Finanziato dall'Unione europea
NextGenerationEU

Ministero dell'Università e della Ricerca

Italiadomani
PIANO NAZIONALE DI RIPRESA E RESILIENZA

ICSC
Centro Nazionale di Ricerca in HPC, Big Data and Quantum Computing

ICSC
Centro Nazionale di Ricerca in HPC,
Big Data and Quantum Computing

ICSC and Digital Sovereignty: Building Italy and Europe's Federated Ecosystem for Advanced Computing

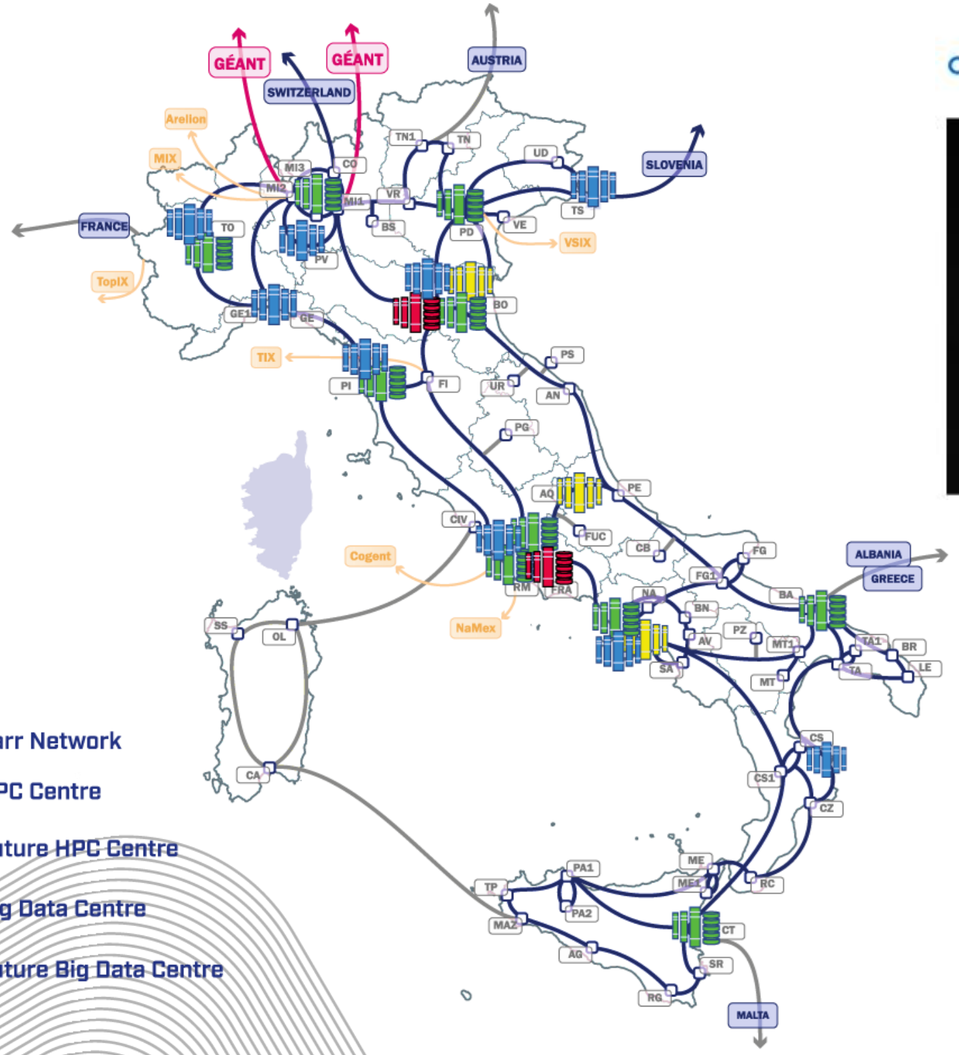
Arnaud Ceol, e-IRG WS NL Semester 2025

Italian Recovery and Resilience Plan: Center for Research In HPC, Big data and Quantum Computing (ICSC)

Objective: Sustain research so that **innovative**, **low TRL** research outputs may be brought to a **ready-to-market state**, through direct involvement of **public and private** institutions.

Research to Business

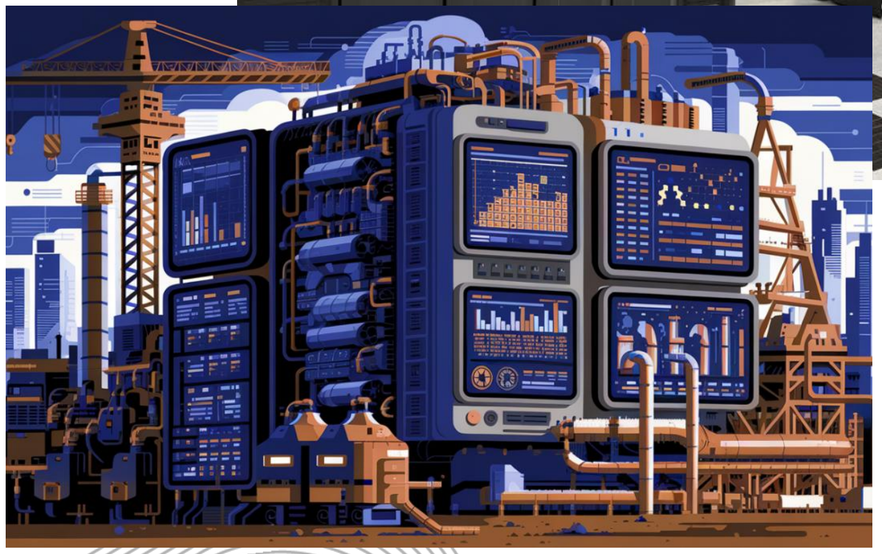
ENGINEERING · eni · FERROVIE DELLO STATO ITALIANE · FINCANTIERI · INFN · CINECA · ENEA
fondazione innovazione urbana · autostrade per l'Italia · HUMANITAS · iFAB · INTESA SANPAOLO
LEONARDO · sogei · ThalesAlenia Space · Terna Driving Energy · UnipolSai
Consiglio Nazionale delle Ricerche · INAF · Consortium GARR


GÉANT
GÉANT
AUSTRIA
SWITZERLAND
SLOVENIA
FRANCE
ALBANIA
GREECE
MALTA
Arelion
MIX
TopIX
TIX
VSIX
Cogent
NaMex
Garr Network
HPC Centre
Future HPC Centre
Big Data Centre
Future Big Data Centre


CINECA
#Leonardo
n. 10 Top500 supercomputer in the world


#Tier1
Inaugurated on May 10, 2024
INFN

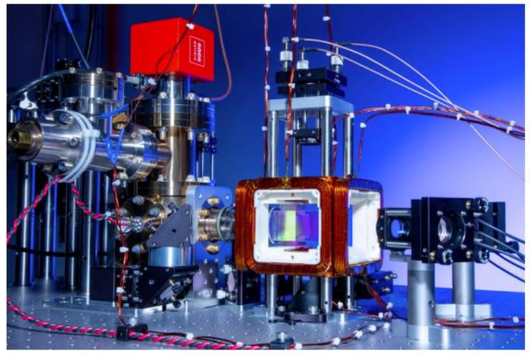

MUR
CINECA
ICSC
OGS
#Gaia
Cloud infrastructure



INNOVATE: THE FIRST INDUSTRIAL SUPERCOMPUTER OF THE EUROPEAN EURO HPC INFRASTRUCTURE

ICSC AND QUERA: A PARTNERSHIP TO PROVIDE ITALIAN RESEARCHERS ACCESS TO ONE OF THE WORLD'S MOST ADVANCED NEUTRAL-ATOM QUANTUM COMPUTERS

Sep 30, 2025 | Press Release



Th
fu
(including the ICSC Fou
2026Q1.

National laboratories and businesses will have direct access to **Aquila**, QuEra's 256-qubit quantum computer, accompanied by a dedicated mentoring program.

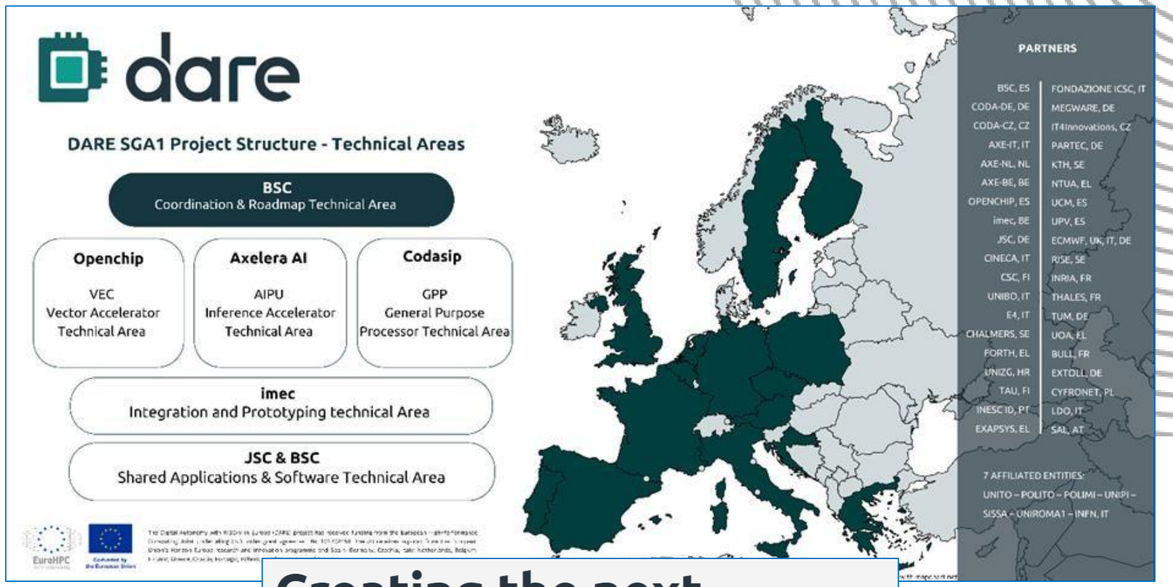
The industrial-grade sup
the development of industrial applications. It is expected to be installed at the Bologna Technopole in the first half of 2026.

Open technologies: RISC-V

- DARE (Digital Autonomy with RISC-V in Europe)
  - Develop **next-generation European processors and computing systems**, including an optimized software ecosystem, designed for research and industry applications (https://dare-riscv.eu/home/) → started **3/2025**

- Why?
  - Open-Source disruption of proprietary models
  - Geopolitical and national security dimensions (reduce reliance on US-controlled IP)
  - Strategic role in AI and High-Performance Computing → AI accelerators
  - Strategic flexibility for industry → customization for specialized workloads

https://dare-riscv.eu/

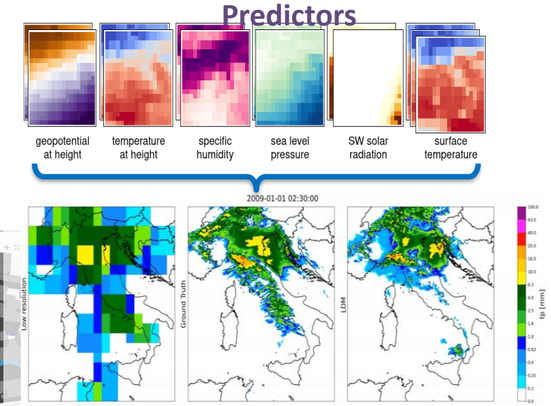


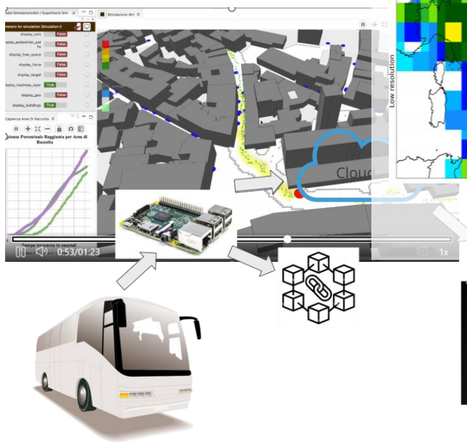
Creating the next generation of processors

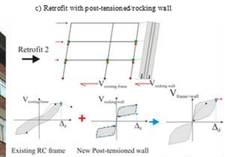
Based on open source and highly adaptable tools

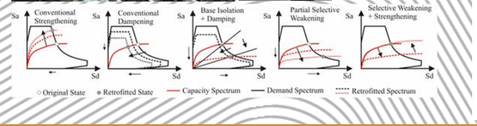
DARE (Digital Autonomy with RISC-V in Europe) is a groundbreaking initiative driving Europe's independence in high-performance computing and AI. By leveraging open-source technologies, DARE is **developing cutting-edge chiplet processors** — the essential building blocks for next-generation supercomputers. This effort is a critical first phase in a long-term plan to ensure **secure, efficient, and scalable computing solutions** tailored to European needs.

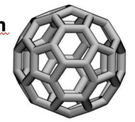
Finanziato dall'Unione europea NextGenerationEU
Ministero dell'Università e della Ricerca
Italiadomani PIANO NAZIONALE DI RIPRESA E RESILIENZA
ICSC Centro Nazionale di Ricerca in HPC, Big Data and Quantum Computing





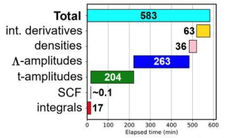


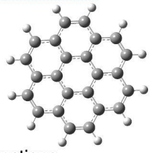




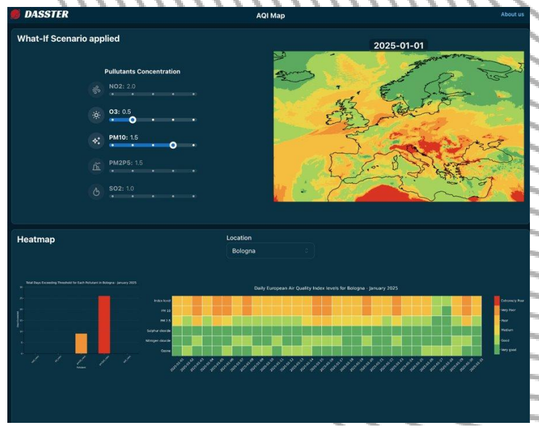
New CCSD implementation
1800 basis functions
D_{2h} Symmetry
About 2h/iteration!

CCSD Geometry Optimization





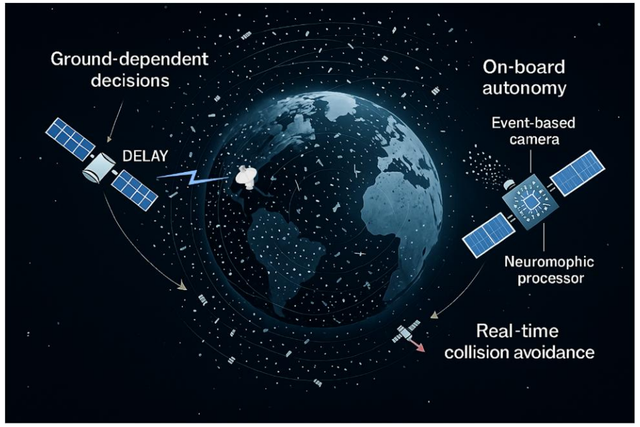
900 basis functions



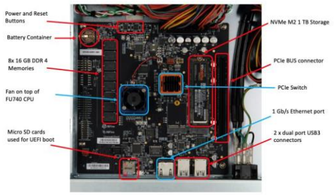
Dynamic Solutions for Hybrid Quantum-HPC Resource Allocation

Roberto Rocco*§, Simone Rizzo*, Matteo Barbieri*, Gabriella Bettonte*, Elisabetta Boella*, Fulvio Ganz *, Sergio Iserte††, Antonio J. Peña††, Petter Sandås††, Alberto Scionti†, Olivier Terzo†, Chiara Vercellino†¶, Giacomo Vitali†¶, Paolo Viviani†, Jonathan Frassineti ‡, Sara Marzella‡, Daniele Ottaviani‡, Iacopo Colonnelli**, Daniele Gregori*

**E4 Computer Engineering*, Scandiano, Italy †*LINKS Foundation*, Torino, Italy
††*Barcelona Supercomputing Center (BSC-CNS)*, Barcelona, Spain ‡*CINECA*, Casalecchio di Reno, Italy
¶*Politecnico di Torino*, Torino, Italy **Università di Torino*, Torino, Italy
§*roberto.rocco@e4company.com*



Monte Cimone: Paving the Road for the First Generation of RISC-V High-Performance Computers



1 FUTURE HPC & BIG DATA

2 FUNDAMENTAL RESEARCH & SPACE ECONOMY

3 ASTROPHYSICS & COSMOS OBSERVATIONS

4 EARTH & CLIMATE

5 ENVIRONMENT & NATURAL DISASTERS

6 MULTISCALE MODELING & ENGINEERING APPLICATIONS

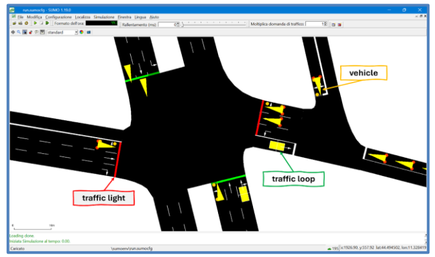
7 MATERIALS & MOLECULAR SCIENCES

8 IN-SILICO MEDICINE & OMICS DATA

9 DIGITAL SOCIETY & SMART CITIES

10 QUANTUM COMPUTING

SII: TRANSVERSAL RESEARCH GROUP on SOCIETAL IMPLICATIONS AND IMPACT



The Ethical Data Initiative

ICSC

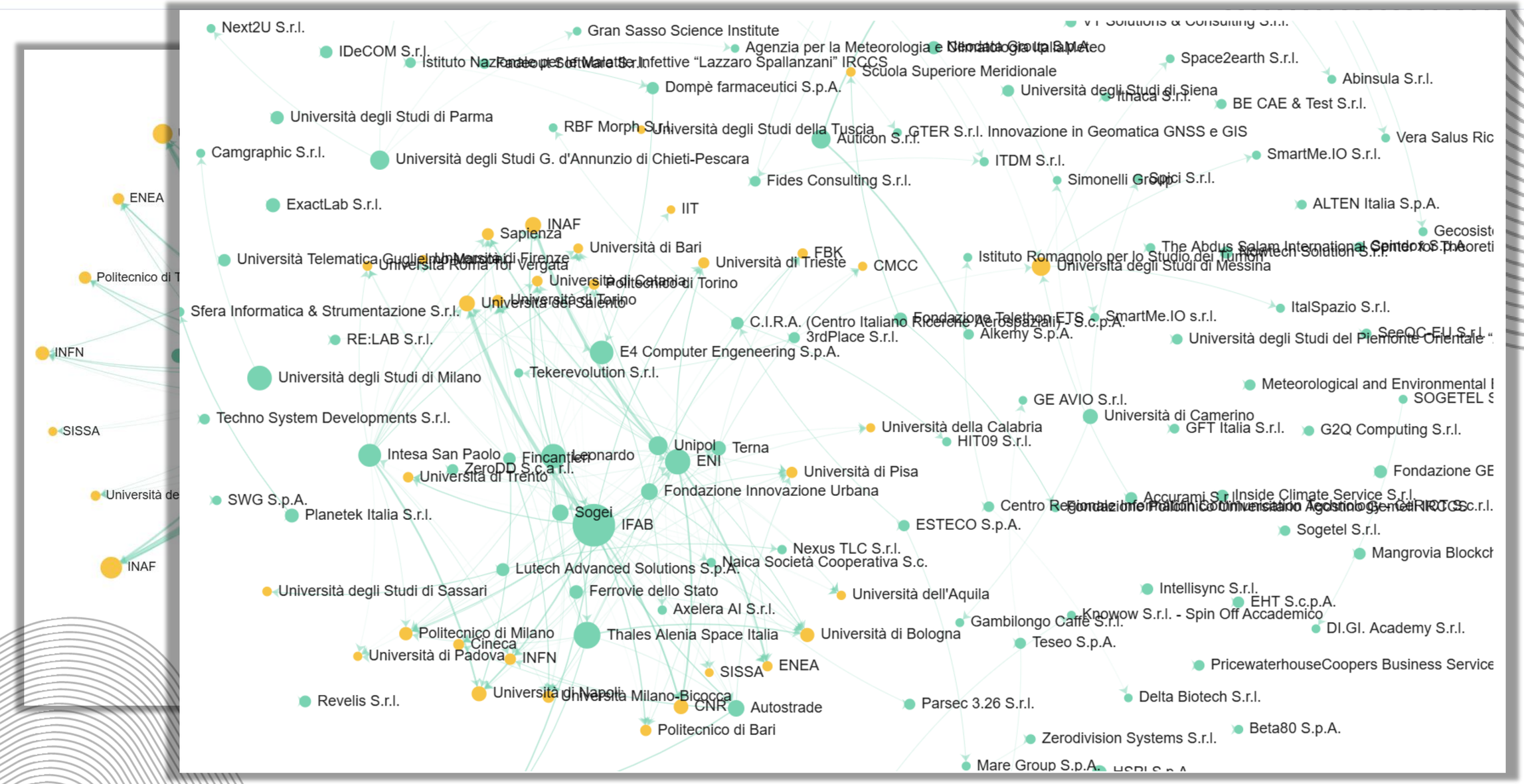
The Ethical Data Initiative and Supercomputing ICSC

Bridging the gap between technological power and human values

https://ethicaldatainitiative.org/

s contest, aimed at posals based on **data** the gender digital

hub.io/GenderHack/


Next2U S.r.l.
Gran Sasso Science Institute
IDeCOM S.r.l.
Agenzia per la Meteorologia e Climatologia dell'Altopiano
Istituto Nazionale per le Malattie Infettive "Lazzaro Spallanzani" IRCCS
Scuola Superiore Meridionale
Space2earth S.r.l.
Abinsula S.r.l.
Dompè farmaceutici S.p.A.
Università degli Studi di Siena
Ithaca S.r.l.
BE CAE & Test S.r.l.
Università degli Studi di Parma
RBF Morph S.r.l.
Università degli Studi della Tuscia
GTER S.r.l. Innovazione in Geomatica GNSS e GIS
Auticon S.r.l.
Vera Salus Ric
Camgraphic S.r.l.
Università degli Studi G. d'Annunzio di Chieti-Pescara
ITDM S.r.l.
SmartMe.IO S.r.l.
Fides Consulting S.r.l.
Simonelli Group
Spici S.r.l.
ENEA
ExactLab S.r.l.
IIT
ALTEN Italia S.p.A.
INAF
Sapienza
Gecosist
Università di Bari
The Abdus Salam International Centre for Theoreti
Università Telematica Guglielmo Marconi
Università di Firenze
FBK
Istituto Romagnolo per lo Studio dei Tumori
Università Roma Tor Vergata
Università di Trieste
CMCC
Università degli Studi di Messina
Politecnico di T
Università di Catania
Politecnico di Torino
Università di Torino
Sfera Informatica & Strumentazione S.r.l.
Università del Salento
ItalSpazio S.r.l.
Fondazione Telethon ETS
SmartMe.IO s.r.l.
C.I.R.A. (Centro Italiano Ricerche Aerospaziali) S.c.p.A.
Alkemy S.p.A.
SeeQC-EU S.r.l.
INFN
RE:LAB S.r.l.
3rdPlace S.r.l.
Università degli Studi del Piemonte Orientale "
E4 Computer Engeneering S.p.A.
Università degli Studi di Milano
Tekerevolution S.r.l.
Meteorological and Environmental I
GE AVIO S.r.l.
SOGETEL S
Techno System Developments S.r.l.
Università della Calabria
Università di Camerino
SISSA
HIT09 S.r.l.
GFT Italia S.r.l.
G2Q Computing S.r.l.
Unipol
Terna
Intesa San Paolo
Fincantieri
Leonardo
ENI
ZeroDD S.c.a r.l.
Università di Trento
Università di Pisa
Fondazione GE
Università de
Fondazione Innovazione Urbana
SWG S.p.A.
Accurami S.r.l.
Inside Climate Service S.r.l.
Planetek Italia S.r.l.
Sogei
IFAB
Centro Regionale Information Communication Technology Scarl
ESTECO S.p.A.
Sogetel S.r.l.
Nexus TLC S.r.l.
Mangrovia Blockch
INAF
Naica Società Cooperativa S.c.
Lutech Advanced Solutions S.p.A.
Intellisync S.r.l.
Università degli Studi di Sassari
Ferrovie dello Stato
Università dell'Aquila
EHT S.c.p.A.
Axelera AI S.r.l.
Knowow S.r.l. - Spin Off Accademico
Gambilongo Caffè S.r.l.
Politecnico di Milano
Thales Alenia Space Italia
Università di Bologna
DI.GI. Academy S.r.l.
Cineca
Teseo S.p.A.
Università di Padova
INFN
PricewaterhouseCoopers Business Service
SISSA
ENEA
Università di Napoli
Università Milano-Bicocca
Revelis S.r.l.
CNR
Autostrade
Parsec 3.26 S.r.l.
Delta Biotech S.r.l.
Politecnico di Bari
Beta80 S.p.A.
Zerodivision Systems S.r.l.
Mare Group S.p.A.

Enhance competitiveness

Preserve Fundamental rights

The **European Union** is committed and determined to be global leader in Artificial Intelligence, **a leading AI con** This Communication outlines a set of bold actions to a that goal. AI has just begun to be adopted in the key sec our economy, helping to tackle some of the most p challenges of our times.

While the full impact of this transformational shift unfolding, Europe must act with ambition, speed and fores shape the future of AI in a way that enhance competitiveness, safeguards and advances our **dem** values and protects our **cultural diversity**.

A trustworthy and **human centric** AI is both pivotal for economic growth and crucial for preserving the **fundamental righ principles** that underpin our societies. Swift policy actio highest priority.

https://digital-strategy.ec.europa.eu/en/library/ai-continent-action-plan

EUSAiR
BRIDGING INNOVATION AND COMPLIANCE IN AI

https://eusair-project.eu/

IT4LIA AI Factory: Solutions for Business, Research, and Society

IT4LIA targets **public and private entities** interested in developing innovative projects based on Artificial Intelligence

Comprehensive suite of services, including no-cost access for eligible startups, SMEs, public administrations, and academic institutions, as well as tailored offerings for other innovation actors

https://it4lia-aifactory.eu/: 🔗 Complete the IT4LIA AI Factory questionnaire: **https://it4lia-aifactory.eu/about-it4lia/share-your-priorities/**

A **full training program** is provided, featuring structured courses, practical hackathons, and internship opportunities

BBMRI-ERIC®
biobanking for a healthier world

BBMRI-ERIC AND THE ICSC SIGN A MEMORANDUM OF UNDERSTANDING TO FOSTER COLLABORATION

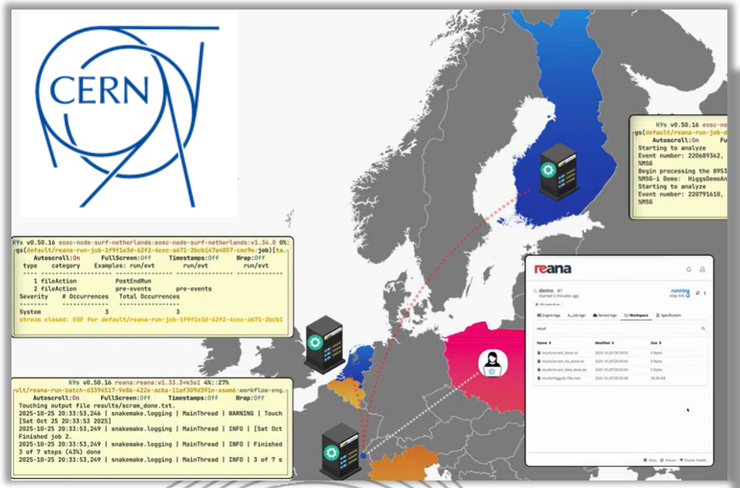
elixir ITALY

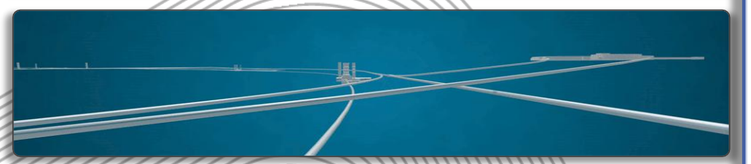
https://elixir-italy.org/

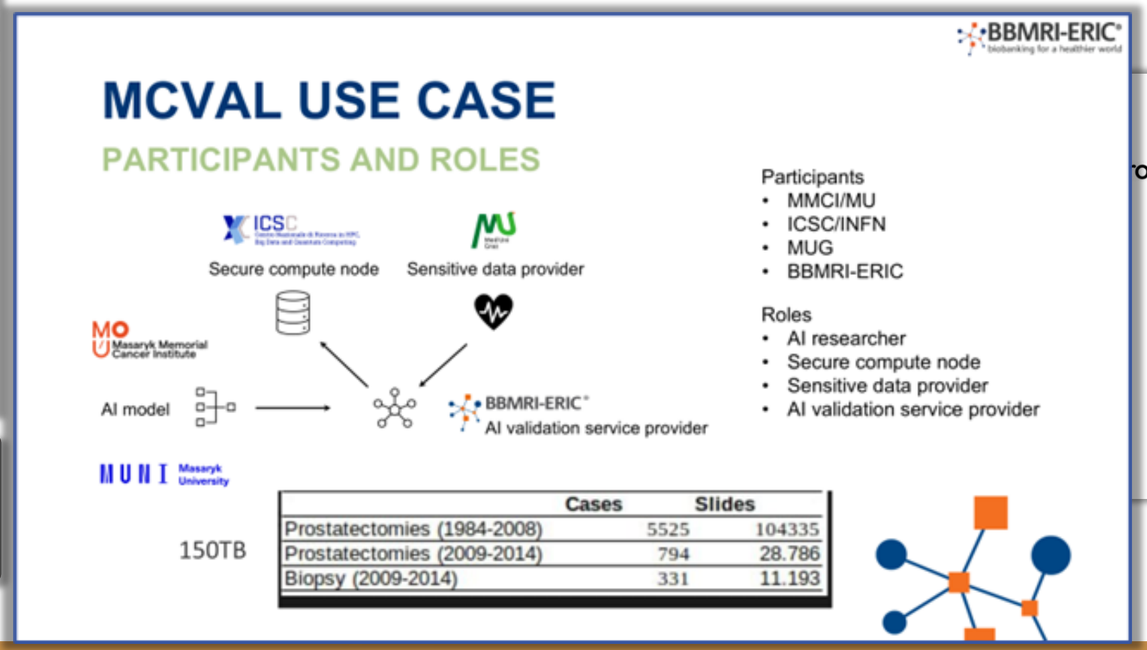
eosc

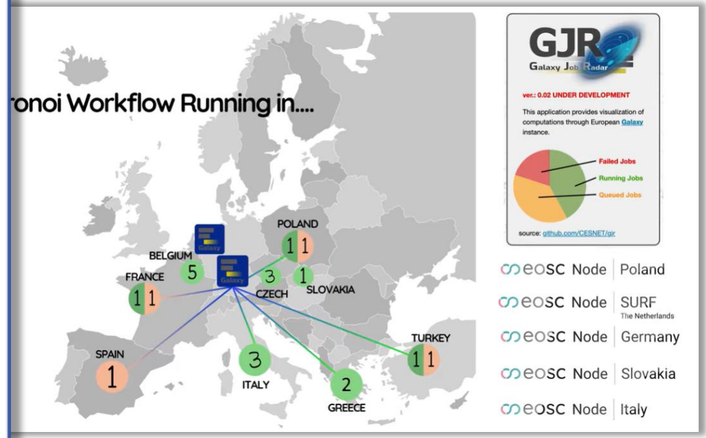
Bologna, February 20 – Today, it has been confirmed that ICSC – Italian Research Center on HPC, Big Data and Quantum Computing has been officially selected as a National Node of the **European Open Science Cloud**

https://eosc.eu/building-the-eosc-federation/eosc-node-italy









Finanziato dall'Unione europea
NextGenerationEU

Ministero dell'Università e della Ricerca

Italiadomani
PIANO NAZIONALE DI RIPRESA E RESILIENZA

ICSC
Centro Nazionale di Ricerca in HPC, Big Data and Quantum Computing

ICSC
Centro Nazionale di Ricerca in HPC,
Big Data and Quantum Computing

Thanks for your attention

https://www.supercomputing-icsc.it/
arnaud.ceol@supercomputing-icsc.it