# CELTIC-NEXT Σeureka Cluster

#### CELTIC-NEXT SRIA & additional Topics of Interest Spring Call 2024, Online Brokerage Proposers Day, 13th March 2024



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# CELTIC's Community







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



#### CELTIC-NEXT in the European Funding Landscape

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

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



**Press Release** 

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

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**S**eureka

Knowledge exchange & SRIAs cross-contributions

Leveraging funding schemes across 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 bottomup spaces for their collaborative projects





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



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

CELTIC-NEXT Seureka Cluster

Future needs of the end users: High level fields of applications Human Centred Technologies and Services, for an Augmented Life Experience

- 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)

#### Full industrial digitization and support of vertical industries

- 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 4<sup>th</sup> Utility, like Energy

#### Futuristic use cases

- 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
<ul> <li>Urban, sub-urban down to rural</li> <li>Into the home for education and remote working</li> <li>One Identity for seamless experience</li> <li>Smart Regions/Cities/Buildings/Ho mes</li> </ul>	<ul> <li>In "normality"</li> <li>In "crisis" (pandemics, major climate events)</li> <li>Highly Precise Positioning</li> <li>Edge Computing</li> <li>Open-RAN / vRAN</li> <li>Slicing</li> </ul>	<ul> <li>Extensive Monitoring</li> <li>Big Data Analytics</li> <li>Artificial Intelligence</li> <li>ICT supporting large and intense Ai/ML deployment for verticals (connectivity, processing, data storage)</li> <li>Transparency or the Imperceptible latency</li> </ul>	•Cyber-security •Identity management	<ul> <li>Holographic media teleport</li> <li>Multi-sense networks</li> <li>Time engineered applications</li> </ul>



## Enabling technologies that have to be mastered

Beyond 5G, from 5G to 6G	Wired and Wireless Industrial ICT	ICT Critical Infrastructure as a Utility, The Critical Connectivity Grid	Space dimension enabled 5G/B5G/6G	Distributed & Smarter Networks
<ul> <li>Enhanced overall architectures to support needed enablers</li> <li>End-to-end Horizontal and Vertical Network Convergence</li> <li>Al/ML for Digital Infrastructures</li> <li>End-to-end Network Automation</li> <li>Autonomous Systems and Networks</li> <li>Advanced QKD Networking</li> <li>Connectivity as a Shared Critical Utility</li> <li>Wireless and Wired Tera- Broadband technology:</li> <li>Wireless (electromagnetic and visual light waves):</li> <li>Larger massive MIMO systems</li> <li>No "Cell" Radio Networks with distributed smart mMIMO systems</li> <li>TeraHertz Communications</li> <li>Wired optical:</li> <li>Photonics</li> <li>Optical smart networks</li> <li>Optical spectrum: Sliceable Optics, shared lambdas</li> <li>Increasing Bandwidth in Optical Network: use of additional bands, Higher modulation schemas</li> <li>Quantum communications</li> <li>QKD</li> <li>Entanglement</li> </ul>	<ul> <li>Industrial features of 5G and beyond</li> <li>Time Sensitive Networks</li> <li>Precision Positioning</li> <li>Private Networks</li> <li>More Indoor techs like Terahertz, Visible Light Coms,</li> <li>Non-3GPP convergence (like Wi- Fi, Industry Net Standards)</li> <li>Tera scale Internet of Things (IoT)</li> </ul>	<ul> <li>Macro/Micro Grids' concepts related technologies adapted to ICT as it exists for Energy</li> <li>Full end-to-end Slicing of physical networks and infrastructures (see Smarter Networks)</li> <li>Cyber-security <ul> <li>Quantum QKD</li> <li>AI/ML &amp; Big Data Real Time Analytics based Security</li> <li>Reinforcement of Sovereignty</li> <li>Cyber-attack based Disaster recovery</li> </ul> </li> <li>Trust enablers <ul> <li>Security</li> <li>Auditability</li> <li>Transparency</li> </ul> </li> </ul>	<ul> <li>SAT enabled 5G/B5G/6G</li> <li>Moving ICT to SAT</li> <li>RAN in SAT (Space-RAN?)</li> <li>CORE in SAT (Space-CORE?)</li> <li>MEC in SAT (Space-Edge Dc?)</li> <li>MBH in SAT (Space-Mobile Backhaul?)</li> <li>Value Added Services in SAT</li> <li>Earth Meshed Network (including Oceans)</li> <li>SAT to Ground</li> <li>SAT to Sea</li> <li>SAT to Air Objects &amp; IOTs</li> <li>SAT to SAT</li> <li>=&gt; SAT to All</li> <li>Multimodal SATs</li> <li>Combining GPS info with Network info</li> <li>Combining Observation modalities with Network info</li> <li>Avionics communications</li> <li>Air to Air</li> <li>Drones / HAPS</li> <li>Balloons?</li> </ul>	<ul> <li>Deeper "edge-ification" for Distributed, collaborative and hierarchical AI/ML</li> <li>More Multi-Purpose Adaptable Networks:</li> <li>Universal adaptive core</li> <li>Programmable network Operating System</li> <li>Advanced very large-scale monitoring (for AI, ML, DL)</li> <li>Distributed AI/ML</li> <li>Consuming</li> <li>Producing</li> <li>Supporting</li> <li>Intelligent and Automated Dynamic Spectrum Management :</li> <li>Electro-magnetic Spectrum: Horizontal &amp; Vertical Flexible Sharing CBRS, DSS, LSA, LAA, MultiFire, new enablers</li> <li>Optical spectrum: Sliceable Optics, shared lambdas</li> <li>Full Slicing</li> <li>Real End-to-End leading to:</li> <li>Multi-layered multi-tenancy</li> <li>Full neutral hosting</li> <li>Multi-Dimensions sliceable (incl. Spectrum and Time)</li> <li>Thanks to: Deeper Network Programmability</li> </ul>





> Non-Terrestrial-Networks and Terrestrial Networks convergence

2024 additional topics:

- > Digitalisation of the Economy thanks to ICT technologies
- Clean Growth & Sustainability
- Remote Health & Care
- ICT for Industry 4.0 and Logistics
- Critical Coms for Emergency & Rescue Services
- Critical Resilient Infrastructures & Cybersecurity
- > Open RAN
- Private Networks (including Industrial & leisure)
- > 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, ...)

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### MANY THANKS FOR YOUR ATTENTION.



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