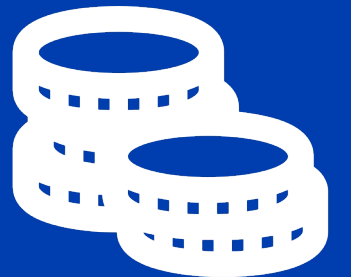# ICSC - National Center on HPC, Big Data and Quantum Computing: Status report

Alessia D'Orazio – Research Manager
alessia.dorazio@supercomputing-icsc.it

Spoke 2 Annual Meeting– December 4th,2024
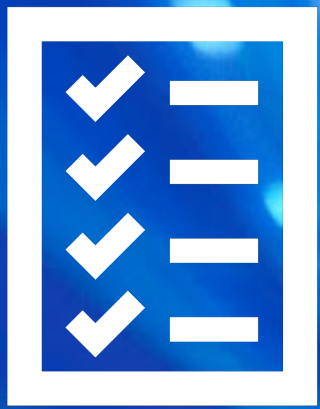
Administration and finance management

ICSC-Budget and «Numbers»

€ millions

- INFRASTRUTTURE
- STAFF
- ALTRO
- BANDI
- PHD
- COSTI INDIRETTI

139.1

88

31.8

32

15.9

13.2

320

41% al Sud

▶ Budget in M€ for **2022-25**
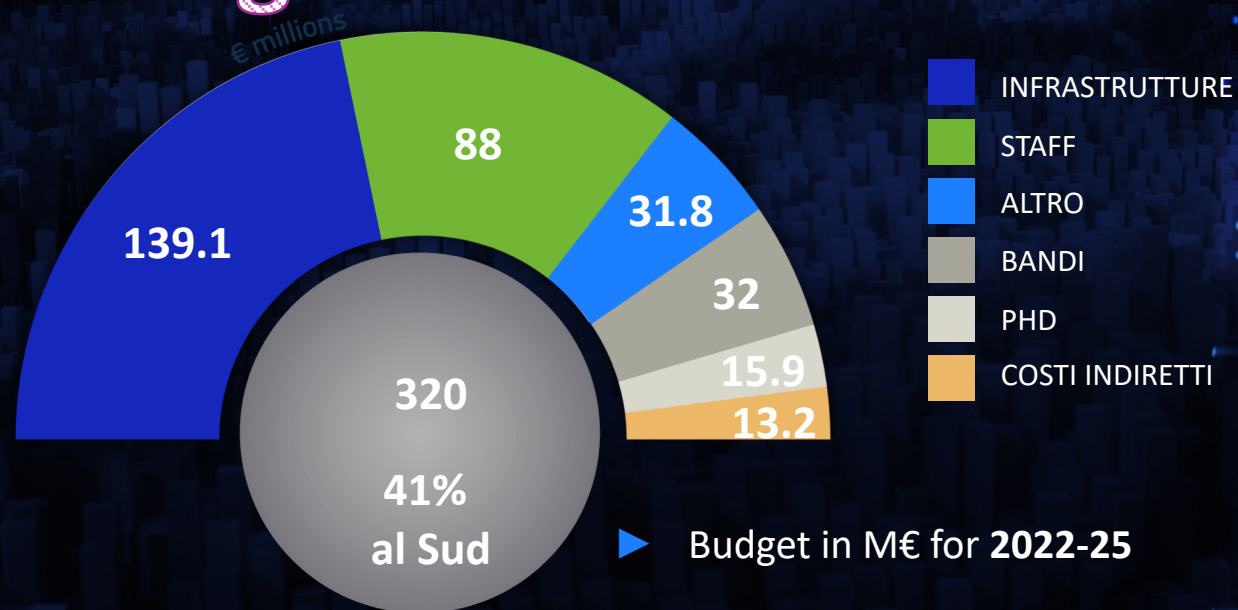
~ **1.500**
"Massa critica"

~ **270**
Recruited researchers

~**330**
Recruited Phds

33 M€
Cascade calls

31 M€
Innovation Funds

From research to business

Oversight of project expenditures

Chart 1

Total Costs: ~320M
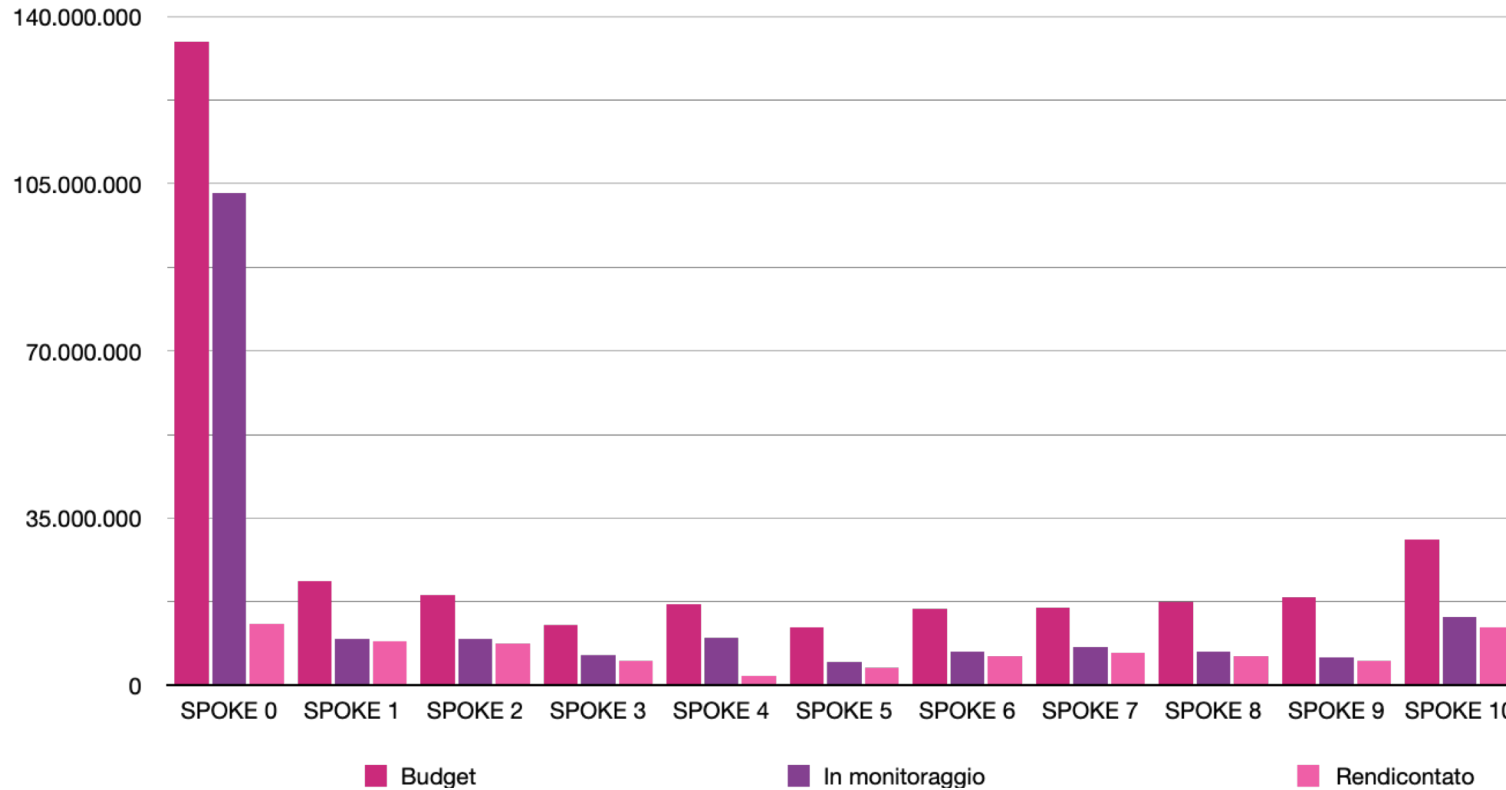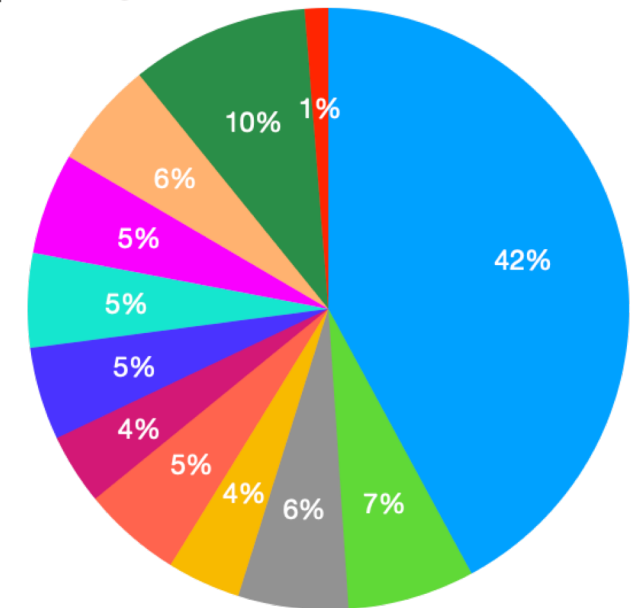
Total «tracked» costs: ~187.1 M

Total reported costs: ~79.2 M

Budget distribution (%) per Spoke

Oversight of project expenditures

All CN partners

Budget, Trasferimenti, Monitorato and Rendicontato

100%

Budget	€ 324M
Trasferimenti	€ 86M
Monitorato	€ 187M
Rendicontato	€ 79M

24.4%
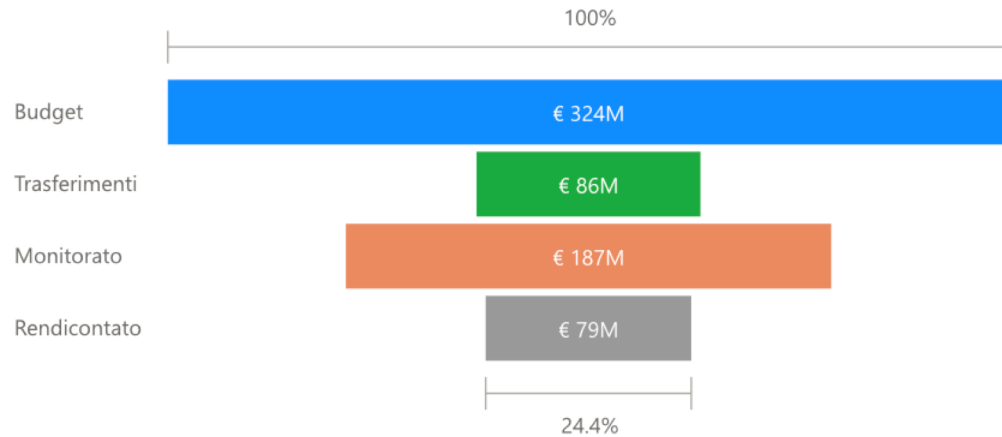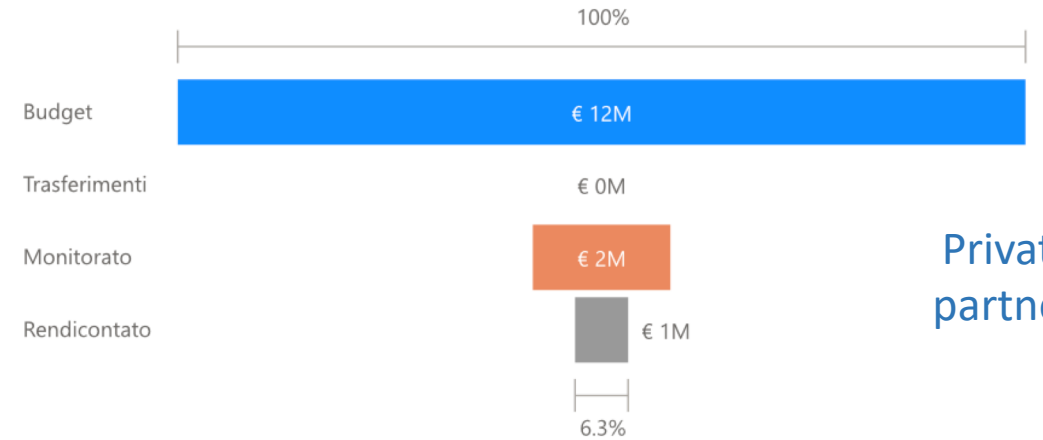
Private partners

Budget, Trasferimenti, Monitorato and Rendicontato
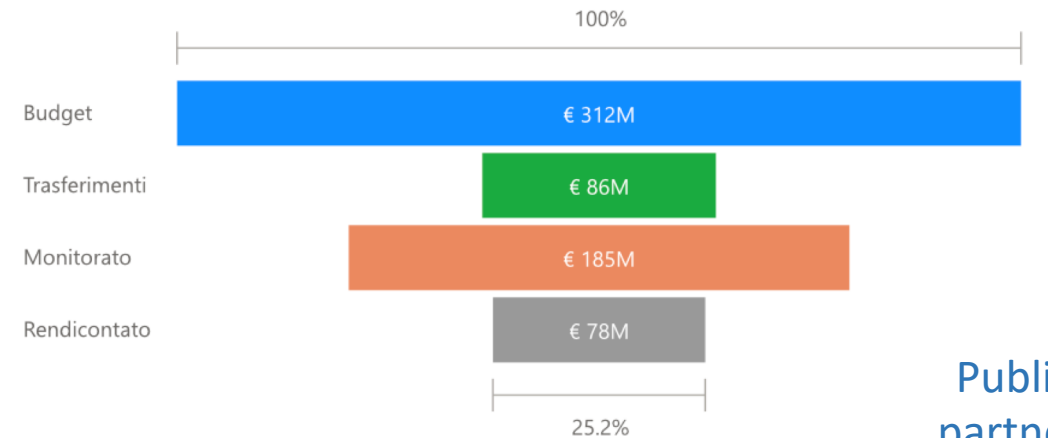
100%

Budget	€ 12M
Trasferimenti	€ 0M
Monitorato	€ 2M
Rendicontato	€ 1M

6.3%

Public partners

Budget, Trasferimenti, Monitorato and Rendicontato

100%

Budget	€ 312M
Trasferimenti	€ 86M
Monitorato	€ 185M
Rendicontato	€ 78M

25.2%

Oversight of project expenditures
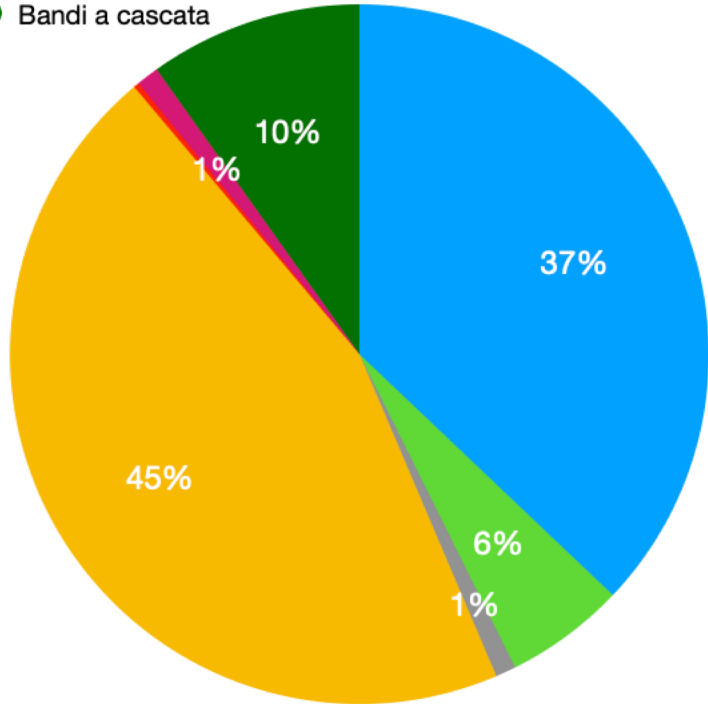
CN Budget distribution
(%) per cost's categories
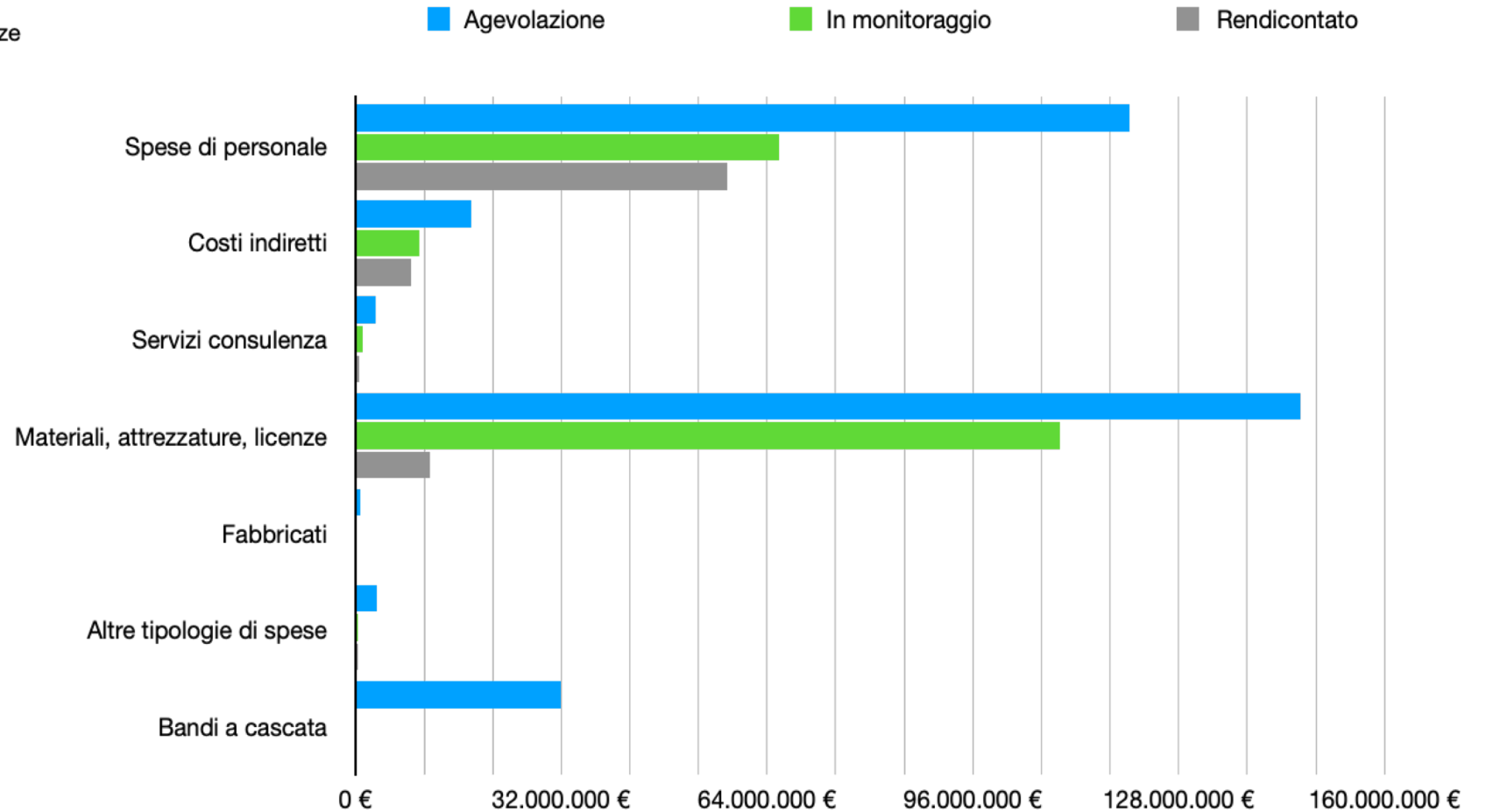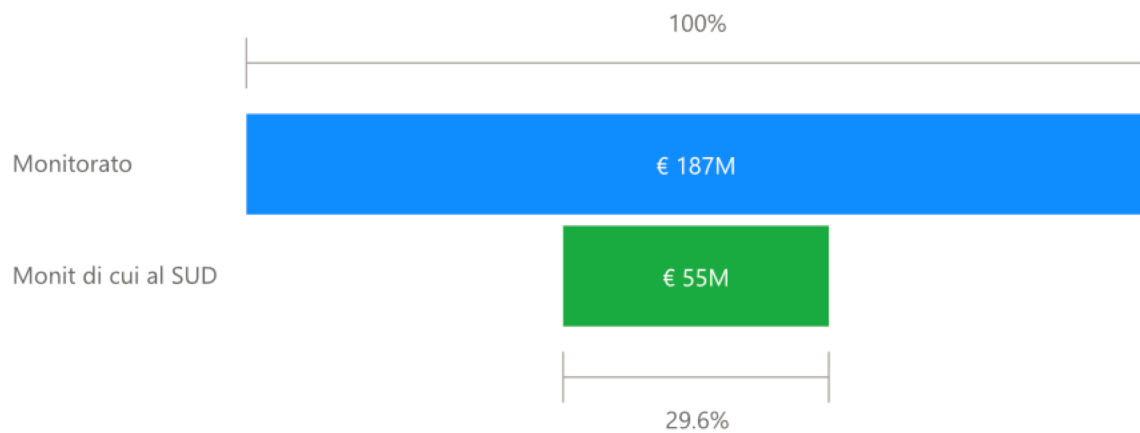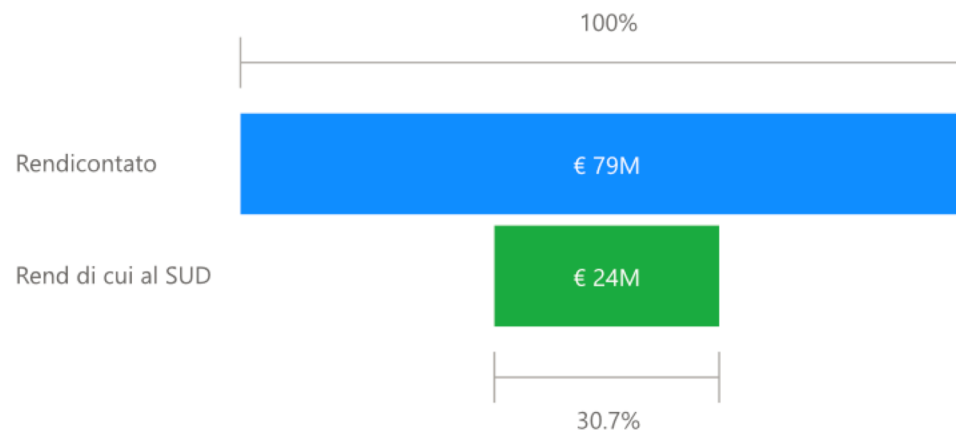
ICSC-Access to resources, services, and partnerships

Access to the resources and services provided by ICSC is currently directed towards:

- Affiliates of the National Center for the realization of scientific programs of the Spoke

- Projects financed with innovation funds

- Projects selected through Cascade Calls

- Beneficiaries of the Innovate for Start-up (I4S) initiative (start-ups)

- Projects proposed by entities that have signed an agreement with ICSC.

- Resource allocation is managed by the Resource Access Committee (RAC) and is carried out through a web request form submitted by interested parties.
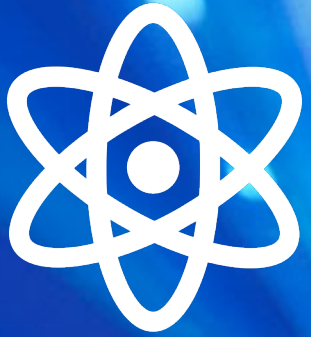
Scientific advancement of the project

SUPERCOMPUTING CLOUD INFRASTRUCTURE
CINECA (Leader), INFN (Co-Leader), GARR (Participant)   0

AUTOSTRADE - ENGINEERING
ENI - IFAB - SOGEI
TERNA- UNIPOL/LEITHÀ
LEONARDO

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

Leader

UNIBO	INFN	INAF	CMCC	UNIBA	SAPIENZA	CNR	IIT	UNINA	POLIMI

Co-Leader

UNITO	INAF	INFN	CNR	UNIAQ	UNIPI	SISSA	UNICT	FBK	UNIPD

Participants

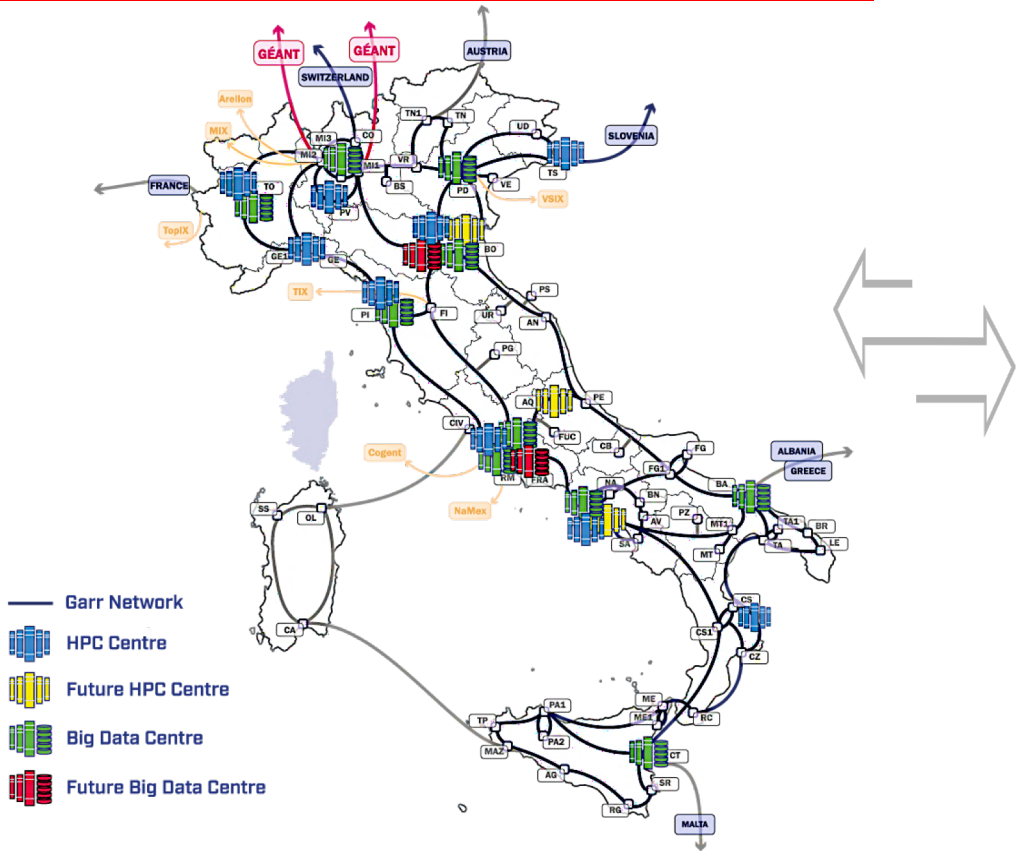| 1	2	3	4	5	6	7	8	9	10
POLIMI	UNICT	SISSA	ENEA	ENEA	UNIBO	UNIMIB	UNIBO	UNICT	UNIBO
POLITO	UNICAL	UNITO	FBK	POLIBA	POLIMI	UNITS	UNITO	UNIMIB	UNIMIB
UNIPI	UNIBA	UNITS	UNITN	UNIFI	POLITO	POLITO	UNIPD	UNITN	UNIPI
UNIPD	UNIMIB	SNS-PI	SALENTO	INGV	UNIPV	UNITO	UNIPV	UNIAQ	UNIPV
ROMA TOV	UNINA	ROMA TOV		SAPIENZA	ROMA TOV	UNIPI	POLIBA	POLIBA	SAPIENZA
UNINA	SAPIENZA	UNICT		CNR	UNICAL	UNIFI	UNIBA	SALENTO	UNINA
UNICT	UNITS				CNR	UNITN	INFN	CRS4	UNIBA
UNICAL	UNIBO				UNIFI	UNICAL	CNR	UNIBO	UNICT
INAF	POLIBA					ENEA	FBK		INFN
CINECA	UNIFI						UNIFE		CNR
ENEA	UNIPD								INAF
IIT	UNIFE								CINECA
UNIFE	SALENTO								IIT

Private

1	2	3	4	5	6	7	8	9	10
ENI	ENI	INTESA	SOGEI	SOGEI	AUTOSTRADE	ENI	ENGINEERING	IFAB	AUTOSTRADE
IFAB	INTESA	LEONARDO	UNIPOL/LEITHÀ	UNIPOL/LEITHÀ	ENGINEERING	IFAB	HUMANITAS	LEONARDO	ENI
INTESA	LEONARDO	SOGEI	IFAB		ENI	LEONARDO	IFAB	SOGEI	IFAB
SOGEI	SOGEI	THALES	TERNA		FERROVIE			THALES	INTESA
THALES	THALES	UNIPOL/LEITHÀ			FINCANTIERI			FINCANTIERI	LEONARDO
UNIPOL/LEITHÀ	UNIPOL/LEITHÀ	IFAB			LEONARDO			FOND. G.R-FIU	SOGEI
	IFAB				TERNA			INTESA	THALES
					THALES				UNIPOL/LEITHÀ
					IFAB				ENGINEERING

«Bandi a cascata»: status

BANDI A CASCATA_ CN00000013

	Spoke	BUDGET	N. progetti finanziati	AGEVOLAZIONE totale richiesta dai progetti vincitori	% Sud	Stato Graduatoria
1	UNIBO 1	3.200.000,00 €	11	2.388.418,71 €	56%	Pubblicata
1	UNIBO 2		3	579.870,88 €	76%	Pubblicata
2	INFN	3.200.000,00 €	14	2.908.189,33 €	20%	Pubblicata
3	INAF	3.200.000,00 €	37	5.266.513,43 €	40%	Pubblicata
4	CMCC	3.200.000,00 €	6	1.796.607,49 €	46%	Pubblicata
5	UNIBA Priv	3.200.000,00 €	8	1.281.821,90 €	50%	Pubblicata
5	UNIBA Pub		3	1.421.136,13 €	85%	Pubblicata
5	UNIBA NEW			493.051,00 €		Bando Aperto - scad 28/11/2024
6	UNIRM SAP	3.200.000,00 €	8	3.200.000,00 €	50%	Pubblicata
7	CNR	3.200.000,00 €	15	2.916.434,52 €	42%	Pubblicata
8	IIT	3.200.000,00 €	7	3.200.000,00 €	43%	Pubblicata
9	UNINA	3.200.000,00 €	17	4.846.193,74 €	90%	Pubblicata
10	POLIMI 1	3.200.000,00 €	11	2.250.580,23 €	67%	Pubblicata
10	POLIMI 2		6	885.616,06 €	11%	Pubblicata
		32.000.000,00 €	146	33.434.433,42 €	52%	

- 13 (+1) Calls opened

- 146 granted projects for 33M€

- Total number of beneficiaries 117 (93 private partners)

All projects have started except for those in Spoke 6 and Spoke 8, which will begin in January 2025.

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

Innovation funds projects

- 73 projects (85% started, some yet to start, 3 canceled)

- Total costs 31M€ (26M€ «agevolazione»)

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

Innovation Funds Connections: All partners

https://igdb.supercomputing-icsc.cloud/
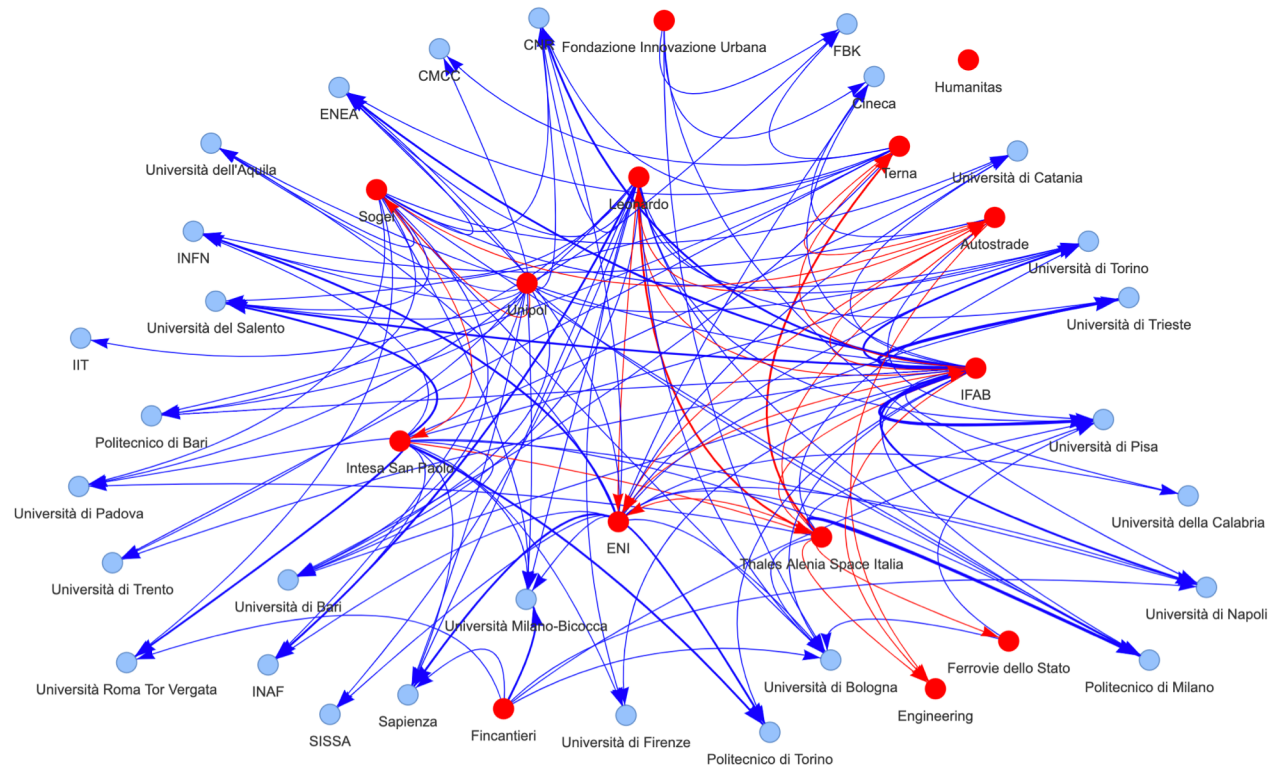
Project timeline in Milestones

	Milestone duration	Project Months		Milestone duration	Project Months
Milestone 1	Set 22 – Ago 23	M1-M12	Milestone 6	Mag 23 – Ago 23	M9-M12
Milestone 2	Set 23 – Ago 24	M13-M24	Milestone 7	Set 23 – Feb 24	M13-M18
Milestone 3	**Set 24 – Dic 24**	M25-M28	Milestone 8	Mar 24 – Giu 24	M19-M22
Milestone 4	Set 22 – Apr 23	M1-M8	**Milestone 9**	**Lug 24 – Ott 24**	M23-M26
Milestone 5	Gen 23 – Apr 23	M5-M8	**Milestone 10**	**Nov 24 – Ago 25**	M27-M36

Recruitment (label for Milestones 1-3)

Scientific activities (label for Milestones 4-5)

Project duration extention: END on 31 Dec. 2025 → added Milestone 11 (Sep.-Dec. 25)

Activities should end in December 2025

Costs and scientific reporting can be finalized in Jan - Feb. 2026 (on-going discussion with MUR to understand exactly the process to close the project)

Scientific reporting of the activities

	Milestone duration	Project Months		Milestone duration	Project Months
Milestone 1	Set 22 – Ago 23	M1-M12	Milestone 6	Mag 23 – Ago 23	M9-M12
Milestone 2	Set 23 – Ago 24	M13-M24	Milestone 7	Set 23 – Feb 24	M13-M18
Milestone 3	**Set 24 – Dic 24**	M25-M28	Milestone 8	Mar 24 – Giu 24	M19-M22
Milestone 4	Set 22 – Apr 23	M1-M8	**Milestone 9**	**Lug 24 – Ott 24**	M23-M26
Milestone 5	Gen 23 – Apr 23	M5-M8	**Milestone 10**	**Nov 24 – Ago 25**	M27-M36

Recruitment (label for Milestone 1–2 rows)

Scientific activities (label for Milestone 4–5 rows)

Project duration extention: END on 31 Dec. 2025 → added Milestone 11 (Sep.-Dec. 25)

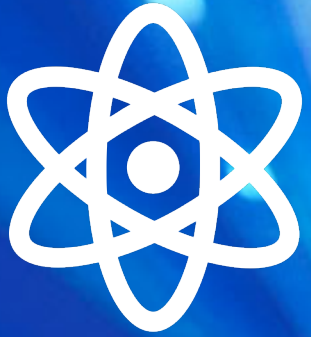**4 Scientific reporting submitted covering activities**
3 from Set. 2022 to Jun. 2024 Referees evaluation: 100% positive
Just submitted the report for Jul.-Nov 2024 **(milestone 9/plan M10) →**
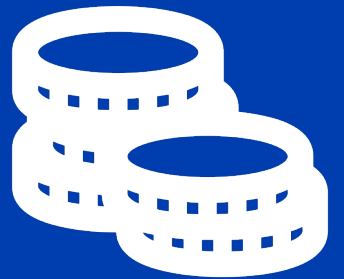under evaluation

Next scientific report to be submitted by the HUB on 7 April 2025 – mid-term check on Mil. 10 results

ICSC Sustainability «Post PNRR»

ART. 86.

(Misure per la sostenibilità delle attività dei centri nazionali, dei partenariati estesi e delle iniziative di ricerca per tecnologie e percorsi innovativi in ambito sanitario e assistenziale)

1. Il Ministero dell'università e della ricerca sostiene le attività dei centri nazionali e dei partenariati estesi, nonché le iniziative di ricerca per tecnologie e percorsi innovativi in ambito sanitario e assistenziale del Piano Nazionale Complementare (PNC), al fine di consentirne il consolidamento nel tempo e la sostenibilità economico finanziaria al termine del periodo di attuazione del Piano Nazionale di Ripresa e Resilienza (PNRR). Tale cofinanziamento è condizionato al rispetto degli obiettivi stabiliti dai seguenti indicatori chiave di prestazione:

a) affidabilità, intesa come la capacità di coordinare e implementare progetti complessi secondo la tempistica e le modalità definite in fase di presentazione;

b) impatto economico e sostenibilità, intesa come la capacità di attrarre risorse dall'esterno, per rendere sostenibile, almeno in termini di cofinanziamento, l'attività, anche successivamente al periodo di attuazione del PNRR;

c) impatto sulla società, intesa come la capacità di avere impatto sulla comunità scientifica e sulle comunità socio-economiche di riferimento, anche grazie a nuove forme organizzative e al coinvolgimento di attori pubblici e privati oltre il nucleo iniziale;

d) impatto sulle policy, intesa come la capacità di fornire indicazioni sulle politiche di riferimento attraverso la redazione di white paper ovvero le proposte di policy nei rispettivi ambiti finalizzate al superamento delle criticità, tenuto conto della sostenibilità politica delle stesse;

e) building capacity, intesa come la capacità di creare facilities, come infrastrutture, laboratori ovvero servizi per la ricerca applicata in modalità partecipata, anche in sinergia con imprese e di creare valore grazie a innovazione e proprietà intellettuale.

2. Con decreto del Ministro dell'università e della ricerca, sentiti gli altri Ministri interessati, da adottare entro novanta giorni dall'entrata in vigore della presente legge, vengono specificati gli indicatori chiave di prestazione di cui al comma 1, nonché le modalità delle attività di monitoraggio del raggiungimento degli obiettivi previsti dagli stessi e di rendicontazione delle spese sostenute.

3. Per le finalità di cui al comma 1, presso il Ministero dell'università e della ricerca è istituto un apposito fondo con una dotazione di 150 milioni di euro per ciascuno degli anni 2027 e 2028.

4. Con decreto del Ministro dell'università e della ricerca, da adottarsi entro il 30 giugno di ogni anno, sono individuati annualmente i Centri nazionali ed i Partenariati estesi, nonché le iniziative di ricerca per tecnologie e percorsi innovativi in ambito sanitario e assistenziale, in possesso dei requisiti di cui al comma 1, ammessi al riparto delle risorse di cui al comma 3.

ICSC Sustainability «Post PNRR»: possible KPIs

- **Reliability**: Demonstrated ability to lead and manage complex projects
  Status PNRR project

- **economic impact and sustainability**, namely the ability to attract external resources, to ensure the sustainability of projects, even after the implementation period of the PNRR.
  National and international funding opportunities, Knowledge transfer, «conto terzi», contribution from Foundation's partners

- **impact on** the scientific **community**, **socio-economic communities**, and the definition of policies related to specific domains.
  International collaboration, education and training, dissemination

ICSC Sustainability «Post PNRR»: possible KPIs

- ***impact on policies***, guiding actions and programmatic lines, for example, through the development of white papers, in order to enhance strengths and overcome any weaknesses, in synergy with local administrations and institutions.
White papers, proposal on sustainable policies (not only on research)
- ***Building capacity***, meaning the ability to support applied research, the creation of new skills and value, through the growth of innovation and intellectual property.
Ability to create facilities (infrastructures, laboratories, services) for applied research in a "participatory" mode, to recruit new skills (PhDs and researchers), also in synergy with companies, and to create value through innovation and intellectual property (patents and company creation).

European and national projects

ICSC submitted a total of 6 (7) proposals. Out of these, 5 (6) proposals were successfully granted, reflecting a success rate of 67%, and 1 proposal was not granted.

The **granted projects** span various sectors, showcasing our commitment to innovation and excellence:

EUSAIR – EU Regolatory Sandboxes for AI (ICSC EU coordinator)

DARE – Digital Autonomy for RISC-V in Europe (FPA)

DARE – Digital Autonomy for RISC-V in Europe (SGA).

INARC – consortium of 5 National Center to participate to EXPO Osaka 2025

INNOVATE - Innovative Network for Technological Advancements with HPC.

(approved today) IT4LIA – see next slide

The Innovate Consortium Chosen to Host EuroHPC's First Industrial Supercomputer

The Innovate consortium, led by CINECA and including seven Italian industrial partners from diverse sectors, has been selected to host and operate the first EuroHPC industrial-grade supercomputer in Bologna, Italy.

Project INNOVATE

CINECA hosting entity

- Premise: Tecnopolo di Bologna

16.7M €, of which 4.0M € from the EuroHPC Joint Undertaking (35% of the total costs)

FIRST EuroHPC industrial-grade supercomputer

will provide supercomputing capabilities, specifically tailored to meet the security, confidentiality and data integrity needs of European **industrial users**.

seven Italian industrial partners:
- Almawave (software company – Data and Artificial Intelligence),
- Autostrade Per L'italia (Transport and Mobility),
- Bi-REX (Italian Competence Centre – Big Data),
- **Fondazione ICSC (National Research Center on High-Performance Computing, Big Data and Quantum Computing),**
- IFAB (International Foundation Big Data and Artificial Intelligence for Human Development),
- SNAM S.p.A (Energy),
- UnipolSai Assicurazioni S.p.A (Finance and Insurance).

Selection of the First Seven AI Factories to Drive Europe's Leadership in AI

The EuroHPC Joint Undertaking (EuroHPC JU) selected the sites that will host the first European AI Factories, set to be deployed next year across Europe: in Finland, Germany, Greece, Italy, Luxembourg, Spain and Sweden.

EuroHPC JU

Just published

FIRST 7 EuroHPC AI Factories
will provide supercomputing capabilities, specifically tailored to meet the security, confidentiality and data integrity needs of European **industrial users**.

Project IT4LIA
CINECA hosting entity
- Premise: Tecnopolo di Bologna
420M €, of which 30M € for the AI Factory (co-financing 50% EuroHPC JU – 50% MS)

https://eurohpc-ju.europa.eu/selection-first-seven-ai-factories-drive-europes-leadership-ai-2024-12-10_en

Selection of the First Seven AI Factories to Drive Europe's Leadership in AI

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EuroHPC JU

Project IT4LIA
Coordinated by Italy, in collaboration with contribution ofAustria and Slovenia

IT4LIA will provide a world class AI infrastructure and a cohesive ecosystem to bring together researchers, developers, startups and SMEs, to bridge the gap between AI providers and potential users, such as public administration, students, academia, SMEs and industries. CINECA hosting entity

Several partners, from academia, industries, Regions, will be engaged in a number of services and activities: **ICSC will coordinated activities on trananing and education and data services.**

International collaboration

Agreement on Quantum-Basel – University of Applied Sciences Northwestern Switzerland (FHWN) - signed

Highlighted **several key areas** for collaboration:

o **Education and Training**: focus on joint quantum computing modules for education and training

o **Hardware integration**:Connecting the physical IonQ quantum computer with Leonardo

o **Expanded access**:Access to addition virtual quantum hardware system from Quantum Basel o **DigitalCity Twins**

o **Sustainable Chemistry**:focus on catalysis and related areas

o **AI in Pharma**

o **DigitalTwins-Pharma**

o **Staff exchange**:Joint Phd/Master's programs,as well as gues tprofessorship

o **Joint events**:Organization of joint workshops,conferences,and seminars

From ICSC's perspective, these collaboration topics align with various Spokes: Spoke 10 for quantum computing, Spoke 7 for Sustainable chemistry and catalysis, Spoke 8 for Digital Twins and AI in Pharma and Spoke 9 for Digital City Twins.

International collaboration

Collaboration agreement with the Serbian Computing Centre – to be signed at the end of Jan. 2025

- Development of joint project activities in the fields of high-performance computing and Big Data.
- Collaboration and support for the modernization plans of the Serbian Computing Centre.

Collaboration agreement with ICTP - The Abdus Salam International Centre for Theoretical Physics (UNESCO Category 1 Institute) on areas of mutual interest - under discussion

- Formalization of ICSC in the World Consortium "International Consortium for Scientific Computing (ICOMP)" launched by ICTP in May 2024

Memorandum of Understanding ICSC - Sprin-D- signed (https://www.sprind.org/en/), the German federal agency for disruptive innovation

PLANNED

- **collaboration agreements with institutions in African States on topics related to supercomputing, Big Data and AI. Priority to the countries identified in the "Mattei Plan", Rwanda and South Africa**

- **Collaboration agreement with CECAM** - Centre Européen de Calcul Atomique et Moléculaire

- **Collaboration agreement with Japan institutions.**

Observatory on Supercomputing Trends and Applications: Events

9 **Events**

- **19 Jan 2024 – Bologna**
- **6 Mar 2024 – Napoli**
- **18 Jun 2024 – Torino**
- **24 Oct 2024 – Catania**
- **Jan 2025 – Firenze (postponed)**
- **5 Mar 2025 – Milano**
- **Apr 2025 – Bari**
- **Jun 2025 – Roma**
- **Jul 2025 – Padova / Venezia**

16 **Thematic Webinar planned**

**5 held between
April and December 2024**

**12 planned between
December 2024 and July2025**

https://osservatorio.supercomputing-icsc.it

ICSC – Vision for sustainability beyond NRRP

Some questions that require an clear and shared answers

What is the **added value** that ICSC brings to academia, industry and society?
What, specifically, about our value proposition makes us "**unique**"?

What are our **customers'** fundamental, long-term **needs**?
Who are these prospective customers/clients?

What part will **the ICSC Foundation play**?
We shall be considering its evolution, for instance, in terms of its relation to stakeholders, competence, assets, services, toward Italy and beyond.

Current **hub and spoke model**, required by the PNRR action. But, neither the current configuration, nor the current ICSC composition should be considered a dogma.
Is the actual HUB and thematic Spoke configuration sustainable beyond the PNRR?

a *future governance structure and model* must take into proper account inputs from both academia and industry.

https://www.supercomputing-icsc.it

Supercomputing shaping the future

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