

ECHO-TWIN

An Integrated Digital Ecosystem for the Edge-Cloud-HPC Continuum



Arnaud Ceol

Fondazione ICSC – Centro Nazionale HPC, Big Data
and Quantum computing



#Tier1
Inaugurated May 2024

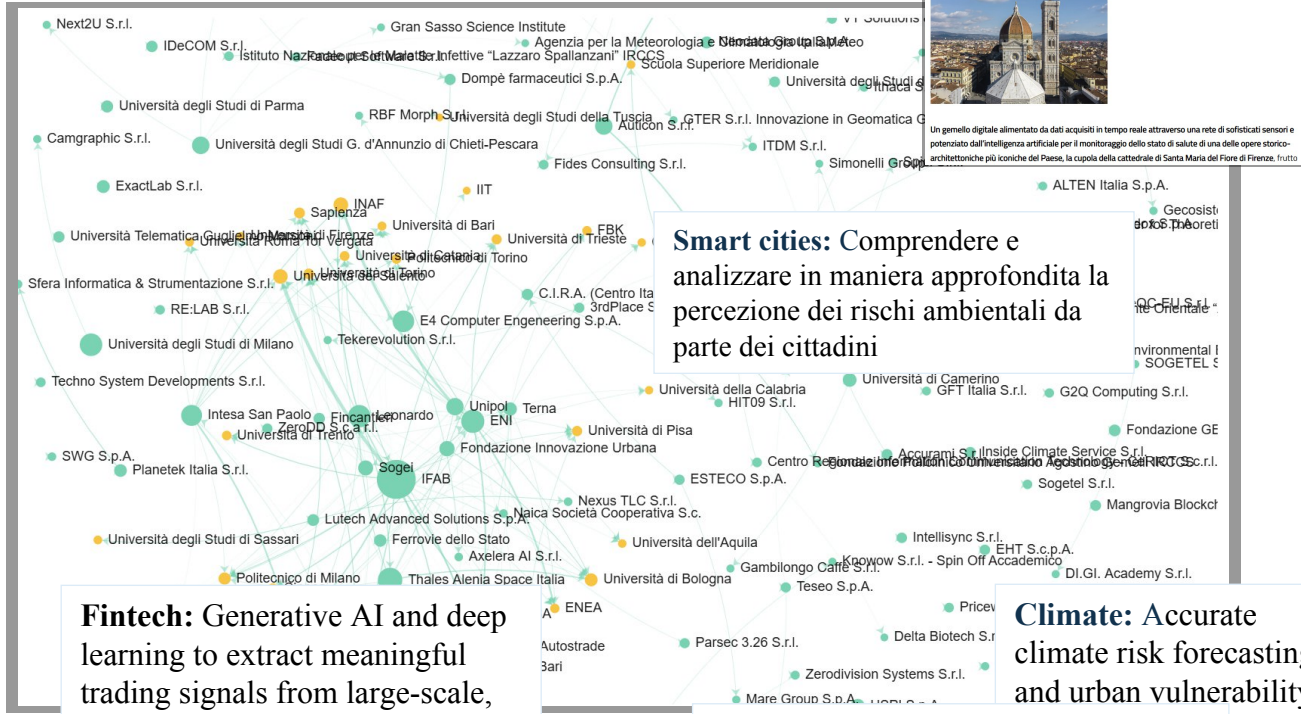


#MEGARIDE
Optimized for AI and Cybersecurity



INNOVATE: The First INDUSTRIAL EURO HPC Supercomputer

LISA



GEMELLI DIGITALI E INTELLIGENZA ARTIFICIALE PER LA SALVAGUARDIA DEL PATRIMONIO STORICO-ARCHITETTONICO ITALIANO: IL CASO DELLA CUPOLA DEL BRUNELLESCHI



Un gemello digitale alimentato da dati acquisiti in tempo reale attraverso una rete di sofisticati sensori e potenziato dall'intelligenza artificiale per il monitoraggio dello stato di salute di una delle opere storico-architettoniche più iconiche del Paese, la cupola della cattedrale di Santa Maria del Fiore di Firenze. In foto

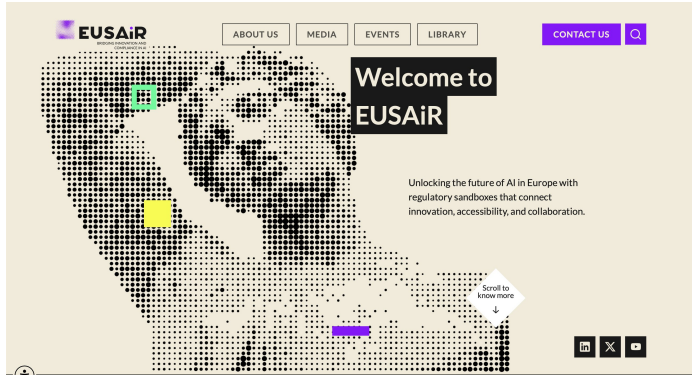
Smart cities: Comprendere e analizzare in maniera approfondita la percezione dei rischi ambientali da parte dei cittadini

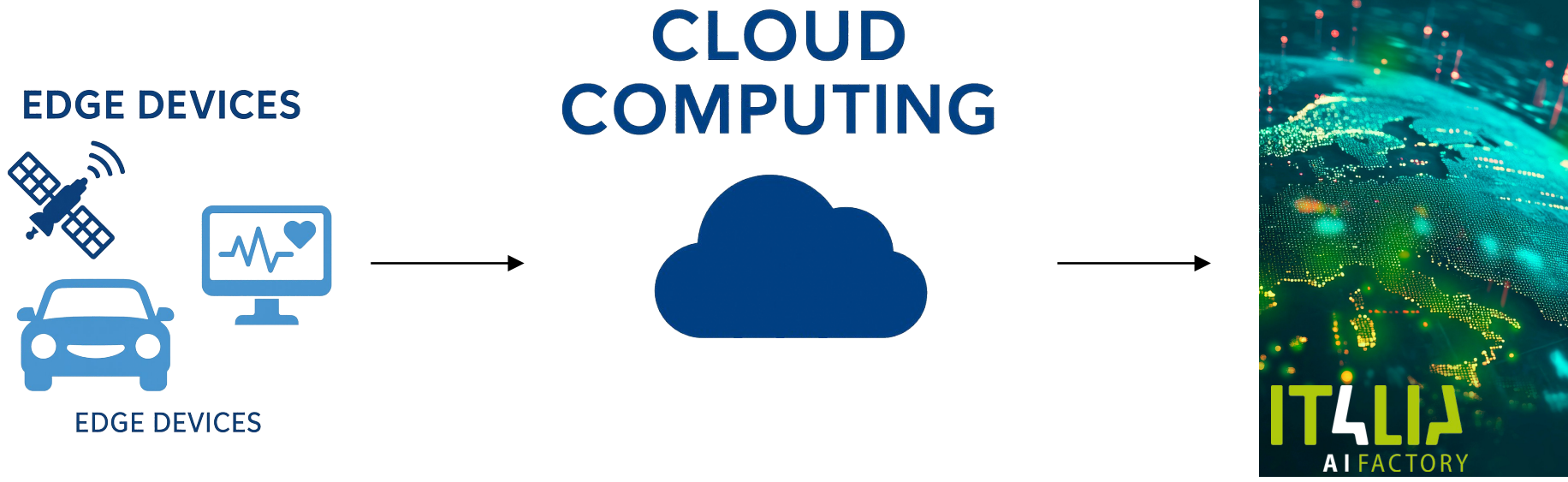
Fintech: Generative AI and deep learning to extract meaningful trading signals from large-scale, non-traditional data sources

Climate: Accurate climate risk forecasting and urban vulnerability

Health: Data-driven, AI-assisted early diagnosis and prevention of neurodegenerative disorders.

Fintech: fully functional AI-driven document classification and retrieval system





ECHO-TWIN: Advances AI-driven digital twins across distributed edge-cloud-HPC infrastructures, strengthening innovation ecosystems and industry skills.

Partners PUBBLICI

- ICSC
- ALMA MATER STELLOBIUM UNIVERSITÀ DI BOLOGNA
- UNIVERSITÀ DI TORINO
- FONDAZIONE BRUNO KESSLER
- Consiglio Nazionale delle Ricerche
- INAF ISTITUTO NAZIONALE DI ASTRONOMIA
- INFN
- Università di Catania
- FEDERICO II
- UNIVERSITÀ DEL SALENTO
- UNIVERSITÀ DEGLI STUDI DI BARI ALDO MORO
- UNIVERSITÀ DELLA CALABRIA
- Politecnico di Bari

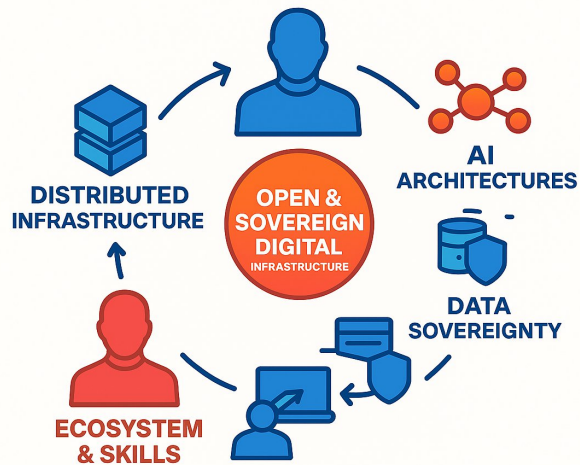
Partners PRIVATI

- Istituto Oncologico del Mediterraneo s.p.a.
- PARSEC
- planetek italia
- nurjanatech
- netSERVICE Empowering Digital Evolution

Piano Nazionale Ricerca, Innovazione e Competitività 2021-2027 (PN RIC 2021-2027),

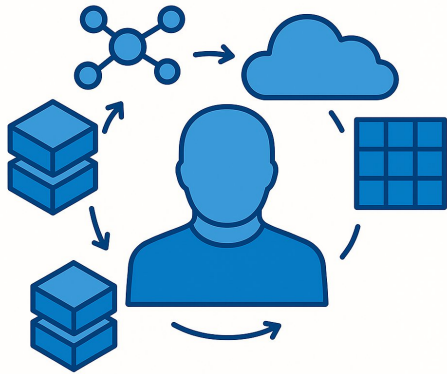
Key technical pillars

- **AI & Digital Twins:** Domain-specific Digital Twins with Edge AI for real-time inference and predictive analytics (**Environmental and infrastructure risk monitoring, In-silico healthcare models, Smart mobility**).
- **Edge-Cloud-HPC:** Federated infrastructure with heterogeneous architectures (x86, ARM, RISC-V), reducing dependence on proprietary technologies.
- **Low-Power Computing:** Deployment of energy-efficient edge nodes and workload optimization across the continuum.
- **Data & trust:** Federated data spaces with governance, security and ethical frameworks.
- **Ecosystem:** Collaboration, testbeds and skills across research, industry and public sector



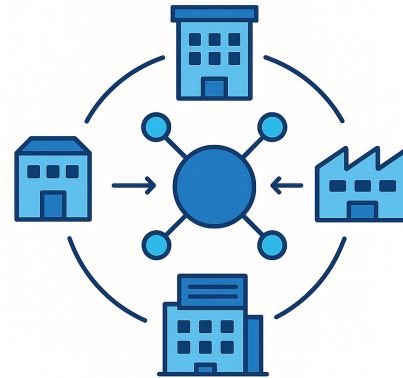
RISE → research & innovation on DT/AI

Develops advanced AI, **edge-cloud-HPC** architectures and **digital twin** technologies for real-world applications.



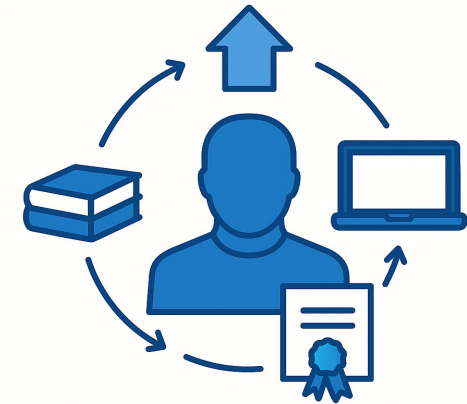
NET → infrastructure & technology transfer

Builds and **connects** innovation **infrastructures** and **labs** to enable **technology transfer** and collaboration.



UP → training & capacity building

Upskills and reskills industry through training and networking to accelerate **adoption** of AI and digital twins.



🧠 Compute & AI

- Heterogeneous servers (ARM, RISC-V)
- Edge devices for real-time AI inference

🏢 Labs & Testbeds

- Innovation labs for Digital Twin validation
- Matchmaking events

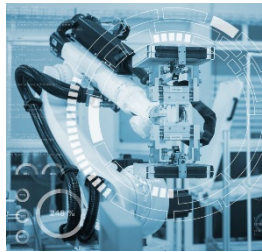
🔒 Security & Compliance

- GDPR / NIS2 / AI Act compliance
- Secure, privacy-preserving computing environments

Expected results

For the National Center

- Strengthening as a **national hub** for **HPC, AI and Digital Twin**.
- Development of interoperable distributed edge-cloud-HPC infrastructures.
- Greater capacity for **technology transfer** and collaboration with **industry**.



For Industry and Public Administration

- Access to advanced infrastructures and technologies (AI, HPC, Digital Twin).
- Acceleration of **innovation, digitalization** and **sustainability**.
- Increased **skills** and **competitiveness**, especially for SMEs..

For Citizen

- Improvement of **public services** (healthcare, environment, mobility).
- Greater territorial **resilience** and environmental **sustainability**.
- Indirect benefits from **innovation, skilled** employment and economic growth.



Grazie per l'attenzione!

Arnaud Ceol (ICSC)

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Lucia Floresta (ICSC)

Ugo Becciani e Davide Salomoni (ICSC)



<https://www.supercomputing-icsc.it/comunicati-stampa/al-via-a-napoli-echo-twin-progetto-per-la-creazione-di-ecosistemi-intelligenti-e-soluzioni-digitali-avanzate-a-supporto-di-ricerca-e-settore-produttivo/>