



Research & Innovation Roadmap

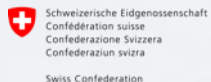
for the Cognitive Computing Continuum

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Consolidating Research & Policy along the **Cognitive Computing Continuum**

A Unique CSA Proposal for HORIZON-CL4-2023-DATA-01-06



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NexusForum.EU will boost the consolidation of the European Computing Continuum, building on the activities and impact generated by the **EUCloudEdgeIoT** ecosystem and providing a forward-looking and bold vision in new areas and directions.



- **Technology Priorities for the Cognitive Computing Continuum**
 - R&D priorities to **support the EU cloud-edge industry.**
 - Shape a **forward-looking** and **bold long-term vision** (5-10 years).
 - **Complement** industrial roadmaps and innovation carried out by the **EU Cloud Alliance** and the new **IPCEI-CIS.**
 - **Important input** for the **Horizon Europe Work Programmes** and the **next EU Commission.**



First (Draft) Version of the Roadmap

- **Four main topics** (aligned with the four IPCEI-CIS Workstreams):
 - AI for Cloud-Edge
 - Cloud-Edge for AI
 - Telco Cloud-Edge
 - Cloud-Edge Use Cases
- **Identified other interesting areas**, that might become specific sections in future versions of the Roadmap:
 - Neuromorphic, quantum computing, space edge, hyper-decentralized edge ...



Expectations for the official version of the Roadmap

- **To be published by end of 2024**
- **Additional sections** in the Roadmap will **cover key transversal topics** (aligned with focus areas under the Cloud-Edge WG of the EU Cloud Alliance):
 - Sovereignty & Open Source, Sustainability, Interoperability, Cybersecurity.
- **Expand the current topics** (presented in next slides) with more details
- More feedback from the broad cloud-edge-IoT ecosystem/communities on future research & innovation topics
 - Insights from ongoing RIAs
 - Input from related initiatives
 - ...



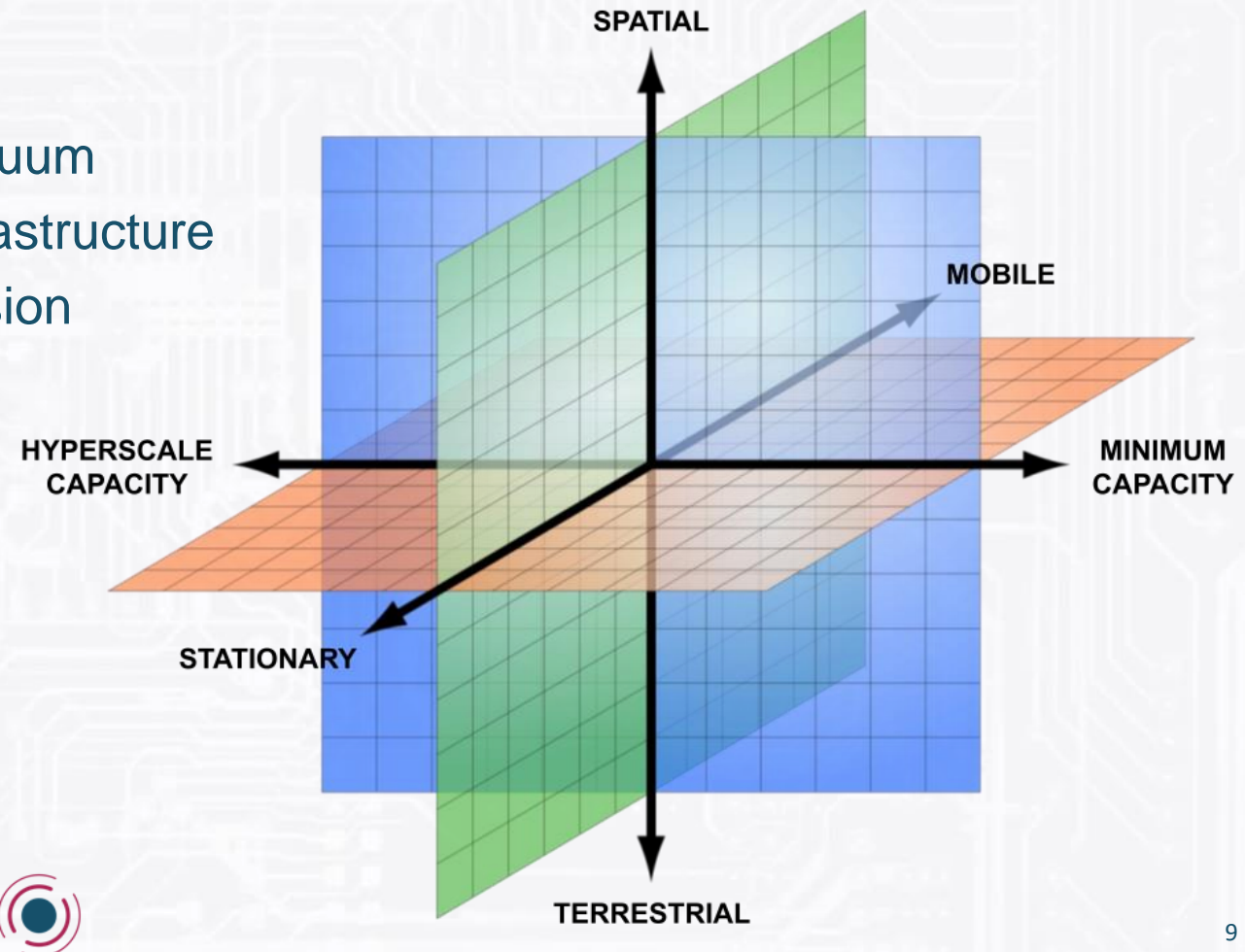
- **AI for Cloud-Edge: *Orchestration and Managing a Multi-Provider Continuum.***
 - “Cross-layer” Optimization in a Multi-provider Cloud-Edge Continuum.
 - Large Language Models and AI for Debugging and Root Cause Analysis.
 - AI for an Energy-efficient, Green, and Power-grid-aware Continuum.
 - Efficient Resource Allocation for "Continuum-native" Workloads.
 - Serverless Computing Across the Cloud-Edge.
 - Distributed AI for Safety-critical Applications
- **Cloud-Edge for AI: *Enabling and Facilitating AI Applications Across the Continuum.***
 - Integrating RISC-V Hardware in the Cloud-Edge.
 - Open Compiler Infrastructure and Lightweight Virtualization for Heterogeneous Hardware.
 - Integrating (Euro)HPC in the Continuum.
 - Federated Computation for Foundation Models.
 - Confidential Computing and Data Privacy & Security.
 - LLMOps and GenAIOps.



- **Telco Cloud-Edge:** *Telco as One of the Main Tenants and Infrastructure Providers.*
 - Open Radio Network Access (O-RAN)
 - Resilient On-prem 5G/6G Edge-Cloud for Industry 4.0 and Beyond
 - AI and Generative AI to Optimize Network Resources and Operational Efficiency
 - Seamless Data Connectivity Across Different Networks
- **Cloud-Edge Use Cases:** *Requirements from Next-Gen Use Cases and Applications.*
 - Software-Defined Vehicles
 - Decentralized Spatial Computing for AR/VR Technologies
 - Satellite Communication for Edge Applications
 - Cyberspace and Physical Space Fusion



- **Other Topics of Potential Interest:**
 - Integration of Neuromorphic Systems
 - Space Edge
 - Towards a Hyper-Decentralized Continuum
 - Integration of Quantum Computing Infrastructure
 - Quantum and Classical Computing Fusion



How the Swarm Projects Can Contribute

- **Your perspectives and insights** on research & innovation needed for the Cognitive Computing Continuum
- Requirements on the Cognitive Computing Continuum from your **Use Cases**
- **Engagement with** the NexusForum.EU project events and workshops
- ...





THANK YOU FOR YOUR ATTENTION



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