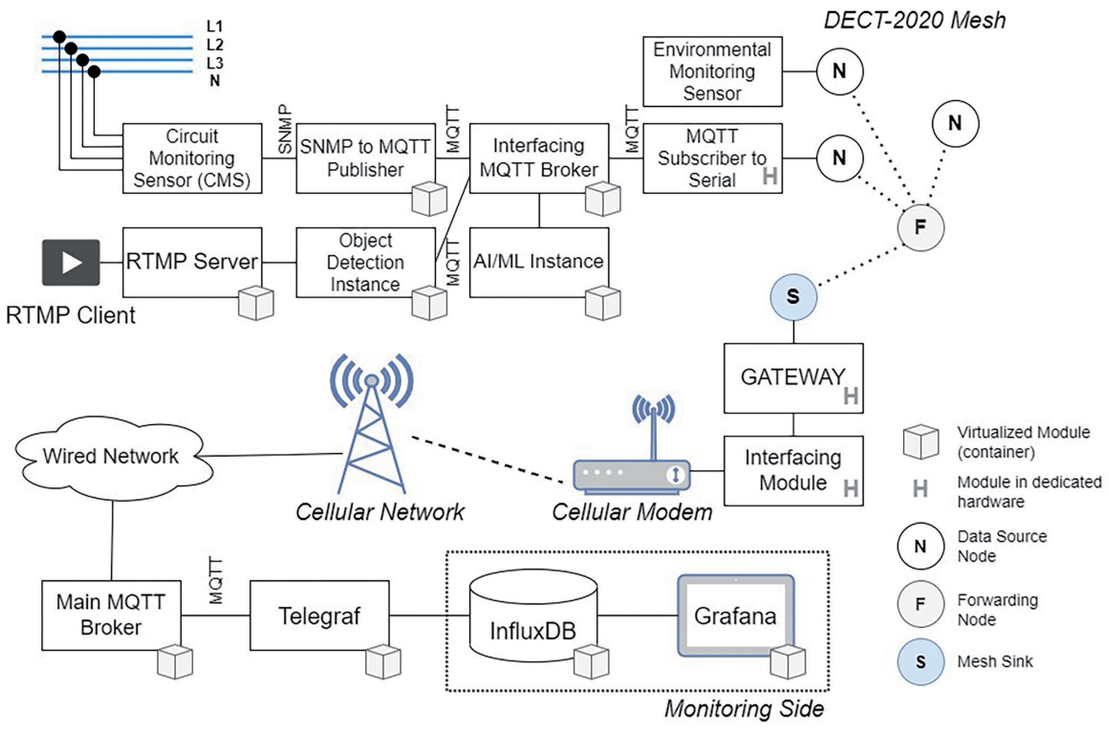

Figure 7: PoC system architecture for Energy QoS monitoring

Furthermore, USWA was present in EuCNC & 6G summit 2025 conference within DEC NR+ special session as well as with Demo booth. Finally, USWA project was regularly present in Berlin 6G summits.

Conclusions

During the USWA project, technology landscape evolved significantly due to rapid rise of AI and promising new possibilities for automation and process optimization. At the same time, introduction of new DECT-2020 NR based chipsets and products in the marketplace has established DECT-2020 NR as mature and reliable wireless technology for industrial applications. With new solutions and PoC developments, the USWA project has demonstrated enormous opportunities for different industry areas, where DECT-2020 NR technology provides cost-efficient, reliable and resilient wireless communication solution connecting devices and advanced data processing solutions. However, innovation continues, and DECT-2020 NR provides a solid foundation for future technologies beyond the project and today's applications.

Acknowledgements

Project partners acknowledge research funding from by the European Union – NextGenerationEU – received through Business Finland, Centro para el Desarrollo Tecnológico Industrial, Federal Ministry of Education and Research, and Turkish funding agency.

› Further information

USWA: C2021/1-8
https://www.celticnext.eu/project-uswa/
https://www.celtic-next-uswa.org/

CELTIC Proposers Day in Aveiro

At the Heart of the CELTIC Community: the European AI-ACT & 6G Fuelling the AI Compute Continuum

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On September 11th 2025, the CELTIC-NEXT Community gathered once again for the highly anticipated CELTIC Proposers Day in Aveiro, Portugal.

Welcome:

The day started with a warm welcome from José Carlos Pedro, the President of the Board of Directors from our host organization Instituto de Telecomunicações in Aveiro, Portugal, followed by a short welcome from the CELTIC-NEXT Director Mr. Xavier Priem.

Both underlined the importance of in-person gatherings to foster new project ideas and to exchange on the latest advancements in the next generation of telecommunication.

Keynotes:

Two keynotes in the area of AI have been presented focusing on International Regulation and legal Frameworks, highlighting the transformative potential of 6G, current trends in the compute continuum that underpin a European value-based AI ecosystem.

On the Path to the AI-ACT:

The first keynote gave insights "on the path to the AI-ACT", kindly presented by Prof. Diogo Gomes from Instituto de Telecomunicações.

Prof. Diogo Gomes started with an overview on the EU AI-ACT that has been unanimously approved by the EU Council on 21 May 2024 and is foreseen to be fully applicable in 2026. The EU AI-ACT balances innovation with fundamental rights and safety, it is the first comprehensive European AI regulatory framework. Prof. Gomes touched on the basics of its Risk-based framework ranging from no obligation for minimal risk to conformity

Keynote 1: On the path to the AI-ACT, Prof. Diogo Gomes, Instituto de Telecomunicações

assessment for unacceptable AI risks as, for example, social scoring as well as unacceptable prohibited aspects of AI covered within the EU AI-ACT.

Transparency and Explainability, record-keeping as well as Auditability were mentioned as key requirements for High-Risk AI systems.

Open questions such as the ambiguity in definitions, enforcement capacity and expertise as well as risk of over-regulation vs under regulation have been discussed, as the importance of global competitiveness of AI systems is of utmost importance and the compliance is often seen as a burden to the industry.

He emphasized the need for adaptive flexible rules in a fast-moving field to underline the strength of the European industry in the Telecom ecosystem and the benefit it provides to its vertical markets. This approach strengthens vertical markets to thrive and fully leverage a strong alliance in the telecom sector.

In his keynote Prof. Gomes gave an overview on international legal frameworks such as for example the Algorithmic Accountability Act and the Stop Discrimination by Algorithmic Acts in the United States; the AIDA Act in Canada; the Basic Act on the Development of Artificial Intelligence and Establishment of Foundation for Trust in Korea, and the Act on the Promotion of Research, Development and Utilization of Artificial Intelligence-Related Technologies in Japan.

GSMA RAI that provides guidance for mobile operators and ecosystem partners on designing and deploying AI responsibly have been touched as well as the technical standards for secure and trustworthy AI from ETSI supporting the EU AI-Act compliance ecosystem through harmonized standards.

6G: Fuelling the AI Compute Continuum

The second keynote, kindly presented by Wolfgang John, Principal Researcher at Ericsson Research Sweden, on the topic of "6G: Fuelling the AI Compute Continuum" began with an overview of the International Telecommunication Union (ITU) process regarding the ongoing 6G 3GPP standardization activities, which are scheduled to start in end of 2024 and are expected to lead to commercial release in 2029 and beyond.

Keynote 2: 6G: Fuelling the AI Compute Continuum, Wolfgang John, Ericsson Research Sweden

Wolfgang John provided insights on how AI-native networks, 6G Compute, Trustworthy systems and limitless connectivity capabilities of the 6G network platform serve as key enablers for co-creating a cyber physical world. First ideas on AI powered services have been shown working on today's but also on tomorrows mobile networks that are both a communication and a computing platform.

Next generation of 6G networks include AI native infrastructure closely coupled to distributed data networks through a common platform functionality as cloud infrastructure, transport and data infrastructure serving end customers needs. The 6G network platform ensures service assurance, external interaction and business support through network assets that include cloud native and AI native infrastructure in a cyber physical world.

Representative from ANI, Portugal: Mrs. Polina Pereira

Representative from CDTI, Spain: Mrs. Juana Sanchez

Poster Session: Burcu Ergun, Airties, Türkiye

At the Entrance, happy team of two: Mehmet Sükrü Kuran and Burcu Ergun from Airties, Türkiye

Especially the 6G AI compute continuum will simplify the procurement and deployment of future ready applications and devices. Optimization of connectivity compute and AI as well as network architectures supporting network insights and data as well as optimizing data transfer proved by large scale use cases have been highlighted during the presentation.

Examples of relevant data and insights within a mobile network as fraud detection and prevention, connectivity status and prediction, spatial data and user density have been mentioned to evolve in the future by the implementation of 6G and the AI compute continuum.

Trust, privacy and data sovereignty has been highlighted as potential driver for local compute and AI services. This presents a significant opportunity for mobile network operators as a nationally regulated business partner offering trustworthy bundles of communication, compute, data handling and AI model management. Immediate questions from the audience were raised on when the solution would be ready to be used. Which underlined the interest from industry viewpoint on the 6G and AI native compute continuum.

Funding Landscape in CELTIC:

As part of the Proposers Day, representatives from the CELTIC funding bodies explained details of funding in their country. Mrs. Polina Pereira from ANI opened the session by warmly welcoming the CELTIC Community in Aveiro and then presented the funding scheme in Portugal. Following Mrs. Pereira's presentation, Mrs. Juana Sánchez from CDTI, Spain, gave insights on new funding opportunities in Spain and encouraged the participants from Spain to submit a high quality proposals related to the advices given in her presentation.

Following the funding presentation in Spain, our new Public Authorities representative Mrs. Bahriye Özkara from TUBITAK, Türkiye, showed relevant details on how to apply on national level in Türkiye to the interested participants. The funding landscape in Finland and support of CELTIC Calls has been kindly explained by Mr. Heikki Uusi Honko from Business Finland. Mrs. Camille Tang-Taye Pinois from BPI France followed his presentation and provided insights on the processes in France to the audience.

Successful SME

Mr. Pedro Lousa from Beyond Vision, highlighted the impressive growth and success of Beyond Vision which is a high-tech drone company, noting that it is among the first drone operators to utilize 5G technology, enabling extended-range communications. He also emphasized the company's coordination role within the CELTIC project Intelligent Edge of Things (IEoT) that operated and finished successfully even during the Corona Pandemic. The expected revenue for Beyond Vision's Drone Group, which entered the market in 2021, is projected to reach approximately €13 million by 2025, supported by a workforce of around 70 employees. The company specializes in dual-use applications for both civil and military purposes.

Insights from the Experts

In the next session, hands on experience from the CELTIC Experts where given. The session was opened by Mr. Xavier Priem, CELTIC Director, followed closely by Prof. Ayman Radwan, who explained in detail his CELTIC project success in the Health area as well as useful advices on the journey from Proposal Idea to a successful project end including strong guidelines on how to prepare a successful CELTIC Proposal.

Pitching Session and Consortium Building

Overall 15 new project ideas have been presented in the pitching session moderated by Mrs. Christiane Reinsch, CELTIC programme coordinator, who also moderated the days proceedings.

The pitching session was highly interactive and showcased innovation, featuring presentations such as Secure X, presented by DFKI from Germany, which captivated the audience with its cutting-edge security solutions. Celtiberian SL from Spain impressed with DronaaS, highlighting the potential of drone-as-a-service. A team of two from Airties, Türkiye, introduced Scota and Wi-Excellence, their smart connectivity test automation solutions, which promise to enhance network performance and Wi-Fi connectivity. Finally, Screenlight presented the concept of Cinema Futuro, sparking excitement about the future of cinema and its evolving technologies. Many more presentations were given, each one not only informative but also interactive, engaging the audience in discussions about the future of their dynamic sectors. Each of the presenters invited to an online consortium-building sessions that took place the following week.

Throughout the day, the pitch presenters gathered around posters to discuss their presentations with potential new partners.

After the pitching session, the attendees enjoyed the guided tour through the Lab of Insituto de Telecomunicações.

Updates from the CELTIC Office: Focus on the CELTIC-NEXT Group of Experts

Xavier Priem
Director CELTIC Office
priem@celticnext.eu

CELTIC-NEXT Group of Experts are central and instrumental to CELTIC's success since its inception in 2003. They are at the core of CELTIC's SRIA, Labelling Evaluations, Projects' Evaluations, and Reputation. Without them, there would be no CELTIC, CELTIC-PLUS, or CELTIC-NEXT programmes! They are the CELTIC Experts!
Please allow us to offer more insight into their group in CELTIC-NEXT, including their tasks and the impact they have on your projects.

Purpose of the CELTIC-NEXT Group of Experts (GoE)

The Group of Experts (GoE) is responsible for assessing project proposals and participating in CELTIC project reviews. The GoE includes several sub-groups dedicated to specific technical areas. Core group members nominate individuals for the GoE, and an expert presides over each GoE meeting.

Composition of the GoE

The CELTIC-NEXT Core Group has established a permanent CELTIC-NEXT Group of Experts, which has delegated responsibilities and carries out specific tasks. The CELTIC-NEXT Core Group determines the working rules for the CELTIC-NEXT Group of Experts. The number of members and the composition of the CELTIC-NEXT Group of Experts are agreed upon by the CELTIC-NEXT Core Group. The CELTIC-NEXT Core Group may decide to replace a member in the CELTIC-NEXT Group of Experts if such a member becomes an Affiliate to another Participant with a representative in the CELTIC-NEXT Group of Experts, or to a company not resident in Europe, or if the criteria for their membership no longer apply, or to appoint additional members.

Labelling and recommending funding

After evaluation by the CELTIC-NEXT Group of Experts, the CELTIC-NEXT Core Group, in agreement with the involved Public Authorities (PAs), decides whether to grant a label, hereinafter called the "CELTIC-NEXT Label", to the proposed Project. The CELTIC-NEXT Label confirms that the CELTIC-NEXT Organisation considers the proposed Project aligned with the Programme's goals and that the applying organisations are eligible to participate as Participants in the Programme. It also confirms that the CELTIC-NEXT Organisation recommends the Project for public funding. The CELTIC-NEXT Project Proposal is the fundamental technical document submitted for funding applications to the respective PAs. The final decision on funding rests with the respective PAs.

Responsibilities of the GoE

The CELTIC-NEXT Group of Experts is a delegated responsibility by the CELTIC-NEXT Core Group for all decisions regarding the selection and monitoring of projects. Unless otherwise determined by the CELTIC-NEXT Core Group, the CELTIC-NEXT Group of Experts carries out the following tasks:

- Developing, updating, and implementing guidelines for the selection and ranking of technical projects.
- Making recommendations on giving the CELTIC-NEXT Label to project proposals and funding outlook by PAs.
- Making recommendations in case of major Project change requests.
- Participating in mid-term reviews and giving recommendations to achieve better project outcomes (see Figure 1).
- Participating in final reviews, assessing project outcomes and results, and providing further recommendations on further exploitation and potential follow-up projects.
- Advising the CELTIC-NEXT Core Group on all relevant issues.

› Further information

https://www.celticnext.eu/core-group-members/

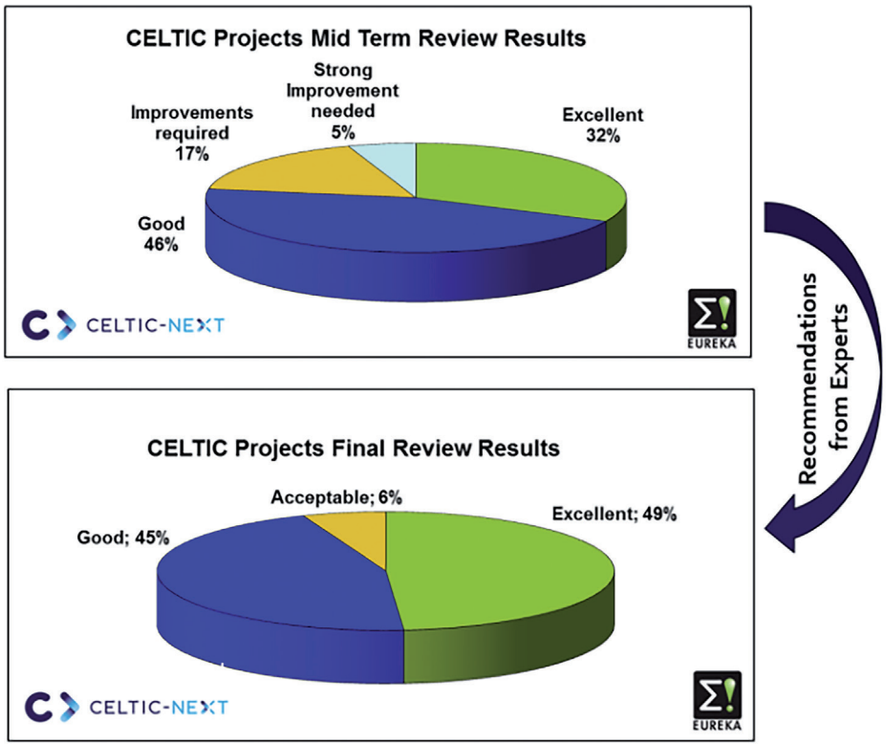

Figure 1: The positive effect of CELTIC-NEXT's Experts' recommendations at mid-term reviews

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