CELTIC-NEXT SRIA & additional Topics of Interest
Autumn Call 2023, Online Launch Event, 7th Sept 2023

Xavier Priem, CELTIC-NEXT Director

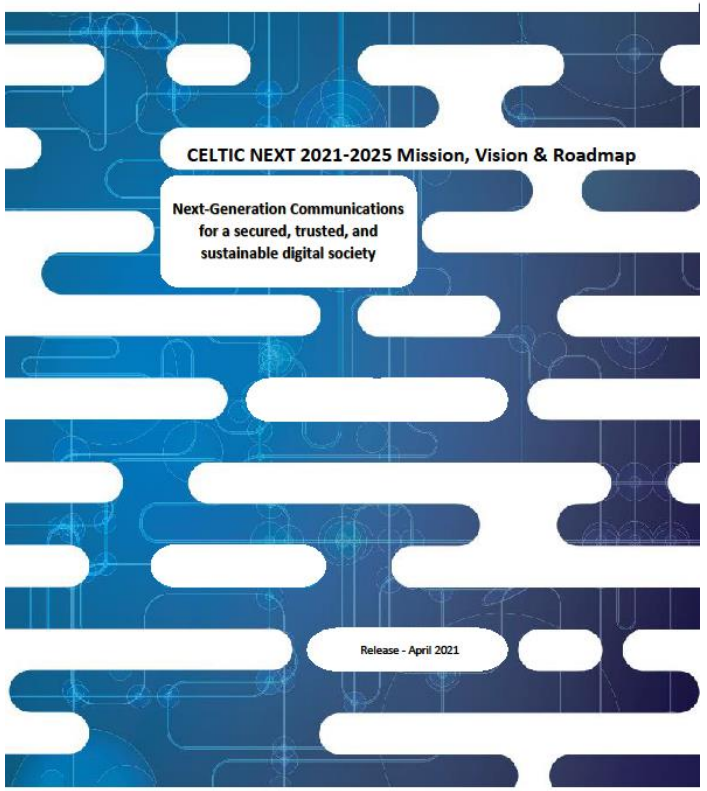
www.celticnext.eu

CELTIC's Community

CELTIC Core Group

with over 1150 community members across 41 countries (Europe & beyond)

CELTIC's Community builds its Mission, Vision & Roadmap



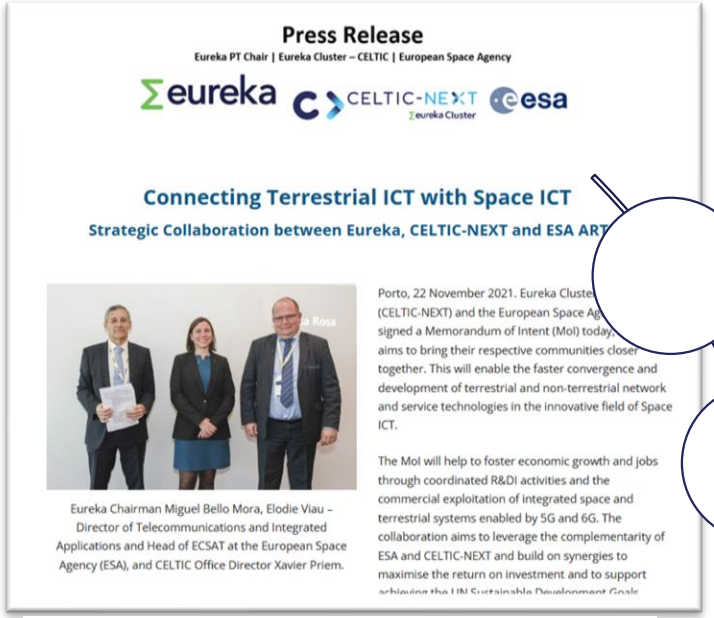
https://www.celticnext.eu/celtic-next-organisation/

CELTIC-NEXT in the European Funding Landscape

EUREKA-CELTIC & European Space Agency MoI Signed (Nov. 2021)

EUREKA-CELTIC & 6G-IA SNS MoU Signed (Apr. 2022)

MEMORANDUM OF INTENT
between
the European Space Agency,
Eureka Association AISBL
and
CELTIC-NEXT Programme, as represented by EURESCOM GmbH,
on
Joint Coordination with regard to the CELTIC-NEXT Programme



Press Release
Eureka PT Chair | Eureka Cluster – CELTIC | European Space Agency

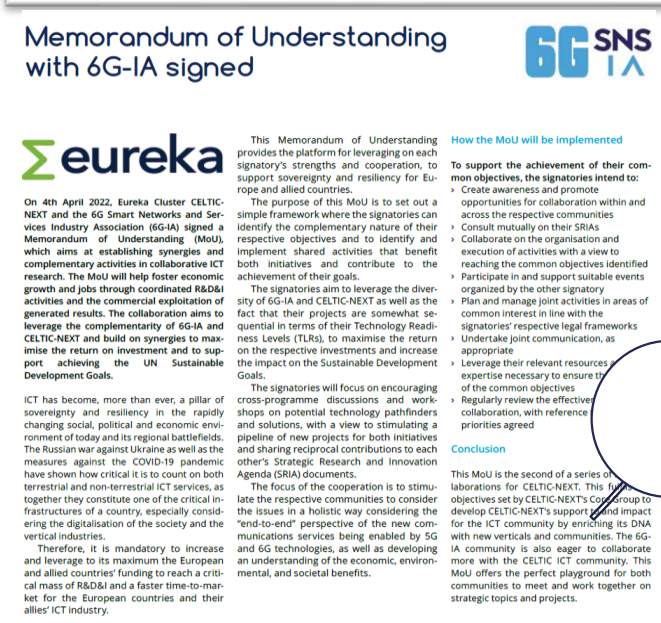
Connecting Terrestrial ICT with Space ICT
Strategic Collaboration between Eureka, CELTIC-NEXT and ESA ART

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.

Porto, 22 November 2021. Eureka Cluste (CELTIC-NEXT) and the European Space Ag signed a Memorandum of Intent (MoI) today, aims to bring their respective communities closer together. This will enable the faster convergence and development of terrestrial and non-terrestrial network and service technologies in the innovative field of Space ICT.

The MoI will help to foster economic growth and jobs through coordinated R&DI activities and the commercial exploitation of integrated space and terrestrial systems enabled by 5G and 6G. The collaboration aims to leverage the complementarity of ESA and CELTIC-NEXT and build on synergies to maximise the return on investment and to support

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



Memorandum of Understanding with 6G-IA signed

On 4th April 2022, Eureka Cluster CELTIC-NEXT and the 6G Smart Networks and Services Industry Association (6G-IA) signed a Memorandum of Understanding (MoU), which aims at establishing synergies and complementary activities in collaborative ICT research. The MoU will help foster economic growth and jobs through coordinated R&D&I activities and the commercial exploitation of generated results. The collaboration aims to leverage the complementarity of 6G-IA and CELTIC-NEXT and build on synergies to maximise the return on investment and to support achieving the UN Sustainable Development Goals.

ICT has become, more than ever, a pillar of sovereignty and resiliency in the rapidly changing social, political and economic environment of today and its regional battlefields. The Russian war against Ukraine as well as the measures against the COVID-19 pandemic have shown how critical it is to count on both terrestrial and non-terrestrial ICT services, as together they constitute one of the critical infrastructures of a country, especially considering the digitalisation of the society and the vertical industries.

Therefore, it is mandatory to increase and leverage to its maximum the European and allied countries' funding to reach a critical mass of R&D&I and a faster time-to-market for the European countries and their allies' ICT industry.

This Memorandum of Understanding provides the platform for leveraging on each signatory's strengths and cooperation, to support sovereignty and resiliency for Europe and allied countries.

The purpose of this MoU is to set out a simple framework where the signatories can identify the complementary nature of their respective objectives and to identify and implement shared activities that benefit both initiatives and contribute to the achievement of their goals.

The signatories aim to leverage the diversity of 6G-IA and CELTIC-NEXT as well as the fact that their projects are somewhat sequential in terms of their Technology Readiness Levels (TLRs), to maximise the return on the respective investments and increase the impact on the Sustainable Development Goals.

The signatories will focus on encouraging cross-programme discussions and workshops on potential technology pathfinders and solutions, with a view to stimulating a pipeline of new projects for both initiatives and sharing reciprocal contributions to each other's Strategic Research and Innovation Agenda (SRIA) documents.

The focus of the cooperation is to stimulate the respective communities to consider the issues in a holistic way considering the "end-to-end" perspective of the new communications services being enabled by 5G and 6G technologies, as well as developing an understanding of the economic, environmental, and societal benefits.

How the MoU will be implemented

To support the achievement of their common objectives, the signatories intend to:

- Create awareness and promote opportunities for collaboration within and across the respective communities
- Consult mutually on their SRIAs
- Collaborate on the organisation and execution of activities with a view to reaching the common objectives identified
- Participate in and support suitable events organized by the other signatory
- Plan and manage joint activities in areas of common interest in line with the signatories' respective legal frameworks
- Undertake joint communication, as appropriate
- Leverage their relevant resources expertise necessary to ensure th of the common objectives
- Regularly review the effective collaboration, with reference priorities agreed

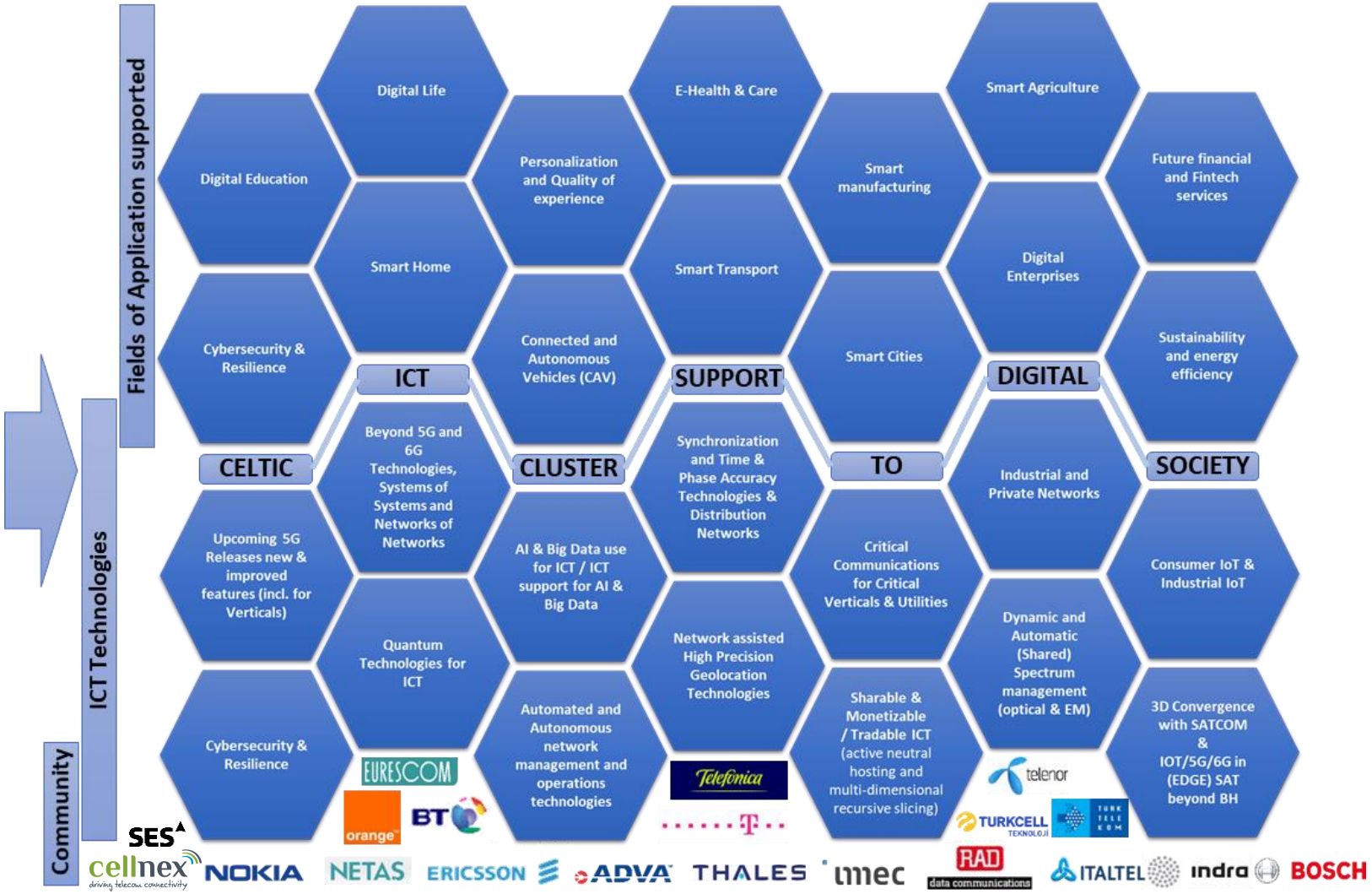
Conclusion

This MoU is the second of a series o laborations for CELTIC-NEXT. This fu objectives set by CELTIC-NEXT's Core Group to develop CELTIC-NEXT's support and impact for the ICT community by enriching its DNA with new verticals and communities. The 6G-IA community is also eager to collaborate more with the CELTIC ICT community. This MoU offers the perfect playground for both communities to meet and work together on strategic topics and projects.

- Knowledge exchange & SRIAs cross-contributions
- Leveraging funding schemes across TRLs & topics
- Calls timing alignment
  Easier pipelining of proposals
- From Research to Market
  (TRL ↗, early adopters, testbeds…)
- Offering innovative entities the full panel between top-down programs and bottom-up spaces for their collaborative projects

CELTIC-NEXT
eureka Cluster

As usual, Proposals that address **any of the topics of the CELTIC Strategic Roadmap** in this bottom-up call are welcomed



https://www.celticnext.eu/strategic-roadmap/

Future needs of the end users: High level fields of applications

Human Centred Technologies and Services, for an Augmented Life Experience	Full industrial digitization and support of vertical industries	Futuristic use cases
• Digital divide elimination • Smart Regions/Cities/Buildings/Homes • Smart Transportation • Smart Tourism • Sustainability & Efficiency of Smart Energy Grids • Public Safety & Crowd Control • E-Health & Care • Users in Control and Trust of offered services • Digital support for Education and Remote Education • Digital (Media, Gaming, Sports, Culture and Entertainment) • Remote working and Nomadic Working (Digital Nomads)	• Digital Enterprises • Private Networks for Smart Manufacturing (Indus. 4.0) • Smart Logistics (geolocation IOT networks) • Smart Agriculture • Future Financial and Fin-Tech • ICT support to third party AI based applications • Connectivity Grid / Telecom Infra as 4th Utility, like Energy	• Holographic "Teleportation" • "World" Real-time Synchronous Digital Twin

Future needs of the end users: Main technical areas of research

Ubiquity / Pervasiveness	Dynamic capacity following people seamless mobility	Automation, Reliability, Transparency: Cognitive operations	Protection and Trust	Holographic "transportation" & Real-time Synchronous Digital Twin
•Urban, sub-urban down to rural •Into the home for education and remote working •One Identity for seamless experience •Smart Regions/Cities/Buildings/Homes	•In "normality" •In "crisis" (pandemics, major climate events) •Highly Precise Positioning •Edge Computing •Open-RAN / vRAN •Slicing	•Extensive Monitoring •Big Data Analytics •Artificial Intelligence •ICT supporting large and intense Ai/ML deployment for verticals (connectivity, processing, data storage…) •Transparency or the Imperceptible latency	•Cyber-security •Identity management	•Holographic media teleport •Multi-sense networks •Time engineered applications

Enabling technologies that have to be mastered

Beyond 5G, from 5G to 6G

- Enhanced overall architectures to support needed enablers
- End-to-end Horizontal and Vertical Network Convergence
- AI/ML for Digital Infrastructures
- End-to-end Network Automation
- Autonomous Systems and Networks
- Advanced QKD Networking
- Connectivity as a Shared Critical Utility
- Wireless and Wired Tera-Broadband technology:
  - Wireless (electromagnetic and visual light waves):
    - Larger massive MIMO systems
    - No "Cell" Radio Networks with distributed smart mMIMO systems
    - TeraHertz Communications
  - Wired optical:
    - Photonics
    - Optical smart networks
    - Optical spectrum: Sliceable Optics, shared lambdas
    - Increasing Bandwidth in Optical Network: use of additional bands, Higher modulation schemas
    - Quantum communications
      - QKD
      - Entanglement

Wired and Wireless Industrial ICT

- Industrial features of 5G and beyond
  - Time Sensitive Networks
  - Precision Positioning
- Private Networks
- More Indoor techs like Terahertz, Visible Light Coms,
- Non-3GPP convergence (like Wi-Fi, Industry Net Standards…)

Tera scale Internet of Things (IoT)

ICT Critical Infrastructure as a Utility, The Critical Connectivity Grid

- Macro/Micro Grids' concepts related technologies adapted to ICT as it exists for Energy
- Full end-to-end Slicing of physical networks and infrastructures (see Smarter Networks)
- Cyber-security
  - Quantum QKD
  - AI/ML & Big Data Real Time Analytics based Security
  - Reinforcement of Sovereignty
  - Cyber-attack based Disaster recovery
- Trust enablers
  - Security
  - Auditability
  - Transparency

Space dimension enabled 5G/B5G/6G

- SAT enabled 5G/B5G/6G
  - Moving ICT to SAT
    - RAN in SAT (Space-RAN?)
    - CORE in SAT (Space-CORE?)
    - MEC in SAT (Space-Edge Dc?)
    - MBH in SAT (Space-Mobile Backhaul?)
    - Value Added Services in SAT
  - Earth Meshed Network (including Oceans)
    - SAT to Ground
    - SAT to Sea
    - SAT to Air Objects & IOTs
    - SAT to SAT
    - => SAT to All
  - Multimodal SATs
    - Combining GPS info with Network info
    - Combining Observation modalities with Network info
- Avionics communications
  - Air to Ground
  - Air to Air
  - Drones / HAPS
  - Balloons?

Distributed & Smarter Networks

- Deeper "edge-ification" for Distributed, collaborative and hierarchical AI/ML
- More Multi-Purpose Adaptable Networks:
  - Universal adaptive core
  - Programmable network Operating System
- Advanced very large-scale monitoring (for AI, ML, DI…)
- Distributed AI/ML
  - Consuming
  - Producing
  - Supporting
- Intelligent and Automated Dynamic Spectrum Management :
  - Electro-magnetic Spectrum: Horizontal & Vertical Flexible Sharing CBRS, DSS, LSA, LAA, MultiFire, new enablers…
  - Optical spectrum: Sliceable Optics, shared lambdas
- Full Slicing
  - Real End-to-End leading to:
    - Multi-layered multi-tenancy
    - Full neutral hosting
    - Multi-Dimensions sliceable (incl. Spectrum and Time)
  - Thanks to: Deeper Network Programmability

2023 additional topics:

CELTIC and Countries are also looking at:

- **Non-Terrestrial-Networks and Terrestrial Networks convergence**
- **Digitalisation of the Economy thanks to ICT technologies**
- **Clean Growth**
- **Remote Health & Care**
- **ICT for Industry 4.0 and Logistics**
- **Critical Coms for Emergency & Rescue Services**
- **Critical Infrastructures & Cybersecurity**
- **Open RAN**
- **Private Networks**
- **AI for ICT & Networks (including Radio Massive MIMO, Open-RAN RICs, …)**
- **Consumer IoT, Industry IOT**
- **ICT Technologies for METAVERSES**
- **and 5G Advanced and 6G topics (sensing, location, …)**

As usual, Proposals that address **any of the topics of the CELTIC Strategic Roadmap** in this bottom-up call are welcomed

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CELTIC-NEXT Video Channel

MANY THANKS FOR YOUR ATTENTION.

CELTIC-NEXT

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