Summer 2024

EURESCOM message

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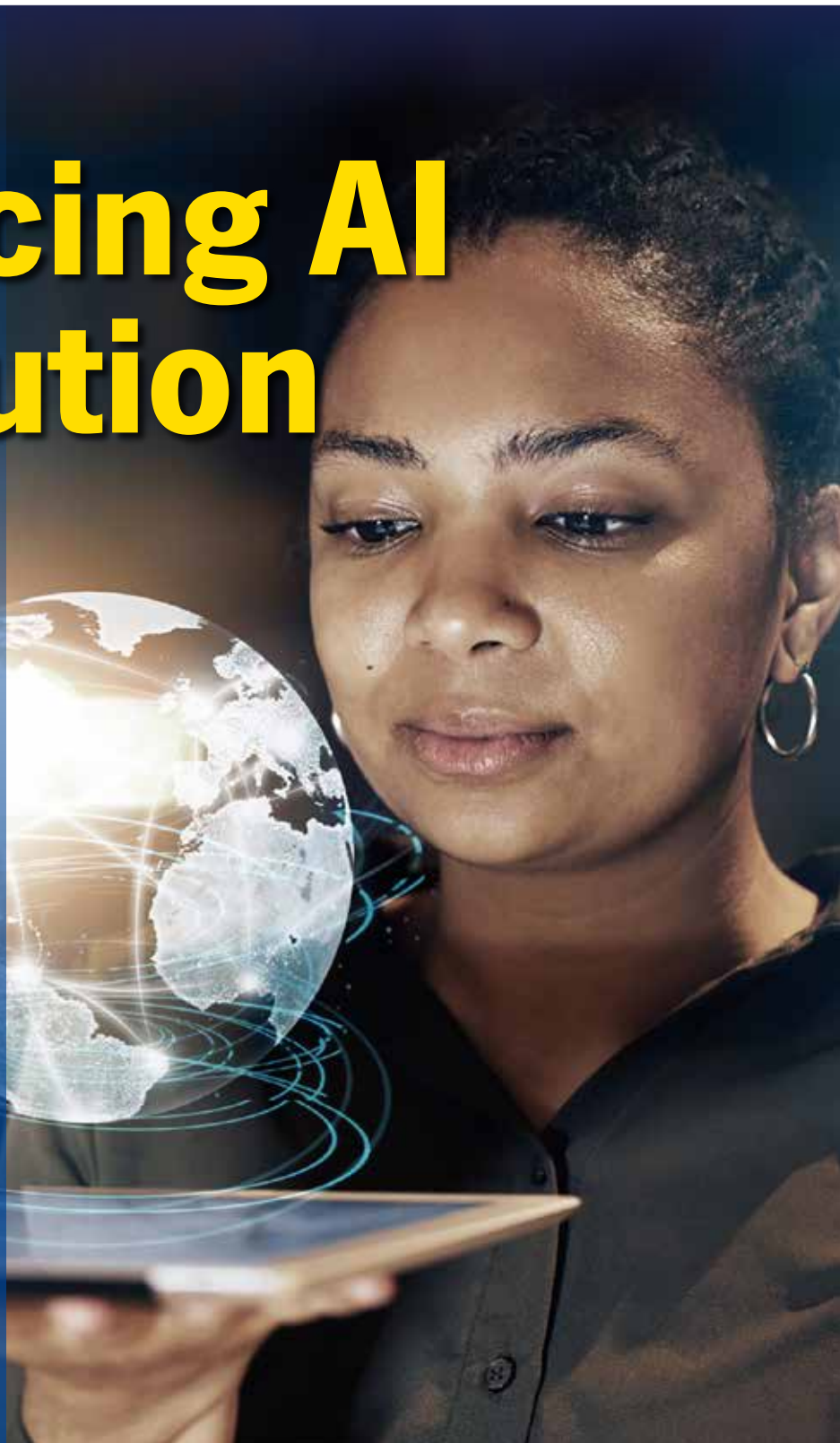
CELTIC News 1/2024

CELTIC-NEXT

Embracing AI R/Evolution



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CELTIC-NEXT Autumn Call 2024 for Project Proposals – Deadline: 21st of October 2024

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Easy proposal process

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Benefits of participating in CELTIC-NEXT

- You are free to define your project proposal according to your own research interests and priorities.
- Your proposals are not bound by any call texts, as long as it is within the ICT/telecommunications area see: CELTIC-NEXT Scope and Research Areas.
- CELTIC-NEXT projects are close to the market and have a track record of exploiting their results soon after the end of the project.
- High-quality proposals have an excellent chance of receiving funding, with an average success rate higher than 50 %.
- The results of the evaluation will already be known in December 2024.

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

Contact:

CELTIC-NEXT Office
Xavier Priem
office@celticnext.eu
Website: www.celticnext.eu

Dear readers,

The evolution of Artificial Intelligence (AI) traces decades back, from an idea conceptualization in the halls of academia to its use in real-world scenarios. In this ever-evolving technological landscape, transformative influence of artificial intelligence across various sectors has a profound and disruptive impact on us. As we make new learnings every day the evolution and revolution of AI seems like an ongoing process, marked by continuous innovation and exploration.

Eurescom embraces more than three decades of experience in managing multinational collaborative R&D projects, programmes, and initiatives in the ICT sector. It recognises the need for aligning technology development with a value-based consideration and prioritization of different economic and social outcomes in the development of 6G networks, in the context of EU research funding frameworks. Hence, in the first article of the cover theme, we attempt to present "The Role of AI/ML in Key Value Indicator Analysis" and propose a value-driven AI technology development which is one of the important drivers in the development of innovative 6G technology.

This issue is a innovative collection of inside view of selected EU research activities from the plethora of projects that present the diverse R&D activities taking place at Eurescom. The article from the project PAROMA-MED presents how researchers are pushing the boundaries of AI capabilities, tackling new challenges, to "Empowering Collaborative Intelligence: The Federated learning approach" and promise advancements in health applications.

As we stand at the vertex of a new era, we recognize not only the revolutionary potential of AI but also its evolutionary journey; the project CENTRIC contributes to "AI Techniques for the 6G AI-AI" and develops a sustainable AI-native Air-Interface for 6G networks and utilizes advances in machine learning (ML) to enable the development and discovery of efficient waveforms, custom modulations, and transceivers for the physical layer as well as customized lightweight communication protocol and sustainable radio resource management.

Whilst the AI - Telecommunications landscape explores new dimensions, in the article "AI/ML in Telecommunications Networks" authors delve into the multifaceted role of AI/ML in shaping the future of telecommunication networks, and provide recommendations concerning the future availability of large data sets, which are necessary for training and benchmarking algorithms.

As AI continues to evolve, our approach towards its development and deployment, the "Innovations using AI/ML in project 6G-BRAINS", attempt for seamless and efficient wireless connectivity. Presented are innovative approaches to network resource management and spectrum utilization using cutting-edge AI technologies.

The edition includes a very interesting and retrospective article - the KENNEDY Perspective on "AI or not AI". Will AI help us to succeed? How will AI help me in real life? as there is a juggle on whether to trust these systems and to what extent!

This issue further covers a variety of articles on different, ICT-related activities. Under "Events", we report about participation of Eurescom projects at MWC Barcelona 2024, the world's largest telecoms event where technology, community and commerce converge. In our "News in brief" section, we update about what's new at Eurescom – a short overview on the newly started projects.

Finally, in the latest "A bit beyond" we engage in crucial AI act that is recently passed in the European Parliament and it awaits reading in the EU Council.

Together with my editorial colleagues I believe that you will find value in this edition of Eurescom's message, and we would appreciate your comments on the current issue as well as suggestions for future issues.

Enjoy reading our magazine!

Pooja Mohnani
Editor-in-chief

Cover image: © Canva

EVENTS CALENDAR

3 – 6 June 2024
EuCNC & 6G Summit
Antwerp, Belgium
https://www.eucnc.eu/

13 – 14 June 2024
Global Innovation Summit
Istanbul, Türkiye
https://gis-2024.b2match.io/

1 – 4 July 2024
Berlin 6G Conference 2024
Berlin, Germany
https://www.6g-platform.com/

23 – 24 October 2024
NEM Summit 2024
Antwerp, Belgium
https://nem-initiative.org/

22 October 2024
Indo-Pacific-European Symposium
Seoul, South-Korea
More information to come on https://www.inpacehub.eu/

30 – 31 October 2024
5G Techritory
Riga, Latvia
https://www.5gtechritory.com/

7 – 8 November 2024
FUSECO Forum
Berlin, Germany
https://www.fokus.fraunhofer.de/ngni/events/fuseco-forum_2024

8 – 12 December 2024
Globecom 2024
Cape Town, South Africa
https://globecom2024.ieee-globecom.org/

SNAPSHOT

Digital X Südwest at the Stuttgart Stadium

Johannes Bronswick (Portfolio Manager IT Services at Telekom Deutschland GmbH) and Klaas-Pieter Vlieg (Eurescom GmbH) in front of the Telekom Deutschland 5G booth.

Eurescom IT Services Manager, Klaas-Pieter Vlieg attends the DIGITAL X, a conference for Europe leading cross-industry digitalization initiative, with over 300 dedicated national and international partners. The event took place on 7–8th of May 2024 in the MHP Arena Stuttgart in Germany.

The ambition of this annual event is to help SMEs with their digital transformation by gathering experts in the domain from all over the world to discuss challenges and solutions faced by businesses.

On stage, top-class speakers provided interesting insights into digitalization topics such as connectivity, artificial intelligence, cybersecurity and sustainability.

Further information
Digital X website – https://www.digital-x.eu/en

Contents

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If you would like to contribute, or send any comments, please contact:
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AI or not AI – that is the question

David Kennedy
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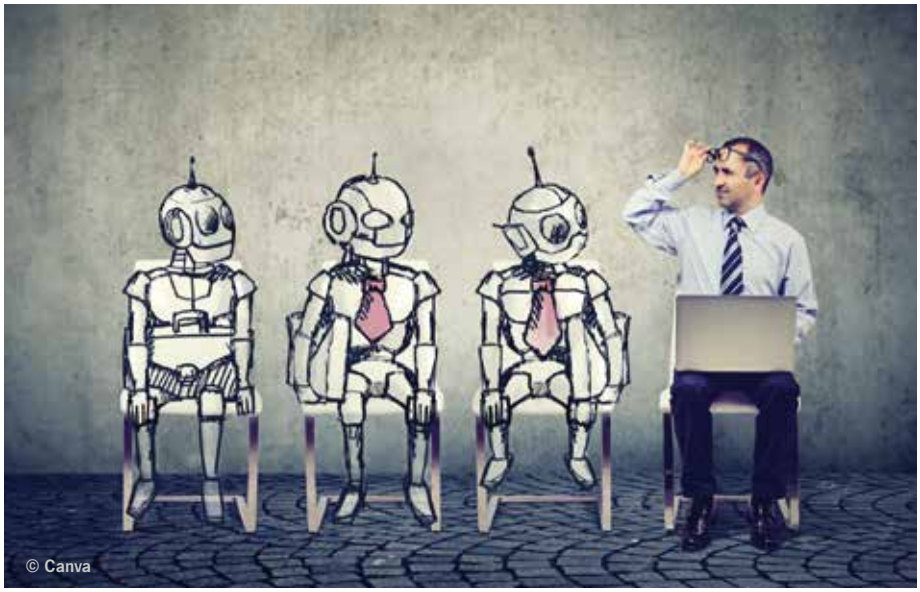

Recently, along with thousands of others around Europe, I went through the process of writing Project proposals for projects to be submitted for evaluation for funding. As part of this process, I had the thought if I could use AI to help me. I'm sure I was not the only one. However, I am aware that Students papers can be checked for use of AI and, in their case, it is considered negative as they should prove their own analyses and creative thinking when doing their assignments. But when making proposals is it allowed to use AI – will it help you to succeed? Actually, how will AI help me in real life?

What is AI?

AI is actually a generic term for a computer and software that mimics human intelligence. So, it has to go through the same principles as us in it has to learn – from lots and lots of data and many algorithms that teach the machine how to process the data. It then has to take the next step of working out which algorithms it should use to solve challenges and problems. The next phase is where, through repeated use and ever more data, the machine can refine and even correct (improve?) its own algorithms. To the most complete stage where it has so much experience of data and algorithms that it observes patterns that enable it to make accurate predictions or actually to be creative and create new test, images, and even ideas on request.

How can I use it?

Most of you don't realise it but you are most likely already using AI tools. In the recent period the most dramatic developments in the use of AI have been in the ability of machines to understand natural language. So when you ask Google, Alexa, Siri, or any of our voice-based friends for help they are using AI algorithms to understand what you want. What has particularly changed in the last couple of years is that they have learned to understand what we want from the context of the question as much as the words used. Google maps will now tell you that your destination will be closed by the time you arrive as the system thinks this is important for you to know. The upsetting thing is it's right – it can accurately assess what is relevant for my trip.

What is not so nice is that the level of monitoring of my online existence is also fed into AI tools to profile me and offer me as a target for advertising campaigns tailored for people with profiles similar to mine. While you can confuse the system occasionally by doing things out of character, it is worrying how ads are mostly relevant and how much the system knows about me.

Back to business

I was asking if you can use AI to generate new project proposals – obviously yes you can – but I did not. You need to be careful about what you ask an AI tool to do. If you make a question too generic the AI tool will give you answers that can be too random. Even now, I think, AI systems, like many small children, will give you an answer it thinks you will like – even if it has assembled it by just grouping data it thinks relevant into normal sounding sentences. It could give you an answer that fits the algorithm but is not true. My advice is that if you ask an AI system to advise you on the 5 most important aspects of doing your project – you should, like the students, use your own reasoning and creativity to integrate the answers into your work.

Will AI be my Friend?

There are now many tools available as apps to allow you to create your own virtual friend. Over time this AI friend could learn to talk to you in a very natural way and would actually resemble you if you are the only data source he/she has to learn from. The bigger question is when will you allow your AI-Friend to represent you, to go shopping for you, or to select the colour paint for your bedroom. Don't get me wrong – this will happen.

We will all have our digital friends at some point in the future, they may be basic at first as we see already smart phones reminding us about all aspects of our life such as the steps taken, the appointments scheduled and even how we slept.

Conclusion

The limitation factor for now is that AI systems require huge amounts of data to learn from, lots of processing to work with the data and lots of energy to keep the system going. But as time goes on AI will teach itself to be more efficient and learnings will be shared between machines to the point where our smart devices will be quite the little personalities, helping us to live our lives. I just hope they don't learn to nag me about my driving.

P.S. No AI was used in the generation of this article.

The Role of AI/ML in Key Value Indicator Analysis

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Traditionally, technology design in ICT focused on functional performance and market potential. However, with increasing attention on societal challenges and sustainability goals, there's a call for a shift towards aligning technology development with key values for society. In the last while the concept of Key Value Indicators (KVIs) became a prominent point of attention in research and innovation for next generation ICT solutions. At the same time artificial intelligence and machine learning (AI/ML) have gained traction as a means to cope with the complexity of the future mobile telecommunications network and to optimise resource use for the delivery of advanced services. But, can AI/ML contribute to the design of values-driven technology development?

Key Value Indicators

To date we lack a clear definition of the concept, as well as a framework that serves as a tool for addressing societal challenges and identify value outputs. The Smart Network and Services (SNS) joint undertaking of the EU Horizon Europe programme for research and innovation started to request from research projects to address Key Value Indicators (KVIs). The work programme does not explicitly specify which values should be addressed, but rather refers to the Sustainable Development Goals (SDGs) of the UN and the work of the research projects HEXA-X and HEXA-X II. A recent publication in Telecommunications Policy magazine tries to shed more light into the problem space.

In the case of UN SDGs, the SNS work programme provides examples such as: SDG 8: Promote sustained, inclusive, and economic growth: achieve higher levels of economic productivity through diversification, technological upgrading, and innovation. SDG 9: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation, upgrade infrastructure and retrofit industries to make them sustainable with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes. SDG 11: Make cities and human settlements inclusive, safe, resilient, and sustainable. SDG13: Climate Action: Support smart low carbon lifestyles, monitoring emissions, and shaping demand in transport and energy, enabling resilient mission critical communications in extreme weather (vertical markets: transport, health, and public safety). Furthermore, it provides for complementary societal values in ethics issues related to privacy and EMF (electric and magnetic fields) awareness and reduction.

A first indicative list of KVIs published by HEXA-X names three groups of KVIs, namely Democracy (privacy, fairness, digital inclusion, trust), Ecosystem (sustainability, business value, economic growth, open collaboration, new value chain) and Innovation (safety, security, regulation, responsibility, energy consumption). However, from a more practical AI/ML applicability point of view different KVI areas could be formulated, namely resilience, sustainability, and inclusiveness. In these areas the role of AI/ML can be better formulated and possibly measurable indicators can be derived.

Resilience

Resilience, defined as the ability to rapid recovery if failure occurs and ability to scale to meet unforeseen demand, is a fundamental property of 6G networks. AI/ML has demonstrated the ability to enhance network resilience by enabling dynamic adjustments to unforeseen disruptions, as well as forecasting unusually high demand and mitigating security attacks. AI algorithms can contribute to developing robust communication protocols and fault-tolerant architectures to handle unexpected disruptions, ensuring continuity of network operations.

Sustainability

Sustainability, defined as meeting present needs without compromising future generations' ability to meet their own needs, has become a top priority for the design and development of 6G networks. AI/ML may play an important role in enabling environmentally responsible and energy-efficient network capabilities. First and foremost, AI/ML can help optimising energy consumption and overall resource use during service delivery and network operations. The technology may also help prioritising technologies and practices that minimise the network's environmental footprint. However, there is a notable tussle to address, namely the high energy demand of AI/ML algorithms during the training phase. Hardware accelerators are increasingly being used, like GPUs (Graphics Processing Units) and TPUs (Tensor Processing Units). Although they achieve efficient processing of data during the training phase, they increase the environmental footprint, since increased demand for hardware has a

negative impact on the overall life cycle assessment as well.

Inclusiveness

Inclusiveness, defined as the recognition that every member of society should have equal access to opportunities, resources, and services, is a top priority of policy and regulation in the context of 6G. In this context AI/ML may play a role in steering the development and deployment of 6G towards inclusiveness. Through transparent system capabilities and user-friendly interfaces, AI/ML-powered systems can ensure accessibility for individuals with diverse technical knowledge or disabilities. Moreover, support for under-represented communities can be achieved by providing real-time translation services and access to remote civic services, thereby improving accessibility and enhancing overall well-being. However, there is a tussle to overcome in inclusiveness as well; namely that the measures to address inclusiveness are known since decades, yet they are expensive, because they often imply the deployment of more resources. AI/ML could be used in such a setting, as the tool to help resolving the tussle, i.e. to propose economically viable, yet inclusiveness supportive 6G deployment models.

Outlook

The telecommunications ecosystem; vendors, operators, and service providers, have started to acknowledge the need to address the pain points and the needs of the customers and the society at large. Such pain points and needs are usually not quantifiable through performance metrics, such as data rate and latency. Additional indicators and metrics are necessary to measure the value output of ICT. Although technology evolution has started to understand how to use AI/ML as a tool to improve "classical" key performance indicators, it must now start to investigate how to use the same tool to address key value indicators and metrics.

Further information

- UN Sustainable goals – http://www.un.org/sustainabledevelopment/sustainable-development-goals
- Hexa projects – https://hexa-x.eu/ and https://hexa-x-ii.eu/
- Key value indicators: A framework for values-driven next-generation ICT solutions, Telecommunications Policy – https://doi.org/10.1016/j.telpol.2024.102778

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Empowering Collaborative Intelligence: The Federated Learning Approach

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The emergence of cloud native architectures and the use of AI/ML over federated data sources brings benefits in terms of efficiency and adaptability compared to legacy data architectures. However, challenges arise in terms of privacy and security for the data, the distributed infrastructure and the virtualised services and applications. To address these challenges, PAROMA-MED project delivers an open-source platform to deal with privacy preservation in scalable and reliable way that will be catering for the establishment of personal data federation practices.

In the current era, data emerge as a highly value commodity and the need for insightful knowledge relies on the availability of large volumes of data. However, privacy concerns, fueled by the increasing awareness about the fundamental digital rights of the individuals, and continuously evolving data regulations, especially in EU, pose certain obstacles that make traditional methods of data aggregation and analysis obsolete.

The data availability we have experienced so far was established during the last decades through user interaction with online services and platforms because of their voluntary (or neglectful) behavior to create content. This has fueled the production of the Large Language Models that have radically changed the current service and application landscape but at the same time they have triggered discussions about the created value and the potentially neglected royalties that may be stemming from training data owner-

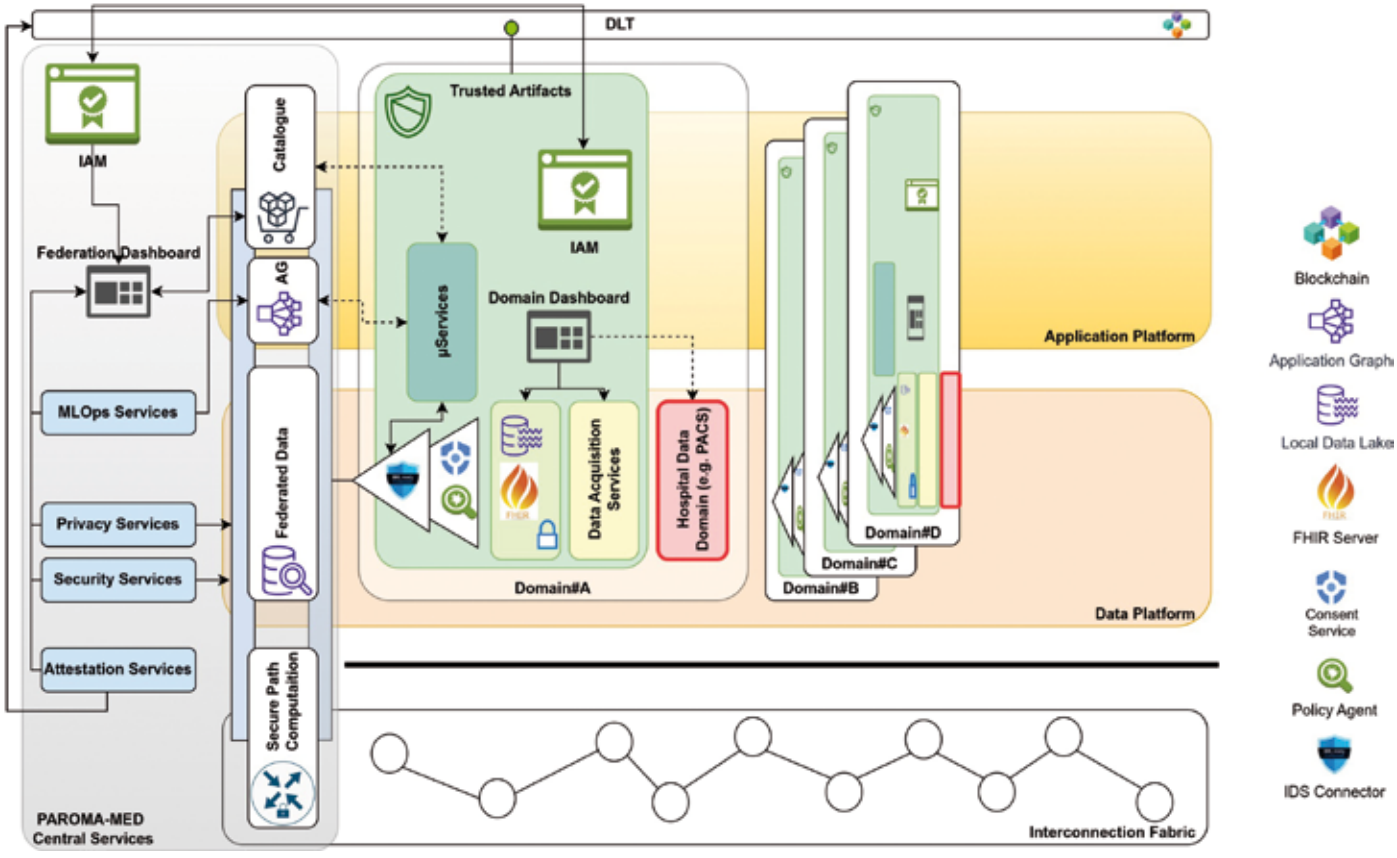

Figure 1: Hybrid Cloud Architecture

ship but equally important about privacy violation.

The need, however, for continuous evolution of AI, in view of its countless capabilities, requires that such obstacles are properly removed but also that the rights of individuals are protected adequately. Federated Learning emerges as a radical solution, establishing a path forward by ensuring data privacy while allowing machine learning models to evolve.

The Concept of Federated Learning

Federated Learning is based on a distribution approach regarding execution of the learning cycles and tasks, introducing a completely new fundamental approach in machine learning workflows. In contrast to current methods that require transfer and centralization of data for performing analysis and training computations, Federated Learning distributes the learning tasks to the computing resources at the border of the privacy perimeter of domains, networks or even personal equipment. In this way, devices, such as edge nodes, gateways, smartphones or Internet of Things (IoT) devices, take over computations on local data sets and update a global model in collaboration with other peer nodes participating in the training.

This edge empowered approach, which can also aid in real-time insights and adaptive decision-making without cloud infrastructure dependencies especially in the context of Data Spaces, eliminates the need for data movements thus contributing to better user privacy protection as well as to better controlled and managed access to data resources. From ML point of view, the model is the only part that is centralised and evolves through the updates collected by a central entity, from each one of the peripheral nodes, ensuring collective intelligence of the distributed data without the compromising of privacy that is left open when data leave their vault. Additionally, the participation of peripheral nodes (and consequently of the data used for the training) can be fully traceable ensuring, potentially, better handling of data royalties due to the contribution to a model that can be thereafter monetized.

Federated Learning addresses privacy concerns by design and can be further enhanced in terms of privacy effectiveness if combined with cryptographic techniques such as federated averaging and differential privacy that can be used for obfuscating sensitive information. These features make Federated Learning a good candidate for intelligence and insightful knowledge creation in industries like healthcare and finance, where data confidentiality is paramount. For example, medical institutions can collaboratively improve models for diagnostic purposes without direct exposure of patient records.

Challenges and Future Directions

As it happens with all distributed patterns, Federated Learning is challenged by aspects such adequate communication for the entire machine learning workflows (discovery, negotiation, preparation and model training and synchronization) especially when it comes to heterogeneous devices and varied networking conditions. Luckily, in the context of the ongoing Data Space evolution, a new paradigm shift in that field (e.g. PAROMA-MED project) based on the repositioning of the primary objective of data sharing towards distributed use of data through code to data techniques can overcome this challenge by eliminating at the same time obstacles stemming from heterogeneity due to the fact that Data Spaces are already being built on top of well-defined protocols, procedures and identity management procedures.

Furthermore, PAROMA-MED project considers the protection of the produced AI model in the same way as it does with all other data resources. Therefore, AI/ML researchers are empowered to express the high-level requirements for privacy and security (privacy and security by design) during the training phase of their models so that the platform marketplace backend service can apply automatically the deployment of the Machine Learning Operation (MLOps) artifacts, ensuring enforcement of the security constraints through smart contracts and policy agents, during the training and distribution of the produced models.

Further information
PAROMA-MED project website:
https://paroma-med.eu/

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AI Techniques for the 6G AI-AI

Physical Layer Techniques

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The CENTRIC project aims to develop a sustainable AI-native Air-Interface for 6G networks, revolutionizing wireless communication through user-centric design. By leveraging advanced AI techniques, the project focuses on user objectives and application-specific requirements, creating a user-centric AI Air Interface (AI-AI). The project is utilizing advances in machine learning (ML) to enable the development and discovery of efficient waveforms, custom modulations, and transceivers for the physical layer as well as customized lightweight communication protocol and sustainable RRM techniques for the MAC and RRN layers, respectively.

To ensure practical implementation, CENTRIC explores innovative hardware computing substrates with energy-efficiency properties, including neuromorphic computing and mixed analog-digital platforms. The project also explores AI-driven innovation and addresses critical challenges in achieving its 6G AI-AI vision. In this paper, we present CENTRIC's vision and contributions to AI-native physical layer techniques for 6G networks.

End-to-End Learned Waveforms and Modulation

Over the past decade, machine learning (ML) has significantly impacted various engineering fields, including signal processing in wireless communications. This revolution is evident in the 3GPP work group on ML for 5G Advanced (Rel. 18) and the integration of neural network hardware accelerators into 5G modems by chip manufacturers. Despite its non-newness, the research driving this current wave of ML adoption began less than a decade ago. ML is often used due to model deficits or algorithmic deficits, indicating the lack of reliable mathematical models or effective algorithms.

CENTRIC emphasizes the importance of well-established models and engineering insights in AI-native solutions. Leveraging domain knowledge is instrumental to developing ML-enhanced algorithms that can be generalized with minimal training data. Techniques like MIMO detection and channel estimation are common examples, with "deep unfolding" being a common technique. Another research line aims to replace physical layer algorithms with neural networks, interpreting the transmitter, channel, and receiver as a single neural network or autoencoder. This concept, also known as "End-to-End (E2E) learning", optimizes the entire communication system from E2E with respect to a chosen loss function. E2E learning can lead to new codes, waveforms, and modulation schemes that are spectrally efficient and hardware-friendly due to lower peak-to-average-power ratio (PAPR) than existing solutions.

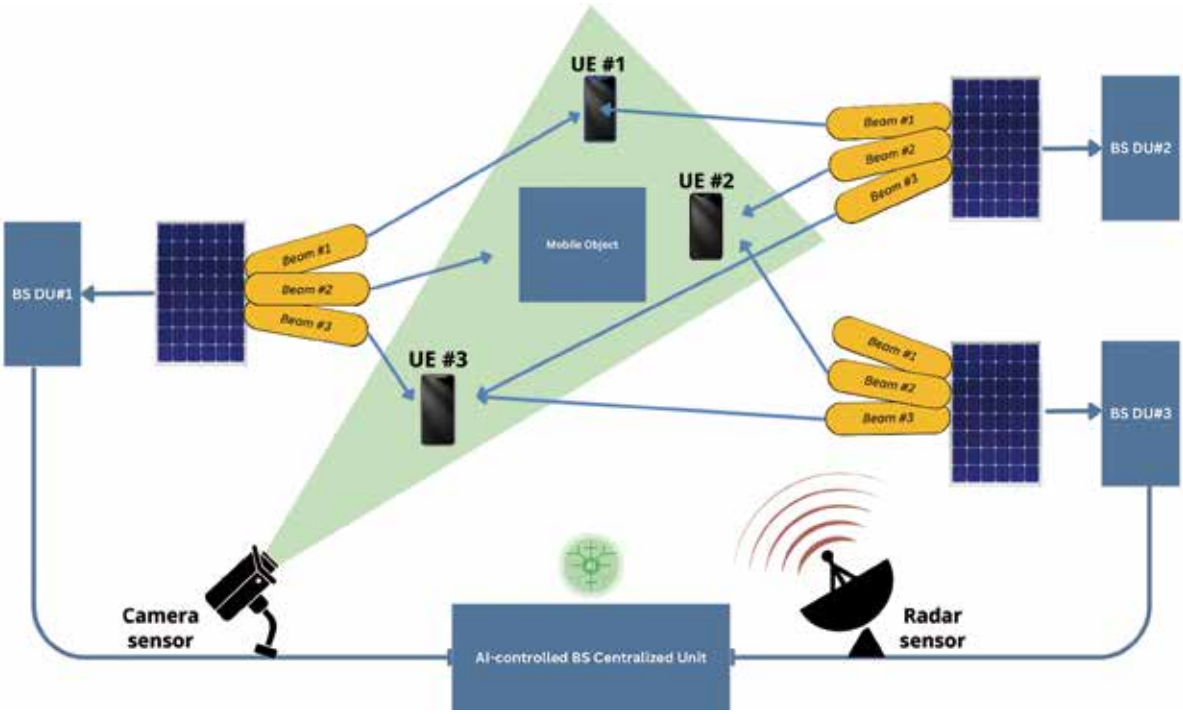

Figure 1: Centralized AI models supports sensing aided beam management in MU-MIMO.

To fully realize the benefits of E2E learning, CENTRIC considers the following research directions as crucial:

- **Integration of model-driven and end-to-end learning for new waveforms for the sub-THz band and transmission of short packets are essential components of 6G AI-AI.** Existing works have shown potential for data-driven optimization of waveforms, but this approach has not been applied for THz channels and hardware due to phase noise and non-linear effects. With CENTRIC's E2E learning framework, it is now possible to train the entire communication chain as a single neural network.

- **Symbol modulation and demodulation are essential components of the PHY layer.** In 5G NR physical downlink shared channel, modulation schemes are used in combination with channel coding to determine data transmission spectral efficiency. Currently used fixed modulation types do not adapt to specific channel conditions or RF impairments. In CENTRIC, deep learning techniques are used to overcome the downsides of fixed modulations and to design a flexible constellation mapper that adapts to real-world channel conditions by dispensing with channel probability distribution models.

AI-empowered MIMO communications

For the last two decades, MIMO communication has been one of the main drivers for boosting the spectral efficiency of modern mobile communication systems. Looking towards the future, the path to further development of MIMO processing is plagued with old and new challenges that AI techniques seem particularly well-suited to overcome: (i) scaling issues in performance and computational complexity resulting from increasing MIMO dimensions; (ii) infeasibility of MIMO precoding due to increased pilot overhead for CSI acquisition and computational burden; and (iii) directional beamforming and beam-based operations required at high frequencies to overcome pathloss and blockage vulnerabilities.

The technical innovations that CENTRIC proposes in the area of MIMO processing to overcome the difficulties described above include:

- **6G AI MU-MIMO neural receiver:** MIMO detection has been extensively studied, but current solutions often struggle with realistic channel models or require dedicated neural networks for different system parameters. CENTRIC has now developed a novel neural network-based receiver for MU-MIMO detection which is compliant with 5G NR PUSCH signal while also able to support beyond 5G functionalities including pilotless communications and custom constellation learning. The neural receiver has been evaluated and measured on realistic 3GPP channel and verified in the lab via hardware-in-the loop experiments. Further enhancements to the receiver to short packet transmissions and waveform learning are being explored in CENTRIC. Transfer learning techniques, which transfer knowledge from training models to new configurations or tasks, are also being explored for adapting neural network-based receivers to diverse system parameters.

- **CSI compression and prediction:** The acquisition of CSI at the transmitter and receiver is a significant challenge for future wireless networks due to the high pilot overhead. CENTRIC has developed novel ML techniques for CSI compression and prediction based on DNN and autoencoders. Learning frameworks for efficient use of ML models for CSI feedback without sharing large data sets are also being developed.

- **Sensing aided Beam management** in 5GNR focuses on selecting and retaining a proper beam pair between transmitter and receiver for good connectivity. Without sufficient measurement reports, signal blockage may interrupt service, leading to the degradation of quality. Some works propose beam prediction using additional information like position or LIDAR (Light detection and ranging), focusing on localization of individual users for better service. CENTRIC focuses on AI methods for user-centric, sensing aided beam operations in mmWave networks.

Further information
CENTRIC project website:
https://centric-sns.eu/

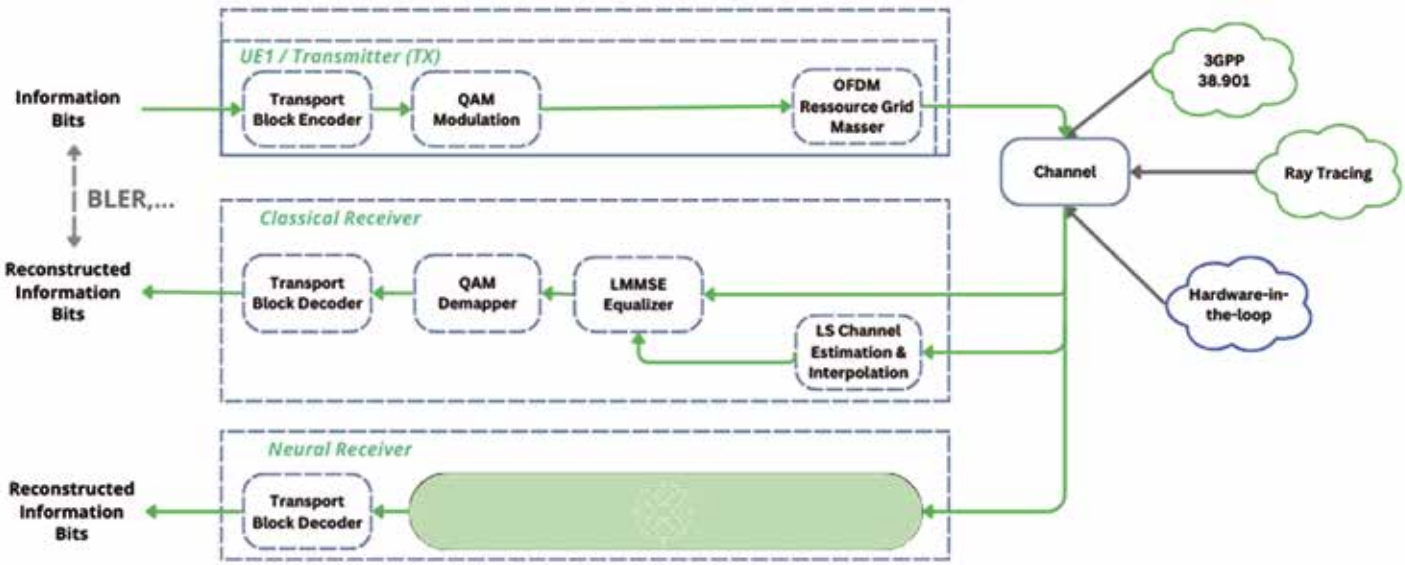

Figure 2: Neural network replaces LMMSE equalizer, demapping and channel estimation blocks in traditional receivers.

CELTIC-NEXT
Eureka Cluster

CELTIC News 1/2024

The newsletter of EUREKA Cluster CELTIC-NEXT

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https://www.celticnext.eu/national-public-contacts-funding-schemes/

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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 area see: CELTIC-NEXT Scope and Research Areas. https://www.celticnext.eu/strategic-roadmap/
- CELTIC-NEXT projects are close to the market and have a track record of exploiting their results soon after the end of the project.
- High-quality proposals have an excellent chance of receiving funding, with an average success rate higher than 50 %.
- The results of the evaluation will already be known in December 2024.

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

Contact:

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What's next for CELTIC-NEXT?

David Kennedy
CELTIC-NEXT Chair Person
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CELTIC-NEXT: Looking Back

It is said that there are periods in history where, if you jump 50 years, the world is recognizable. But there are other periods of rapid development where such a jump brings you to an unrecognisable new world. The first half of the 20th Century would be an example of the latter as at the turn of the century the world was still based on horse transport but by the middle of the 20th Century cars, trains and planes had made the world small and accessible to all.

For Telecommunications we have seen such a generational change in the first 20 years of the 21st Century. In fact, the pace of change from the late 1990s to today has seen the communications infrastructure change and evolve so rapidly that it has changed the behaviour of society as a whole.

As the new technologies advance, they reach a level where they become "adequate". What I mean by this is that it became sufficient for all normal needs to the point that you, as a user, no longer expects or demands evolutions. You don't ask any more if you PC processor is fast enough – they all are fast. We are rapidly entering the era where you don't worry about your data connection any more as it is fast enough. So where do we go from here?

CELTIC-NEXT: Looking Forward

There is a core challenge in the ICT domain that each evolution of the network infrastructure has prompted a complete infrastructure renewal. The fixed network had to be changed for a mobile network and then, in subsequent generations, all physical network elements had to be replaced with newer faster devices. No other infrastructure industry has had such a challenge. For example, the electricity network to your house has probably never been renewed. In the ICT sector growth has been explosive as people now have a communication device for every family member (probably including the dog) and most family members now have several communicating devices.

This means that Telcos must get a good return on investment on each new technology within a very short time in order to be able financially implement the next generation. To progress from here the ICT industry now has to migrate to more generic hardware that can provide many of the interesting evolutions through updating software. Network infrastructures must have interfaces that allow elements to be changed without changing the whole system. At the same time the whole ICT domain must address the new requirements that include important issues like: sustainability, renewability, inherent societal considerations and, more recently, sovereignty.

CELTIC-NEXT: The future opportunities

Two streams of innovation are essential for the future: the first is the revolution – where new services and devices that enhance our live must be invented and brought to life; and the second is evolution – where every aspect of how we do things must be overhauled to be done more efficiently, using less energy and resources, and for lower costs.

ICT not only must facilitate this for its own industry but also it is the facilitator for other sectors. The revolution of millions of sensors - the Internet of Things (IoT), combined with the explosion of Artificial Intelligence (AI) systems means we now should have all the data and the intelligence to learn how to improve everything.

The great opportunities for ICT now include:

- To use our imagination and inventiveness to make our systems simpler, lighter, and more energy efficient. AI can help here.
- To make the lifecycles more sustainable – reprogrammable equipment means longer working lives and less resources, and recycling helps everyone.
- To help reduce the digital divide and promote better education and information. Again, AI can help.
- To clean up the global information pool and make it safe. We all need information we can trust. Another opportunity for clever AI tools?
- On a personal level, we need assistance to enjoy the end-to-end communications, so long the backbone of CELTIC-NEXT projects, so let's invent a new family of cutting-edge services devoted to looking after the interests of the individual.

These challenges are ideal for the Eureka Clusters Programme, as the combination of national interest and early industry investment ensures the wellbeing of both society at large and the industry sectors is considered.

ICT is a tool for economic growth and development. The dramatic evolution of the ICT networks now mean that it generates lots of new opportunities and can change the way our civil society functions. We must now join forces within the CELTIC-NEXT cluster to address these challenges and take advantage of the exciting opportunities to protect, preserve and enhance all the best and beautiful parts of our societies and, at the same time, to invent and develop new, better, more sustainable, solutions to our existing problems.

The exciting evolving ICT sector can be used as a stimulus to stop the spread of negative trends and lead the way towards sustainable development on all levels. CELTIC-NEXT is looking forward to a new generation of projects inventing new networks and services that facilitate a better future for all.

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CELTIC-NEXT Events in a Nutshell

Past Events

EuCNC 2022 & 2023

CELTIC-NEXT and its strategic partnering Cluster Xecs held a joint booth at EuCNC 2022 in Grenoble, France, and at EuCNC 2023 in Gothenburg, Sweden. Both events were very good occasions for both Clusters to meet with the European ICT community members and exchange on inter-governmental funding opportunities offered by the Eureka network of countries within and beyond European borders. AINET Flagship was also present to display the excellence of the CELTIC-NEXT projects.

Xavier Priem, CELTIC Office Director and Nadja Rohrbach, Xecs Director

Eureka HLG/HLR Meetings under Portugese Chairmanship

Four times per rotating chairmanship, the Eureka High Level Group and High-Level Representatives of the Eureka country members meet to check the status of the Eureka Programmes (including the Clusters). CELTIC-NEXT's Director attended several Portugal led meetings to represent the interests of the CELTIC-NEXT community, discussing funding, alignment of topics and strategies, timelines of national calls, etc. One of the targets of those meetings is to attract new countries of the Network to fund CELTIC-NEXT projects. Canada has become a full member of Eureka, Chile as joint member

As an example, the ESA partnership with CELTIC-NEXT and Eureka got signed during the Porto meeting. Also during those meetings the United Kingdom representatives announced their increased support to the Clusters.

Group photo of the Eureka Network meeting in Porto, Portugal

Group photo at the Eureka HLG/HLR Network meeting in Izmir, Türkiye

Eureka HLG/HLR Meetings under Turkish Chairmanship

CELTIC-NEXT's Director attended the Brussels', Ankara's and Izmir's meetings. Both meetings were important for the Clusters and thus for CELTIC-NEXT. At CELTIC-NEXT's level, very fruitful discussions took place with over 20 countries, including Chile as new country for CELTIC-NEXT but also with Brazil that will be an associated Eureka country starting mid-2024. This reinforces one of the CELTIC-NEXT' unique selling points: the ability to have cooperative innovation with countries outside of Europe. Actions have been defined with both countries to introduce CELTIC-NEXT to their national eco-systems.

› Further information

https://eurekanetwork.org/about-us/chair/
https://www.celticnext.eu/celtic-next-participate-first-eureka-network-meetings-under-the-turkish-chair-22-23-november-2023/

CELTIC-NEXT Proposers' Day at the BPI Le HUB in Paris

CELTIC-NEXT Proposers' Brokerage Day in Paris

Due to and during COVID-19 Pandemics, CELTIC-NEXT took the decision to stop all CELTIC-NEXT's regularly organised physical events such as Proposers' Brokerage Days and CELTIC-NEXT annual promotional events. Even if COVID-19 is still present, it is now better mastered and physical meetings have rebooted all over the world. Recognising this, CELTIC-NEXT organised its first post-COVID-19 event at "le Hub by BPIfrance" in Paris, with the support of the French Public Authority in Eureka: BPIfrance. Despite the strikes blocking half of our registered attendees, the event was a success, with keynotes from the Industry and from BPIfrance.

› Further information

https://www.celticnext.eu/past-proposers-days/

Upcoming Events

Eureka Clusters Special Session at the GIS 2024 in Istanbul

The Global Innovation Summit 2024 brings together global leaders, decision-makers, companies, and key research organizations from all over the globe to tackle the most pressing challenges of an ever-changing world.

This year's event is coordinated by the Scientific and Technological Research Council of Türkiye (TÜBİTAK). Among the main priorities of the Turkish Chairship towards building bridges for global challenges are: impactful instruments, building a green and digital future, sustainability of Eureka, embrace the Globe.

On 13 June from 13:45-15:00, the Eureka Clusters CELTIC-NEXT, EUROGIA, ITEA, SMART and Xecs will organise the session 'Turkish companies and Clusters: A mutual synergy'.

This session will enable you to discover and interact with the Eureka Clusters funding instrument, and to learn more about the experiences, benefits and impact for and by (Turkish) companies through participation in Eureka Cluster projects.

› Further information
https://gis-2024.b2match.io/contact

EuCNC & 6G Summit 2024 in Antwerp, Belgium

The 2024 EuCNC & 6G Summit builds on putting together two successful conferences in the area of telecommunications: EuCNC, in its 33rd edition of a series, supported by the European Commission; the 6G Summit, in its 6th edition, originated from the 6G Flagship programme in Finland, one of the very first in its area. CELTIC-NEXT and Xecs will jointly hold the booth #60.

› Further information
https://www.eucnc.eu/

CELTIC 21st Anniversary Celebration & CELTIC-NEXT Exhibition at Berlin 6G Conference 2024 (1st-4th July 2024 at Berlin Congress Centre – BCC)

As already mentioned, on the 2nd of July 2024, CELTIC will celebrate its 21 years of existence on the scene of the international cooperation fostering innovation in the ICT domain and its application verticals. The Celebration's agenda will be communicated online. High level speakers from BMBF, Eureka and the Industry will share the floor of the Plenary Auditorium and express themselves on CELTIC, its great achievements and their vision of its future.

On the 2nd of July also, in the afternoon session, AINET will hold its Closure Event also in the Plenary space.

CELTIC-NEXT will also hold its exhibition from 1st to 4th of July at BCC. CELTIC-NEXT's running projects will expose their current achievements sharing the 6 booths dedicated to CELTIC-NEXT. The Office will be present with a booth for providing information on the programme. Finished projects will have the possibility to hold posters.

Please join us to celebrate together 21 years of international innovation cooperation!

› Further information

https://tuk-anmeldungen.procampus.de/de/6g-conference-2024/
https://www.6g-plattform.de/berlin-6g-conference/

CELTIC-NEXT Proposers' Brokerage Day Autumn Call 2024

CELTIC-NEXT is pleased to announce that the next Autumn Call 2024 will be launched on the 28th of May 2024 with an online event. The Proposers' Brokerage Day will take place on the 5th of September 2024 in physical presence. The location will be announced via our Newsletter and our Web site.

These events are the occasion for all to find potential partners consortium and to get the first feedback from the Public Authorities.

CELTIC-NEXT bottom-up calls are the perfect opportunity to enable projects in the field of next-generation communications for the digital society that contribute to a sustainable world. By applying and participating in any CELTIC-NEXT Calls, your organization can access national public funding for your R&D project as well as a large community sharing your interests.

› Further information to come

https://www.celticnext.eu/

Overview of CELTIC-NEXT running projects

Presenting our current 15 innovative projects in the domain of ICT

In the first half of 2024, the CELTIC-NEXT ICT cluster has a total of 15 ongoing projects that started between October 2021 and May 2024. These projects collectively represent cutting-edge ICT research and development efforts focused on diverse areas such as networking, AI, healthcare and wireless technologies to drive innovation and address critical challenges.

These 15 projects aim to discover technological advancements and outcomes in high technology readiness level (TRL) in the domain of ICT. In the perspective of CELTIC-NEXT vision to obtaining results with a successful technology-market oriented approach, the projects represent an investment of 132.9 millions of euros in public and private money. Around 311 companies, start-ups, SMEs and major industrial-players, Research and Technologyl Organisation (RTO), and universities are involved in actual research from 22 different countries in and outside Europe.

EMBRACE: Efficient Multi-Band networRk Architecture and Components for Petabit/s Elastic networks

Start Date: October 2021
End Date: October 2024
Budget (total): 3207.6 K€
Project Coordinator: Orange SA, France

EMBRACE develops, investigates, and demonstrates the required photonic technology for a complete optical system exploiting the entire spectrum of the single mode fibre (SMF) for applications from metro to long-haul reach. This solution is supported by the large availability of SMFs with almost negligible water peak and thus extended low-loss spectral window. Right now, EMBRACE project is working on solutions to exploit the whole 1260-1625 nm spectrum. Within the project, the designed and prototyped multi-band (MB) components (coherent transceivers, optical amplifiers, wavelength selective switches, lasers) will be integrated into a permanent project demonstrator and tested over real installed fibres owned by the operators participating to the consortium.

SAFE HOME: Security-aware fog-based efficient Home monitoring for elders

Start Date: April 2021
End Date: March 2024
Budget (total): 2853 K€
Project Coordinator: Instituto de Telecomunicações, Portugal

SAFE-HOME is a multi-disciplinary project, which exploits the intersection of a number of disruptive technologies, namely sensor design, artificial intelligence and machine learning algorithms, and recent advances in wireless networking, with emphasis on the interoperability of fog-cloud. The project aims at designing a system for monitoring the activity and movement of elders within a confined space (Home), in order to understand their activity level, with ability to identify emergency situations for alerting specific personnel, based on emergency type (e.g. medical staff, ambulance, or emergency contact). SAFE-HOME will also consider users surrounding information (e.g. neighbourhood and city information) in order to enrich solution results.

iCare4NextG: Integrated care for next-generation

Start Date: April 2021
End Date: March 2024
Budget (total): 3421 K€
Project Coordinator: Turkcell Teknoloji, Türkiye

The project develops a service framework where increased possibilities for improved wellness and care at home, directed by data driven methods, integrating needs from different stages of life, different caregivers and different diagnosis. A combined strategy of service framework development, business modelling and use case solutions are undertaken and this multi-track approach aims at developing a service framework that enables the creation of flexible user solutions and a business milieu where new digital business models can flourish. Care integration would incorporate a number of different providers, would be possible to deliver to the end user in an integrated way.

AI-NET Flagship: Accellerating digital transformation in Europe by Intelligent NETwork automation

Start Date: June 2021
End Date: August 2024
Budget (total): 66547 K€
Sub-projects: AI-NET-ANIARA, AI-NET-PROTECT, AI-NET-ANTILLAS

The most recent CELTIC flagship project is AI-NET, launched in mid-2021 with a €66M total budget. Public authorities of Germany, Sweden and Finland, as well as major players from industry (both large and SME), and academia, are part of this ambitious European initiative.

AI-NET-ANIARA: Automation of Network edge Infrastructure & Applications with Artificial Intelligence

Start Date: June 2021
End Date: January 2024
Budget (total): 11214 K€
Project Coordinator: Ericsson AB (EAB), Sweden

The primary objective of the ANIARA project is to provide enablers and solutions for high-performance services deployed and operated at the network edge. To manage complexity, of artificial intelligence to complement traditional optimisation algorithms. Currently, deep edge network nodes will be deployed at locations not prepared for the power requirements of edge-centric compute.

AI-NET-PROTECT: Providing Resilient & secure networks [Operating on Trusted Equipment] to CriTical infrastructures

Start Date: June 2021
End Date: June 2024
Budget (total): 26585 K€
Project Coordinator: ADVA Optical Networking SE, Germany

The primary focus of the AI-NET-PROTECT sub-project is to provide automated resilience and secure networks operated on trusted equipment to critical infrastructures and enterprises. AI-NET-PROTECT will ensure the protection of critical data, network performance (like latency, throughput, availability), and infrastructure (against tampering and attacks).

AI-NET-ANTILLAS: Accellerating digital transformation in Europe by Intelligent NETwork automation

Start Date: June 2021
End Date: August 2024
Budget (total): 28748 K€
Project Coordinator: Nokia, Germany

AINET project objective is to provide enablers and solutions for high-performance services deployed and operated at the network edge. They contribute to cyber-resilient intelligent network automation from the edge to the core through the FOG, and from the services to the physical resources, for end users, machine-to-machine and IoT networks. AINET-ANTILLAS concentrates on applying these technologies to automotive / teleoperated driving, manufacturing industry, public safety, and public utility businesses. The goal is to provide enablers and solutions for high-performance services deployed and operated at the network edge or in the cloud.

ENTRY100GHz: Energy-Efficient Radio Systems at 100 GHz

Start Date: September 2021
End Date: August 2024
Budget (total): 9151.42 K€
Project Coordinator: Chalmers University of Technology (CTH), Sweden

The aim of the current project is to develop a highly efficient integrated antenna module and RF front-end solution with adaptive waveform generation in spatial, temporal, and frequency domains for beyond 5G (B5G) wireless communication infrastructure at 100GHz band and support other application sectors such as security & sensing, imaging, industrial IOT, automation etc. The proposed solution will be able to adapt dynamically to different user scenarios such as ultra-high data-rate multi-user broadband communication, reliable high mobility connectivity, ultra-low latency machine communications etc.

USWA: Ultra Scalable Wireless Access

Start Date: December 2022
End Date: November 2025
Budget (total): 12883.18 K€
Project Coordinator: Wirepas Oy, Finland

The project Ultra Scalable Wireless Access (USWA) focuses on technology research how to utilize the new DECT-2020 NR radio technology developed in ETSI in various use cases. DECT-2020 NR provides modern radio interface design with state-of-the-art radio capabilities for industrial use cases. DECT-2020 NR technology supports natively mesh radio network architecture which is enabling large scale local networking by relaying data between different devices and also enabling direct communication between devices. DECT-2020 NR technology can operate in a specific license exempt band used by legacy DECT.

F4iTECH: Federated AI Platform for Industrial Technologies

Start Date: March 2022
End Date: February 2025
Budget (total): 2232.44 K€
Project Coordinator: Inosens, Türkiye

Current AI-based industrial applications have a linear sequential approach for data collection, processing and model deployment cycles where each part of the cycle has a clear task. However, collecting the data required for learning the desired models in one place may not always be possible and centralized data collection may cause data quality issues. This project aims to provide great benefit to the manufacturing and transportation industries by efficiently incorporating artificial intelligence into the production or operation line to resolve and eliminate some invisible and internalized problems that cost a lot.

COA-CFD: Cloud-based Online Access to Computational Fluid Dynamic Simulations

Start Date: March 2022
End Date: March 2026
Budget (total): 15836.8 K€
Project Coordinator: Engineering Software Steyr, Austria

Computational Fluid Dynamics (CFD) simulations utilize computational resources to simulate free flows of fluids (air, water, etc.), and the interaction of fluids with surfaces. CFD simulations are used in development of new mechanical parts in the automotive, aerospace and military industries to increase efficiency. CFD based experiments are cost effective in comparison to conventional methods and can estimate properties which cannot be empirically measured. For the last decade, Engineering Software Steyr GmbH (ESS) has been developing new CFD capabilities (particle-based methods) in the form of four new solvers (CFD simulation programs) and hybridizing them to increase usability.

AICom4Health: AI-Powered Communication for Health Crisis Management

Start Date: January 2022
End Date: May 2025
Budget (total): 4985.30 K€
Project Coordinator: SII Concatel S. L., Spain

The objective of AIcom4Health project is to offer an innovative solution towards recovering the pandemics negative impacts on public health ,healthcare access and socioeconomics through remote monitoring -AI based platform's integration to the public's daily life whereas employing healthier citizens for smart cities s in the area of 5G and beyond, network slicing, edge computing, artificial intelligence and machine learning based on feasible use cases including both medical and non-medical sensors for making accurate decisions and predicting risks against contagion in the future. The use cases include integration of an IoT platform with various types of sensors to monitor physiological, behavioral and environmental data from natural indoors and outdoors environments.

6G-SKY: 6G for Connected Sky

Start Date: May 2022
End Date: April 2025
Budget (total): 8924 K€
Project Coordinator: Airbus Defence and Space GmbH, Germany

6G for Connected Sky project aims at solutions to enable reliable and robust connectivity for aerial and ground users via flexible and adaptive network architecture adopting multiple technologies such as satellite and direct air to ground communication (DA2GC). In addition, this project focuses on novel wireless network design and management schemes in 3-dimensional (3D) space including different types of flying vehicles with their unique requirements. Another focus is to provide robust, low latency and/or high-capacity communications to ground users in the rural areas without any infrastructure via non terrestrial networks (NTNs), which are already initially introduced in 5G.

CANOPY: Cognitive and Automated Network Operations for Present and Beyond

Start Date: January 2022
End Date: December 2024
Budget (total): 4203.35 K€
Project Coordinator: Celfinet, Portugal

The objective of this project is to create a novel NOC proactive management solution that will enable the evolution from the current reactive mode of operation towards a proactive and preventive mode. The vision is to predict problems that are going to occur before they impact customer service, providing an integrated view of the issue being solved, performing Root Cause Analysis (RCA) to understand and identify what causes triggered the problem and the corresponding recommended resolution.

CISSAN: Collective intelligence supported by security aware nodes

Start Date: May 2023
End Date: May 2026
Budget (total): 8985.23 K€
Project Coordinator: University of Jyväskylä, Finland

CISSAN proposes and implements algorithms for mitigating IoT security threats through collective decision-making and with a reduced impact on the limited resources of IoT devices. These algorithms are based on research and innovation in optimizing the distribution of security capabilities and aggregating the intelligence in IoT network nodes. Three industrial use cases, on the use of IoT, inform the project developments and are used for validating and demonstrating the project results: (i) public transportation; (ii) smart energy grids; (iii) mining and tunnelling operations.

IoDT2: Internet of Digital Twin Things

Start Date: May 2024
End Date: April 2027
Budget (total): 2504 K€
Project Coordinator: Loughborough University, UK

As current digital twin practices have limitations due to the central location of most digital twin models, which can cause data processing latency and network bandwidth issues, the freshly labelled project will be built on an Information Centric Network (ICN) inspired digital twin network called Digital Twin Centric Network (DTCN). This will allow digital twin models, data, and compute resources to be published and located across networks easily. This framework will have applications in various industries, such as manufacturing (Industry 4.0), healthcare, and smart cities. To demonstrate and validate the framework, the proposers will use an asset management use case in the aerospace sector.

› Further information

CELTIC-NEXT website – https://www.celticnext.eu/running-projects/

Ongoing CELTIC-NEXT signed collaborations

Memorandum of Intent signed with ESA to enable faster convergence and development between terrestrial and non-terrestrial networks & services

On November 22, 2021, Eureka Cluster CELTIC-NEXT and the European Space Agency (ESA) formalized a partnership through the signing of a Memorandum of Intent (MoI) in Porto, Portugal. This collaboration aims to strengthen ties between their respective communities and drive economic growth and job creation by coordinating research, development, and innovation (R&D&I) activities in integrated space and terrestrial systems enabled by 5G and 6G technologies.

Signing the Memorandum of Intent (from left): Eureka Chairman Miguel Bello Mora, Elodie Viau – Director of Telecommunications and Integrated Applications and Head of ECSAT at the European Space Agency (ESA), and CELTIC Office Director Xavier Priem.

This MoI emphasizes leveraging the synergies between ESA and CELTIC-NEXT to maximize investment returns and contribute towards achieving the UN Sustainable Development Goals. In today's dynamic political and economic environment, Space ICT has emerged as a critical pillar for sovereignty and resilience. The growing importance of Space ICT is evident as it becomes central to global industry and government agendas. From an economic standpoint, new non-European players are disrupting the sector with innovations like Low-Earth-Orbit (LEO) satellites and High-Altitude Pseudo-Satellites (HAPS).

The collaboration between CELTIC-NEXT and ESA aims to address these challenges by fostering cross-fertilization and collaboration between their communities. This partnership will facilitate the convergence and development of terrestrial and non-terrestrial network and service technologies, including three-dimensional networking.

To implement this collaboration, both organizations will leverage their respective funding instruments, processes, and expertise while coordinating on specific themes such as network convergence, system development, business ecosystem models, and spectrum sharing. Joint activities will include roadmapping, advisory boards, knowledge networks, webinars, workshops, and testbeds/trial platforms to support common objectives and priorities.

Further collaboration to expect

This MoI marks the beginning of a series of strategic collaborations for CELTIC-NEXT, enriching its support and impact within the ICT community. The collaboration offers an ideal platform for the space and terrestrial ICT communities to collaborate on strategic initiatives and projects. CELTIC-NEXT looks forward to the space community's contributions and engagement in upcoming joint initiatives focused on Space ICT and three-dimensional networking.

Memorandum of Understanding signed with the 6G-IA to establish synergies and complementary activities in collaborative ICT research

The Memorandum of Understanding (MoU) to collaborate on ICT research between Eureka Cluster CELTIC-NEXT and the 6G Smart Networks and Services Industry Association (6G-IA) is now signed for a year now. As its aim is to enhance economic growth and job creation through joint R&D&I activities and the commercialization of outcomes, this collaboration leverages the strengths of both organizations to maximize investment returns and support the UN Sustainable Development Goals.


MEMORANDUM OF INTENT
between
the 6G-IA/SNS,
and
CELTIC-NEXT Programme, as represented by EURESCOM GmbH,
on
Joint Coordination with regard to the CELTIC-NEXT Programme

In the context of today's rapidly evolving social, political, and economic landscape, information and communication technology (ICT) plays a crucial role in ensuring national sovereignty and resilience. Recent global events such as the Russian-Ukrainian conflict and the COVID-19 pandemic have underscored the critical importance of both terrestrial and non-terrestrial ICT services as essential components of a country's infrastructure. To address these challenges, there is a pressing need to increase and optimize funding for R&D&I initiatives in European, with the goal of accelerating innovation and enhancing the competitiveness of the ICT industry.

This collaboration is for now facilitating cross-program discussions and soon workshops and joint projects will be organised to aim at advancing technology readiness and addressing key societal challenges outlined in the Sustainable Development Goals. It encourages cross-program discussions, workshops, and collaborative projects to advance technology readiness and achieve Sustainable Development Goals. Consultations on Strategic Research and Innovation Agendas (SRIAs), organize joint activities, and leverage resources to achieve common objectives are in discussion. Regular reviews will ensure effective collaboration and alignment with each community priorities.

Opportunities for the future

This MoU represents a new collaboration for CELTIC-NEXT and expands its impact within the ICT community. It provides a platform for the 6G-IA and CELTIC-NEXT communities to collaborate on strategic topics and projects.

To operationalize the MoU, the signatories have committed to several actions, including promoting collaboration within their respective communities, consulting on Strategic Research and Innovation Agendas (SRIAs), organizing joint activities, and leveraging their combined resources and expertise.

Outlook

These two memorandums signed with two different big organisation in their domains are a significant milestone for CELTIC-NEXT, representing a strategic expansion of its impact within the ICT community. By fostering closer ties and cooperation, they provide valuable platforms for both communities to collaborate on critical strategic initiatives and projects that will shape the future of ICT.

They will also allow knowledge exchange and SRIA's cross collaborations in the years to come, will help levering funding schemes across low TRL topics, support an easier pipelining for proposals and offer innovative entities the full panel between top-down programs and bottom-up spaces for their collaborative projects.

Roadmap implementation & Outlook

How CELTIC-NEXT is delivering on its 2021's ambitions and what is coming for CELTIC-NEXT in 2024-2025

Xavier Priem
Director CELTIC Office
priem@celticnext.eu

For CELTIC-NEXT, 2021 was a year of renewal and change. 2022 and 2023 were two important years of implementation and analysis. Let's have a look together to what has been achieved to date, and what we plan for 2024 & 2025.

Progress on Implementing the Roadmap

Since 2022, we have pursued the implementation of CELTIC's new roadmap by running several actions. We incorporated this roadmap in our Launch Events and Proposers' Brokerage Days, to allow consortia to propose innovative projects in the large number of fields of technologies, applications, and verticals of the new roadmap. This is our traditional bottom-up approach. We will continue to run our Spring and Autumn Calls as per our successful legacy. This is a unique selling point of CELTIC as a Eureka Cluster compared to other international funding schemes. And it will remain so in the future.

Working on the Partnerships

We signed two major partnerships (with ESA and with 6G-IA-SNS) to enhance our funding impact in the global ICT community, as well as in other industries. Those partnerships will nourish further our roadmap and attractiveness to Public Authorities to fund impactful innovative projects across and beyond the Eureka and European (contracted form: Eurekan) countries. The targets of those partnerships are: knowledge exchange & SRIAs cross-contributions; leveraging funding schemes across Technology Readiness Levels (TRLs) & topics; calls timing alignment & Easier pipelining of proposals; from Research to Market (TRL 7, early adopters, testbeds...); offering innovative entities the full panel between top-down programs and bottom-up spaces for their collaborative projects.

CELTIC-NEXT director Xavier Priem presented the CELTIC-NEXT Eureka CLUSTER advantages and proposal support at the 5G Techritory in a 6G-SNS ICE co-creation workshop on National initiatives.

Running Calls

At the time of publication of this edition of the CELTIC-NEXT's News, the Spring Call 2024 will have ended. Therefore, it is already time to announce the Autumn Call 2024! The Autumn Call 2024 will be launched on the 28th of May 2024 with an online event. The Proposers' Brokerage Day will take place on the 5th of September 2024 in physical presence. The location will be announced via our Newsletter and our Web site. The submission will close on the 21st of October 2024, for a labelling early December 2024. Forecasted possible start dates for labelled projects would be first half of 2025. We can also happily say that more countries support CELTIC-NEXT and that Sweden supports again our Autumn Calls.

Flagships

AINET is ending, time has come for a new flagship

AINET Flagship and its three vertical projects have been tremendous successes with a high impact on several fundamental KPIs. Those projects are about to end. A final Closure Event is programmed for the 2nd of July 2024, collocated with the 6G Conference Berlin. Please check the Events section of this CELTIC-NEXT News issue.
As we are writing those lines, a new large consortium has formed and is making the proposal of a new flagship proposal in the stream of SASER, SENDATE and AINET. More information will be shared if this proposal gets labelled during this summer. The CELTIC-NEXT office is happy to establish the contact between potential new partners interested in joining the flagship after its labelling. Please contact us at office@celticnext.eu .

Designing the Space ICT flagship programme

Space ICT has become a subject of high attention for industry and governments, and this has been strongly reinforced by the effects of the COVID-19 pandemic and the war in Ukraine. A clear sign has been also sent by 3GPP, which has now opened wider doors for the inclusion of SatCom besides the traditional backhauling role. The Memorandum of Intent will encourage terrestrial ICT and Space ICT industry collaboration with other industry verticals to facilitate the adoption of advanced Space ICT technologies in the business models and processes of all industry sectors. CELTIC-NEXT and ESA are working together to define a joint roadmap of technologies, use cases and agenda of calls. ESA is a key actor in the development of all aspects and fields of space activity. Once the first roadmap and calls agenda are ready, CELTIC and ESA will advertise those. The joint Roadmap and Agenda are being defined. The first CELTIC Space ICT flagship is under discussion with the Industry and the funding agencies and ministries.

Acquiring new Core Group memberships

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

ECP & Joint thematic calls

An analysis of the first results for the in 2021 initiated Eureka Clusters Programme (ECP) is currently ongoing. Target is to understand if the new structured collaborative approach grouping the five Eureka clusters under a Eureka Programme as such has achieved the goals it was assigned. Same applies to the first Joint Thematic Call on Sustainability. More will be reported once this analysis is finished.
No new Join Thematic Call bringing all Clusters together in a same call is foreseen as of today. Potential new more focused Joint Calls with CELTIC-NEXT, where a sub-group of clusters (2 to 3) would engage together, are under discussion. Once those calls are exhaustively defined, the CELTIC-NEXT office will advert them.

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

Outlook

2024 is and will remain a challenging year for many topics. Joint collaborative innovation and knowledge exchange is one of the best weapons against obscurantism, pandemics and wars. Our ICT community is one of the best positioned to understand and support this. Cybersecurity, Resilience of Critical Infrastructures, Sustainability... are certainly topics to be fully supported by our ICT technologies and to be ranked now as absolute priorities in the new world that is in front of us. The new flagship proposal goes along those strategic lines.

2024 is also a year of joyful proud Celebration! CELTIC is getting 21 years old! This special Anniversary will be celebrated in Berlin on the 2nd of July 2024, during the 6G Berlin Conference, under the new presidency of Eureka by Germany and Canada. High Level Representatives from our Industry and from Ministries and Eureka's new President will take the floor to share their support and enthusiasm about CELTIC across its history and for the coming years!

A detailed agenda will be shared soon. Stay tuned by visiting ou Call Calendar page: https://www.celticnext.eu/call-calendar/ and/or by subscribing to our Newsletter under https://www.celticnext.eu/news-subscription/.

How to submit a high-quality proposal

5 key steps & 5 factors for a successful CELTIC-NEXT proposal

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CELTIC-NEXT is an industry-driven European research initiative to define, perform and finance through public and private funding common research projects. As the follow-on programme to the successful Eureka ICT cluster Celtic-Plus and its predecessor "Celtic-Initiative", the cluster has been defined for 8 years until the end of 2026. CELTIC is supported by nearly all major European players in telecommunications. Bringing the major European telecommunications vendors and operators together into an ambitious European intergovernmental R&D programme, CELTIC is the best option to address a "system view" of communications to complement other existing Clusters.

CELTIC has been key for initiating ambitious and innovative projects dedicated to end-to-end communications solutions. Until today, CELTIC has labelled, funded and performed 176 projects in all their research areas with a total volume of more than one Billion Euro. By facilitating these collaborative R&D projects, CELTIC has made a great contribution to help Europe to stay at the competitive edge of the telecommunications industry.
Through 21 years of successfully running, the office has gathered the best tips and 5 key steps to submit a high-quality proposal and a rewarding project.

Step 1 - Use the brokerage tool
In order to support you in preparing your project proposal for CELTIC-NEXT Calls, we have created an online Brokerage Tool. Its goal is to help you build your Consortium in preparation for your CELTIC-NEXT Project. The tool functionalities are the following:

- Submission form for your Project Ideas and Expertise Offers
- Overview lists with search form
- Contact request forms
- Process owner support functions: approval process and contact request tracking

Step 2 - Attend to the call events
CELTIC-NEXT organises several events open to the public, which interested parties can attend to learn more about CELTIC-NEXT. We have typically one large CELTIC-NEXT Event per year, including an exhibition where running projects show their results. In addition, we are running several Launch Call Events and Proposers Days every year where interested parties can discuss their project ideas and potential project proposals with other interested experts and with representatives from the Public Authorities. Please watch out for upcoming CELTIC-NEXT Events.

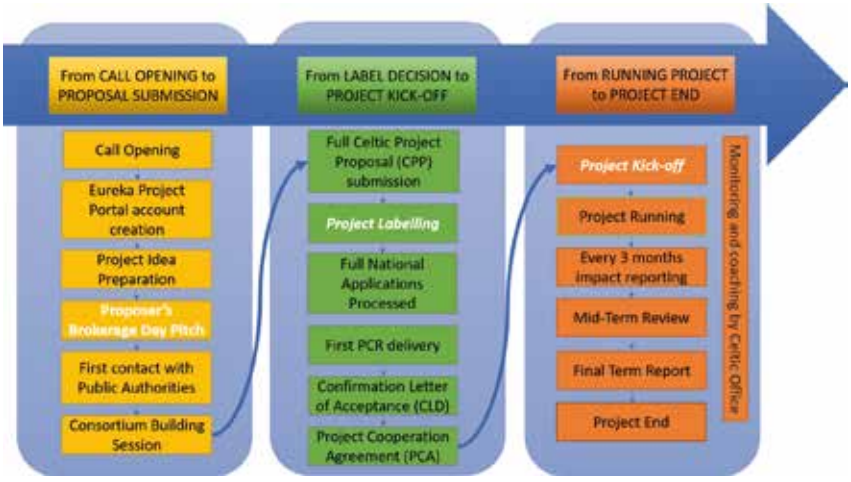
Step 3 - Contact your public authorities
Projects can receive public funding, depending on the national funding rules. To speed up the funding decision process, each project participant should contact their national funding agency early in the process and follow their advice regarding national funding applications in parallel to the proposal submission. You may submit a short proposal abstract (including a short project outline, and intended consortium partners/countries) until one month before the deadline for a first check to the CELTIC Office.

Step 4 - Check your (funding) eligibility
Project proposals for CELTIC-NEXT Calls must meet specific criteria.The consortium should include at least two companies from different Eureka participating countries include at least one industrial partner from each of the countries and in a fair and well-balanced way. The project should generate an obvious advantage and added value resulting from the technological cooperation between the participants.

Step 5 - Submit your proposal in the CELTIC Proposal Submission Portal
First of all, you will need to create an account on the CELTIC Proposal Submission Portal https://cluster-projects.eurestools.eu/. Once your account is created, all steps and documents needed for upload will be explained.

5 factors for a successful project

- Targeting the research areas: Least but not last: CELTIC-NEXT focuses on telecommunication and ICT, connecting people and businesses securely and reliably. The topics in the picture are not prescriptive and are only meant to give you some idea of the wide scope. Any topic related to the CELTIC-NEXT vision of a Smart Connected World is eligible.
- Market relevance and exploitation potential: These are Key aspects to motivate Public Authorities to fund your project. The market analysis includes the technological value chain and added value of the collaboration, value chain as the right mix of partners in the consortium, added value of the cooperation at a technology level, added value by the cooperation at a business level, and consortium/partner access to the market.
- Technology innovation: Innovation above the State of the Art (SoA) is a Key Criterion; 50 % of criticism of the Cluster experts during proposal evaluation are related to insufficient description of the SoA. Strategic relevance and expected impact of your proposal on a per-country perspective such as what new businesses will be generated matters.
- Right mix of participating countries: A large majority of successful projects in the past have been funded and built by a minimum of three different countries. A total of 44 European and non-European countries worldwide are participating in CELTIC-NEXT, of which 27 are coming from Eureka countries.
- Knowing the process of the proposal submission: The CELTIC label decision is given in 3 stages: Proposal Submission by proposers, evaluation phase by Industry Experts and Public Authorities and lastly, Label Decision by the Public Authorities and CELTIC Core Group.



CELTIC-NEXT complete project process: from Call opening to project end.

› Further information

CELTIC-NEXT website – https://www.celticnext.eu/

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

AI/ML in Telecommunications Networks

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The rapid evolution of communication technologies, coupled with the imminent deployment of sixth-generation (6G) wireless networks, underscores the importance of harnessing Artificial Intelligence (AI) and Machine Learning (ML) techniques to address emerging challenges and optimise network performance. AI/ML have emerged as powerful tools capable of revolutionising various facets of communication networks, offering solutions to issues in network planning, diagnostics, and optimization. As the telecommunications landscape continues to evolve, understanding the potential applications of AI/ML in communications networks becomes imperative for industry stakeholders, researchers, and policymakers alike.

This article delves into the multifaceted role of AI/ML in shaping the future of telecommunication networks, and provides recommendations concerning the future availability of large data sets, which are necessary for training and benchmarking algorithms. By elucidating the transformative potential of AI/ML in telecommunications, this article seeks to provide insights into the future trajectory of network research and innovation in this area.

Current Use of AI/ML

Artificial Intelligence (AI) and Machine Learning (ML) are currently being investigated for application in future generations of communications networks, such as 5G and 6G. A broad family of neural networks, which are typically used ML techniques to model complex relationships between input and output parameters of a system or to find patterns in data, such as feed-forward neural networks, deep neural networks, recurrent neural networks, and convolutional neural networks, are considered to solve various networking challenges of the future networks. The related challenges can be grouped in the following three main areas:

- Network Planning,
- Network Diagnostics/Insights,
- Network Optimization and Control.

In **Network Planning**, attention is given to AI/ML assisted approaches to guide planning solutions. As beyond 5G networks become increasingly complex and multi-dimensional, parallel layers of connectivity are considered a trend towards disaggregated deployments in which a base station is distributed over a set of separate physical network elements which ends up in the growing number of services and network slices that need to be operated. This climbing complexity renders traditional approaches in network planning obsolete and calls for their replacement with automated methods that can use AI/ML to guide planning decisions. In this respect solution in two main areas emerge:

- network element placement – optimum constellation of base stations each located to provide best network performance (coverage, terminal density and mobility, required hardware/cabling, overall costs)
- Cloud-RAN clusters dimensioning – providing optimal allocation of baseband unit (BBU) functions.

In **Network Diagnostics**, attention is given to the tools that can autonomously inspect the network state and trigger alarms when necessary. The specific investigations target:

- network characteristics forecast solutions (forecasting mobile traffic for Quality of Experience and Quality of Service improvement and maintaining required service level agreement),
- precise user localizations methods, and
- security incident identification and forecast (e.g., real-time detection of distributed denial-of-service [DDoS] attacks).

In **Network Optimization and Control**, attention is given to the different network segments, including radio access, transport / fronthaul (FH) / backhaul (BH), virtualization infrastructure, end-to-end (E2E) network slicing, security, and application functions. Among the applications of AI/ML in radio access, the slicing in multi-tenant networks, radio resource provisioning and traffic steering, user association, demand-driven power allocation, joint MAC scheduling (across several gNBs), and propagation channel estimation and modelling are being investigated and discussed. The considered solutions can operate in real-time, near-real-time, and non-real-time manner, depending on the specific application time-scale needs.

Availability of data-sets

However, in order that the application of AI/ML in communication network flourishes, the availability of reliable data-sets is a crucial prerequisite. Only this will enable the efficient use of AI/ML algorithms, as well as will allow AI/ML-based solution validation and system troubleshooting. The success of AI/ML models in a variety of network applications and services relies heavily on the use of network data in diverse levels of granularity. Publicly available real and simulated benchmark datasets play an important role in model development and evaluation, as well as fair comparison with state-of-the-art solutions.

Training of AI/ML algorithms is requiring large amounts of data, which are typically not readily available for many reasons. In research projects often the amount of data that can be generated with the prototype systems and experimentation use cases do not suffice to efficiently train the algorithms. Therefore, access to “ready-to-use” available large data sets of network traffic data from the different network domains in publicly accessible repositories is required, for the benefit of all involved researchers and developers, facilitating the:

- development of a comprehensive testing and evaluation framework for assessing the performance, reliability, safety and explainability of AI/ML systems
- collaboration and knowledge sharing through building, contributing to and maintaining an open repository of data and models supporting the development of AI/ML-based solutions
- integration and interoperability test of various solutions, e.g. by including outcomes of numerous projects using or developing AI/

ML-based solutions in the public domain, in order to address scalability questions, or to consider specific use cases for vertical industries, etc.

However, there are so far no sustainable initiatives which have emerged that attempted to create the ultimate/reference networking related AI/ML data sets. The main reasons are:

- willingness to share data – with a few notable exceptions. Typically, data and model owners do not share their assets due to business, data privacy reasons, etc. Assured methods to sanitize data against aforementioned concerns are not trusted
- contextual variations of available data – spanning along various network technology domains and vertical industry sectors, each with its own unique requirements and challenges
- pace of technological advancements, where AI/ML technologies currently evolve very rapidly, and the landscape changes significantly within a short period
- available resources and duplication of efforts in creating the sustainable repositories of data-sets, or consolidating individually created data-sets (e.g. by research projects in publications etc.) within the publicly available repositories.

Conclusions

In the context of European projects, telecom operators have proposed the idea of building a repository of open data sets, however with very limited success so far. The idea of choosing a pre-competitive environment such as a European framework program to build an open repository, seems attractive and could be the best environment to overcome the potential concerns. Considering the heavy dependency of AI/ML on such open training data, it is worthwhile to consider launching an open initiative for creating such a repository in the near future, while considering the following obstacles:

- Data privacy and security considerations are critical when it comes to sharing and releasing data for AI/ML training. Protecting sensitive information and ensuring compliance with privacy regulations restricts the availability and release of data. Stakeholders hesitate to share data due to concerns about unauthorized access, misuse, or breaches of privacy.
- Data bias and fairness, where data used for training AI/ML models can reflect biases present in the data collection process or societal contexts.
- Data access and availability imbalance, where data availability may not be evenly distributed across different network technology domains, vertical industry sectors, or geographic regions.
- Data ownership and proprietary restrictions limit the availability and release of data.
- Data quality and reliability, where data inconsistencies, biases, inaccuracies, or insufficient quantities impact the performance and generalization of data models.
- Gathering and aggregating large-scale data for AI/ML training is complex and time-consuming. It involves collaboration among multiple sources, data cleaning and pre-processing, and addressing legal and ethical considerations.

Establishing an open repository for network data-sets, including its continuous maintenance for both its accessibility and gathering the latest relevant data, which can be used for training and benchmarking algorithms by all involved researchers remains one of the main challenges of networking related application of newest AI/ML techniques.

Innovations using AI/ML in project 6G-BRAINS

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Introduction

In the realm of future industrial applications, the demand for seamless, efficient wireless connectivity is paramount. To meet this need, innovative approaches to network resource management and spectrum utilization are essential. This article introduces some of the innovations of 6G-BRAINS, which leverages cutting-edge Artificial Intelligence (AI) technologies, such as Multi-Agent Deep Reinforcement Learning (MA-DRL).

Use cases and KPIs

Through meticulous research and stakeholder engagement, the first step identified the sectors, usage scenarios and use cases where these innovations can make the greatest impact. The motivation was to derive a wealth of user requirements and technology Key Performance Indicators (KPIs), which 5G cannot deliver. Among the obvious ambitious KPIs in an industrial environment, like ultra-low latency, the project identified gaps and missing indicators such as location accuracy and direction accuracy, which prompted the exploration of advanced features such as sensing.

Multi-agent Deep Reinforcement Learning

6G-BRAINS made significant advance in the understanding and implementation of Deep Reinforcement Learning (DRL) in the context of 6G networks. At the outset, the project introduced the foundational concepts of Reinforcement Learning (RL), elucidating its formalism and the technical hurdles that must be overcome to integrate it seamlessly into the 6G landscape. Building on this groundwork, the project delved into real-world application cases of RL, viewing them through the network domain modelling as well as the problem formulation.

A pivotal aspect involved the specification of key components comprising a Multi-Agent Deep

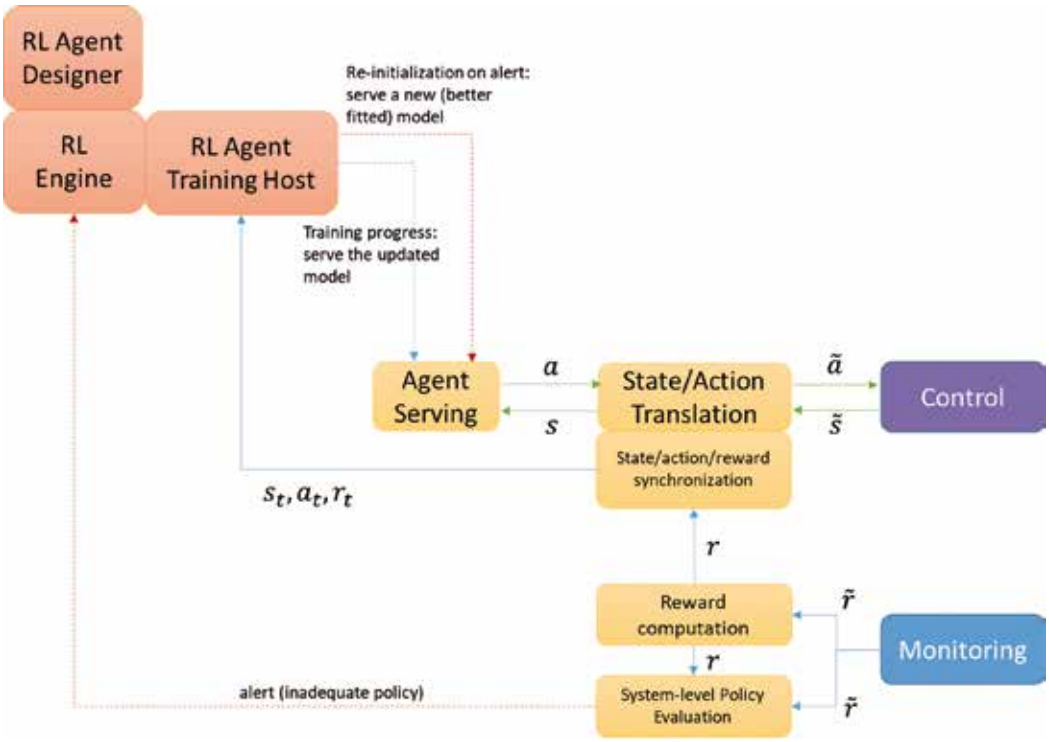


Figure 1: Functional diagram of a Reinforcement Learning training loop.

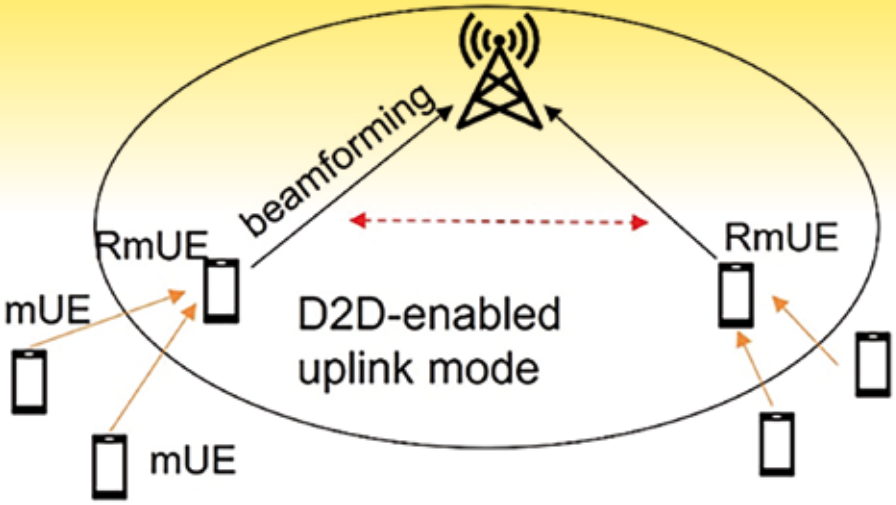


Figure 2: D2D enabled cooperative network model.

Reinforcement Learning (MA-DRL) scheme, their generic interfaces and how these components interact through training and inference workflows (Figure 1).

This framework laid the groundwork for a practical implementation and to foster a deeper understanding for describing application cases of RL in 6G and enable implementing RL in the 6G network. The projection of the RL process on 6G allowed for the formalisation of 6G resource allocation and scheduling as RL problems.

Radio Link Control using RL

In a study, based on a 5G New Radio (NR) inter-cell interference downlink model, the project simulated a cell free network and used RL to choose the best modulation and coding scheme from the channel quality indicator. The results can be used to enhance the 5G network model radio link control, using RL and Industry 4.0 traffic models.

D2D-enabled cooperative network for cell-free access

In the RL application case of improving the communication performance of far cell-edge terminals, the project demonstrated Device-to-Device (D2D) relays between terminals and an Integrated Access and Backhaul (IAB) node. The application case demonstrated the dynamic allocation of transmission power levels for far cell-edge users and the D2D relay, as well as distinguishing individual terminals by beamforming and successive interference cancellation. The impact of this, is an improved communication quality of far cell-edge terminals with poor channel conditions, thereby expanding cell coverage.

Include a title Further Innovations include (i) design and prototyping of enabling technologies for end-to-end network slicing across the radio access and core network segments, utilising AI-based radio link control and radio access slice scheduler; (ii) enablers for 3D localisation through sensor data fusion and the application of RL to improve location accuracy; (iii) integration of blockchain location ledger technologies for sharing position data.

Finally, the project performed 3D laser measurements at a factory, obtaining a raytracing model that allows simulations with spatial consistency over different bands, providing an accurate geometrical representation of the environment from the propagation properties for precise localisation applications.

Outlook

Having achieved significant milestones in leveraging Artificial Intelligence (AI), particularly Multi-Agent Deep Reinforcement Learning (MA-DRL), in the context of 6G networks, the 6G-BRAINS project sets the stage for future advancements and research directions. These include among others: (i) enhanced AI integration and deployment for demonstrating optimisation of 6G network architecture at large scale, (ii) expansion of use cases to a broader range of applications and vertical sectors; (iii) establishing large data set repositories for training and benchmarking AI/ML algorithms; (iv) identifying potential needs for standardisation and policy, governing the deployment and operation of AI-driven network management and control systems, and (v) developing models to help us resolve the tussle between utility of AI/ML and the energy demand for the application of it. In all these areas, initiatives have started, but must be intensified to meet the challenges of 6G and future generation mobile networks.

Further information
Project 6G-BRAINS website:
https://6g-brains.eu/

MWC Barcelona 2024

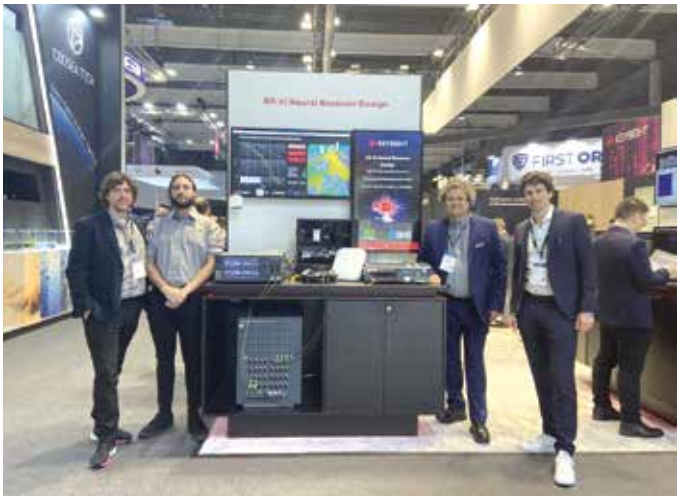
Several Eurescom projects participated in the world's most influential connectivity event

From the 27th of February to the 2nd of March 2024, the global mobile ecosystem organisation GSMA hosted the 14th edition of the Mobile World Congress. This year, the event witnessed a total of 101,000 unique in-person attendees from 205 countries. Among them, 59% were professionals from the sector of core mobile ecosystem. Amidst, of the 2,700 exhibitors, sponsors and partners in the conference programme, were selected Eurescom projects.

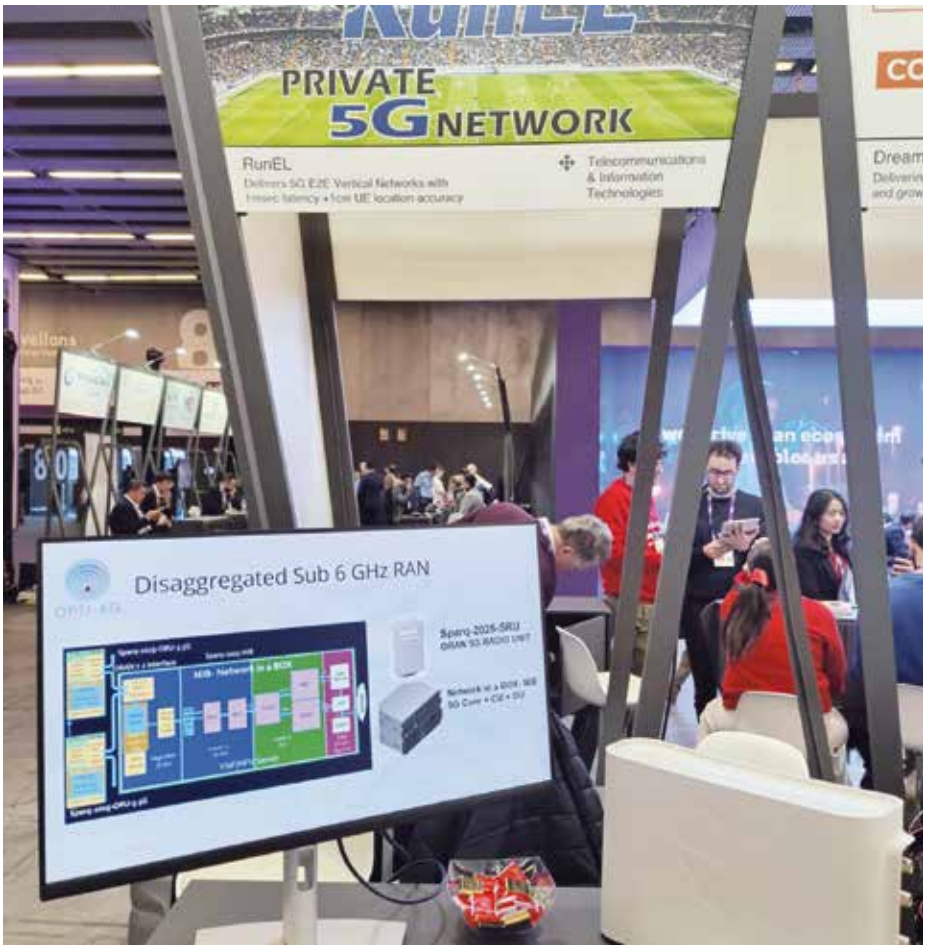
Joint demonstration booth of the SNS JU projects, 6G-SANDBOX and CENTRIC

Keysight Technologies in collaboration with the partners NVIDIA and InterDigital participated to promote two demonstrations from the SNS JU project 6G-SANDBOX and CENTRIC from 27th to 29th Feb 2024.

Both projects are running under the Smart Networks and Services Industry Association (SNS JU). They showcased their latest wireless innovations, including Nemo Wireless Network Solutions, such as 6G using AI Neural Receiver Design and AI/ML and sensing in 6G solutions.



Michael Dieudonne, project coordinator of 6G-SANDBOX Project (Keysight Technologies), Sebastian Cammerer (NVIDIA), Alejandro Villena Rodríguez (Keysight Technologies) and Germán Corrales Madueño (Keysight Technologies).



OPTI-6G at the MWC 2024

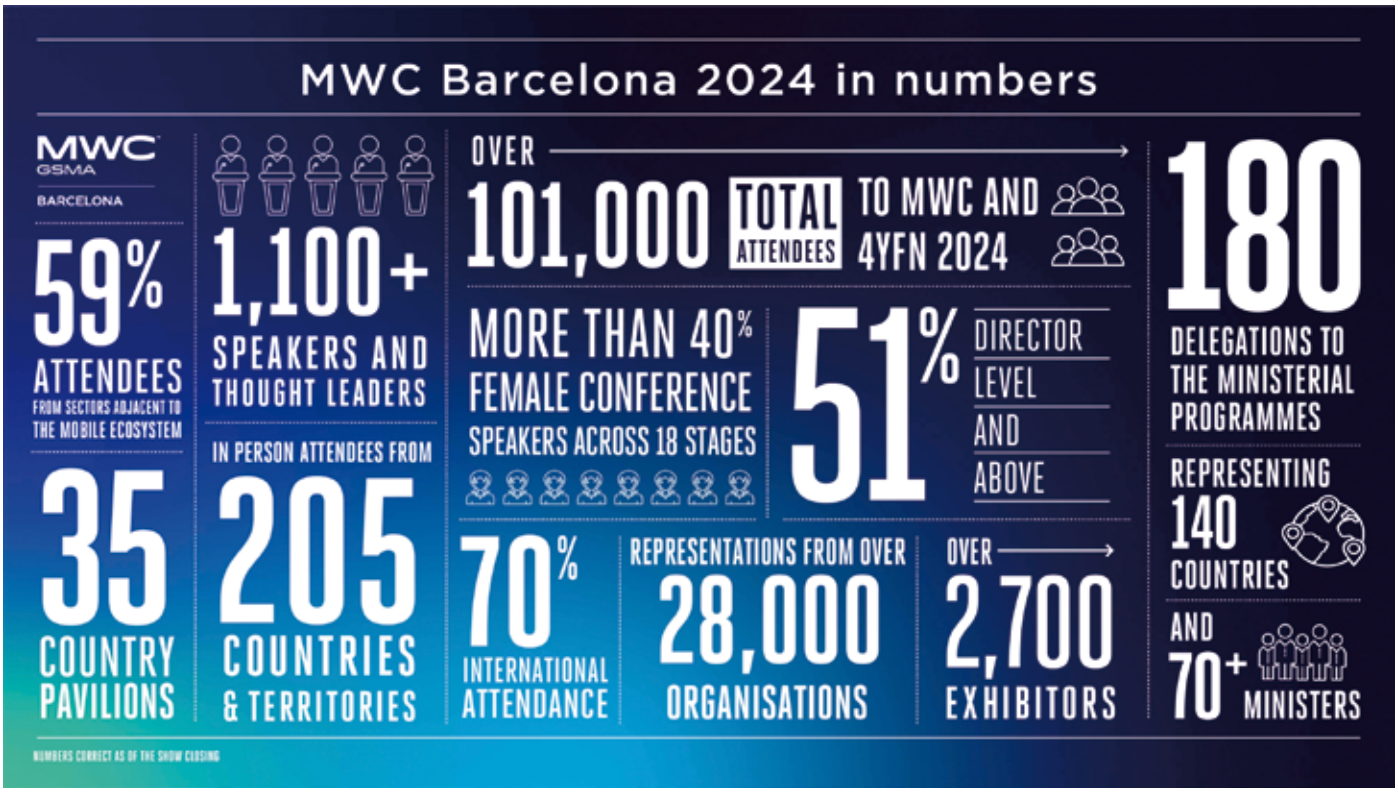
One of Eurescom's newly started project, OPTI-6G, participated at the MWC 2024 through one of its consortium partners, RunEL, between the 27th and 29th of February 2024. Amid, among the other innovative start-ups, RunEL presented its technology and experience, and the OPTI-6G project challenge to design low cost, light weight, low electronic footprint Optical Wireless Communications Remote Units (O-RUs) that can be elegantly integrated into near IR access points.

6G-SANDBOX presentation at the Spanish Pavilion

On the 27th of February, Alfonso Carrillo Aspiazu, Senior Architect in Edge and Telco Solutions at OpenNebula Systems, presented at the Spanish Pavilion on "Accelerating 5G deployment on the Telco Edge with Open Nebula". He presentation included innovations from 6G-SANDBOX project and the announcement of their Second Open Call.

During the full day, he and his colleague, Bruno Rodriguez, also hosted a booth to present the company and the latest results of 6G-SANDBOX project.

Alfonso Carrillo Aspiazu presenting at the Spanish Pavilion.



MCW Barcelona 2024 in numbers, event report image.

Conclusion

Mobile World Congress 2024 provided a platform where technology, community and commerce converge and hence an opportunity for Eurescom projects to disseminate their results in person and to expand their network and representation in the technical world.

Further information

- MWC post event report – https://www.mwcbarcelona.com/post-event-report
- GSMA organisation webiste – gsma.com
- OPTI-6G project website – https://opti-6g.sns-ju.eu/
- CENTRIC project website – https://centric-sns.eu/
- 6G-SANDBOX project website – https://6g-sandbox.eu/
- Keysight company website – https://www.keysight.com/us/en/home.html
- Interdigital company website – https://www.interdigital.com/
- NVIDIA company website – https://www.nvidia.com/en-us/

News in brief

What's new at Eurescom?

SNS JU project OPTI-6G starts

In January 2024 a new SNS JU funded project was started, called OPTI-6G (Grant Agreement number: 101139292, https://opti-6g.sns-ju.eu/). OPTI-6G develops an optical 6G cell free networks for significantly improved indoor communications. In addition to improved connectivity OPTI-6G will use the developed technology for the very accurate measurement of position and orientation of end user equipment. Advancements provided by OPTI-6G will be showcased in a proof-of-concept demonstrator.

The OPTI-6G project brings together a selected small, but multi-disciplinary team of research institutions and industries – including Université de Versailles Saint-Quentin-en-Yvelines, France; RunEL NGMT Ltd from Israel; Oledcomm SAS from France and Brunel University London from the UK under the leadership of Eurescom GmbH – to realise its ambitious goals. The project is scheduled to conclude at the end of 2026.

The start of the ESA 6G SmartSat project

Eurescom started the ESA 6G SmartSat project together with its subcontractors Airbus Germany GmbH, Deutsche Telekom AG and Fraunhofer FOKUS in January 2024. 6G SmartSat focuses on beyond 5G/6G networking architectures for multi-layered non-terrestrial networks and smart satellites. In this context the project considers the concurrent trends of 5G and beyond 5G NTN, mega-constellations, re-purposable payloads and the concept of multi-layer non-terrestrial networks (ML-NTN), and will assess viable alternatives. The project is planned to conclude in the middle of 2025.

Horizon Europe INPACE project

As part of a large consortium under the leadership of G.A.C. Group France, Eurescom started a new Horizon Europe support action INPACE - Indo-Pacific-European Hub for Digital Partnerships: Trusted Digital Technologies for Sustainable Well-Being (www.inpacehub.eu), Grant Agreement number 101135568, in January 2024. The mission of INPACE is to actively support the implementation of the EC Digital Partnerships with Japan, the Republic of Korea, and Singapore, and the cooperation with India in the context of the Trade and Technology Council, by creating a sustainable and interactive multi-stakeholder Indo-Pacific European Hub.

INPACE covers a very wide range of technology domains, within which Eurescom is specifically responsible for the 5G and beyond and the cybersecurity domains, as well as the Digital Partnership with Japan, in collaboration with professor Akihiro Nakao from University of Tokyo. INPACE is scheduled to run for three and half years.

Further information

- OPTI-6G project website – https://opti-6g.sns-ju.eu/
- Eurescom website – https://www.eurescom.eu/
- INPACE project website – https://www.inpacehub.eu/

AI ACT – a conscious choice

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What is AI and why is it important?

AI is the ability of a machine to display human-like capabilities such as reasoning, learning, planning and creativity [1]. It enables systems to perceive their environment, solve problems and act to achieve a specific goal. These systems gather data - through attached sensors, process this data and respond. They are capable of optimizing and thus adapting their behaviour by learning and work autonomously.

Whilst some AI technologies have been around for more than 50 years, recent advances in computing power, with availability of enormous amount of data and new algorithms, have led to major AI breakthroughs in recent years.

Artificial intelligence is already present, influences our everyday life and is digitally transforming our society and thus has become an EU priority.

What is AI ACT?

To prepare Europe for an advanced digital age, the AI ACT provides a comprehensive legal framework on AI, which addresses the risks of AI within Europe and sets the tone for upcoming AI regulations worldwide. The AI Act aims to provide AI developers and deployers with clear requirements and obligations regarding specific uses of AI [2].

The AI Act aims to "strengthen Europe's position as a global hub of excellence in AI from the lab to the market, ensuring that AI in Europe respects set values and rules, and harnesses the potential of AI for industrial use."

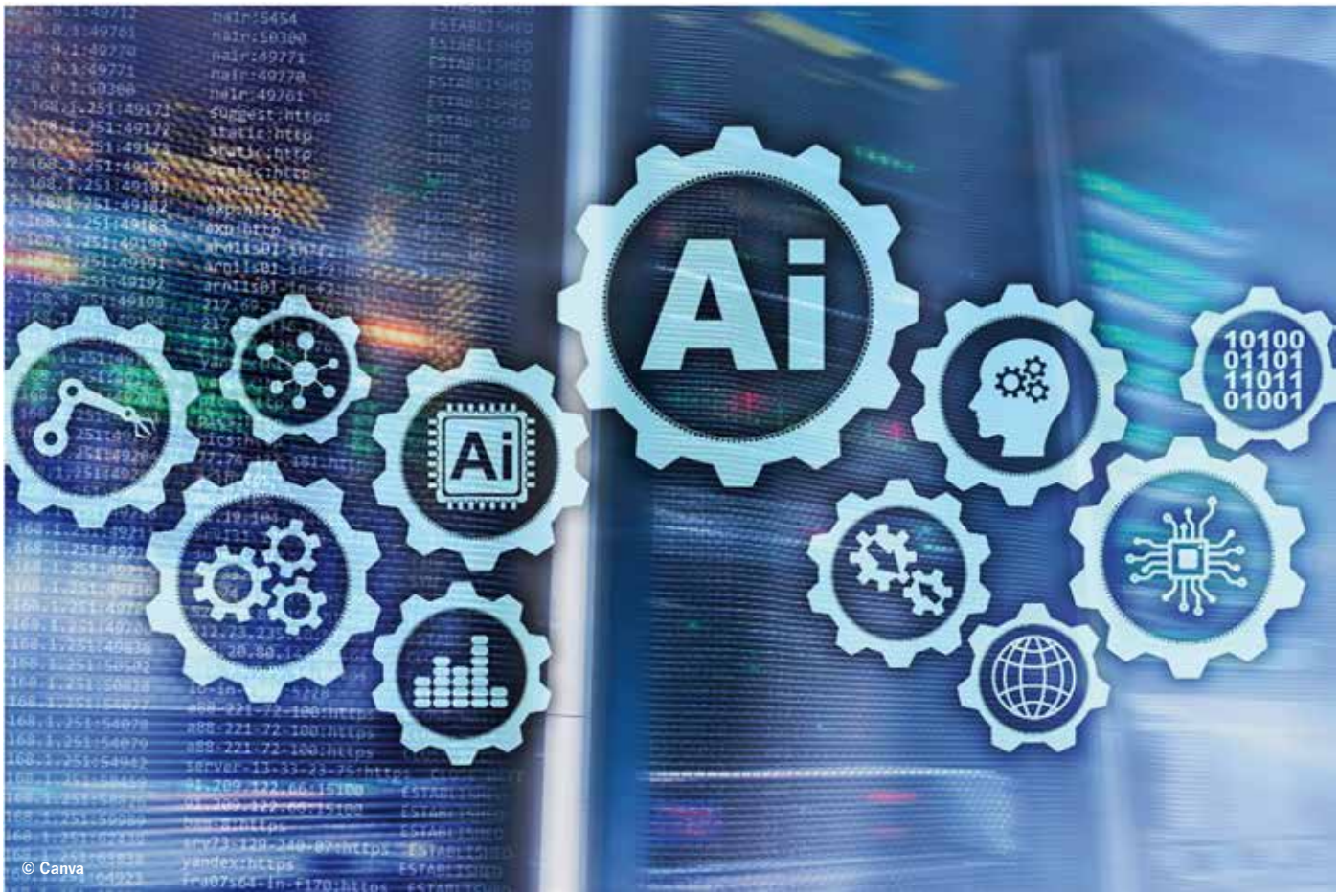
— European Parliament News

Why is it needed?

To make sure that AI systems used in EU are safe, transparent, traceable, unbiased, trustworthy and environmentally friendly. AI systems should be overseen by people, rather than by automation, thus should foster inclusiveness.

The AI Act fosters the development of trustworthy AI in Europe, which also includes the Innovation Package and the Coordinated Plan on AI [3] . Together, these measures assure the health, safety and fundamental rights of people, and providing legal certainty to businesses across Europe. Overall, these initiatives would strengthen EU's AI talent pool through education, training, skilling and reskilling activities.

Whilst the existing legislation provides protection, however it is insufficient to address AI system specific challenges, the proposed rules will be able to:



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- address risks created by AI applications/ services;
- prohibit AI practices that pose unacceptable risks;
- determine a list of high-risk and set clear requirements for such applications;
- define specific obligations for deployers and providers of high-risk AI applications;
- require assessment before a given AI system is put into service or placed on the market;
- overall, establish a governance structure

To whom does the AI Act apply?

This legal framework is applicable to both public and private actors inside and outside the EU as long as the AI system affects people located in the EU [4].

It is a cause of concern for both the developer of such system as well as the deployers of AI systems (high-risk). Importers of AI systems must also ensure that the provider (foreign) carries out appropriate conformity assessment procedure, bears a European Conformity (CE) marking and is accompanied by required documentation and instructions of use.

In addition, certain obligations are foreseen for providers of general-purpose AI models, including large generative AI models. Providers of free and open-source models are exempted from most of these obligations; however, the exemption does not cover obligations for providers of general-purpose AI models with systemic risks.

Research, development and prototyping activities preceding the release in the market are exempted and the regulation furthermore does not apply to AI systems that are exclusively for military, defence or for national security purposes, regardless of the type of entity carrying out those activities [4].

What happens if you don't comply?

AI systems that do not respect the requirements of the Regulation, would attract penalties, including administrative fines, in relation to infringements and communicate them to the Commission [4].

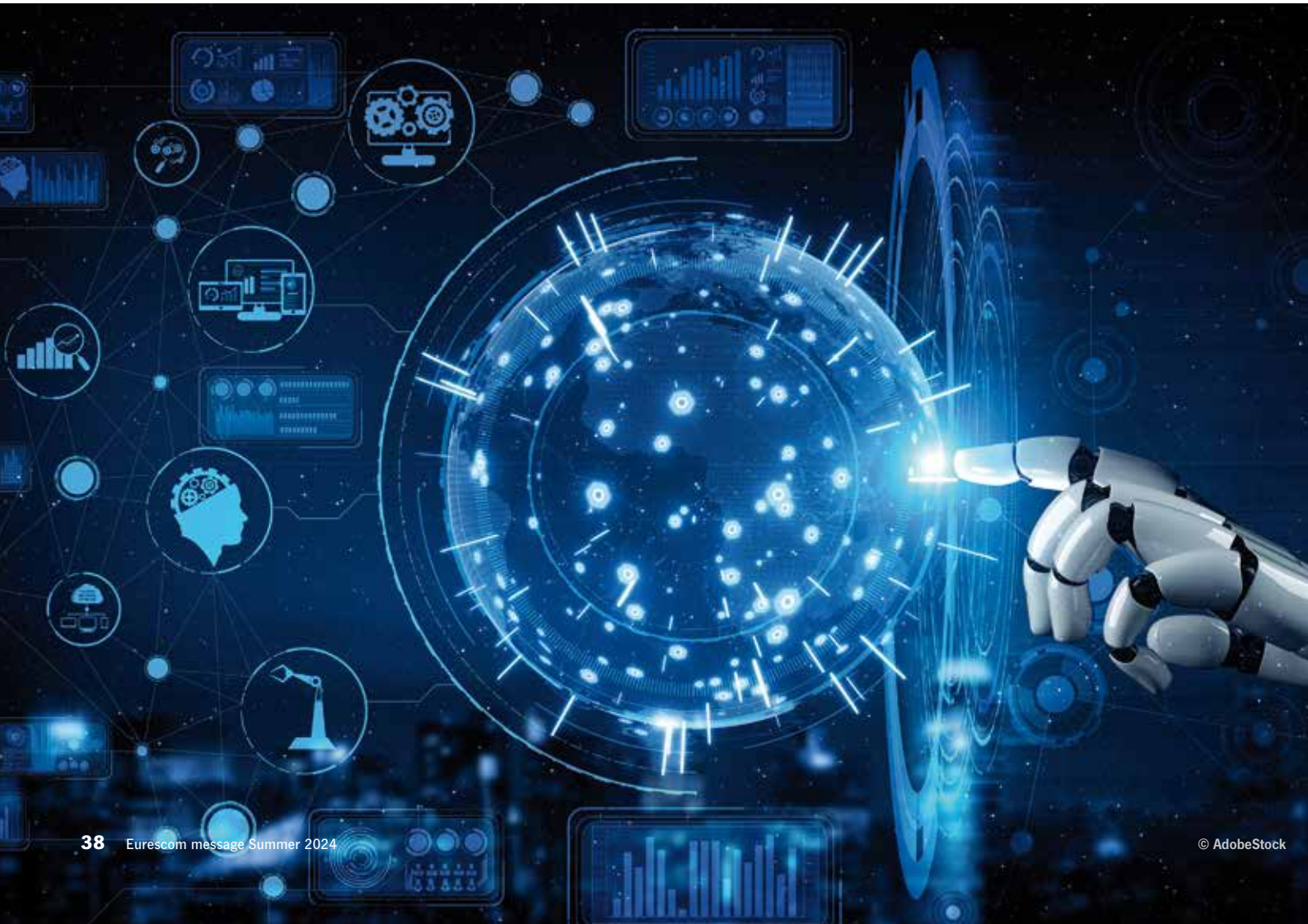
The Regulation sets out thresholds that needs to be taken into account:

- Up to €35m or 7% of the total worldwide annual turnover of the preceding financial year (whichever is higher) for infringements on prohibited practices or non-compliance related to requirements on data;
- Up to €15m or 3% of the total worldwide annual turnover of the preceding financial year for non-compliance with any of the other requirements or obligations of the Regulation, including infringement of the rules on general-purpose AI models;
- Up to €7.5m or 1.5% of the total worldwide annual turnover of the preceding financial year for the supply of incorrect, incomplete or misleading information to notified bodies and national competent authorities in reply to a request;

To conclude, the AI Act for the ICT industry aims to foster innovation while ensuring that the developed AI technologies are deployed responsibly, ethically, and in the best interests of society. It would provide assurance to its users and guidance for stakeholders, overall contributing to the sustainable growth and adoption of AI technologies.

Further information

[1] https://www.europarl.europa.eu/topics/en/article/20200827STO85804/what-is-artificial-intelligence-and-how-is-it-used
[2] https://digital-strategy.ec.europa.eu/en/policies/regulatory-framework-ai
[3] https://ec.europa.eu/commission/presscorner/detail/en/ip_24_383
[4] https://ec.europa.eu/commission/presscorner/detail/en/QANDA_21_1683



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