

Building infrastructures and scaling up: Data sharing on a global scale

Session 8 | Great room 2 | 3.00-4.00PM



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**International
Conference
on Research
Infrastructures**

**3-5 December 2024
Brisbane, Australia**

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**Building infrastructures and scaling up
– data sharing on a global scale**

Tuesday, 3 December 2024

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This session will examine the value and challenges of scaling data infrastructures from national to global levels, focusing on three key areas: economies and challenges of scale, interoperability, and the impact of AI. The panelists will discuss global system modelling with managing large data volumes, explore the potential gains and losses from standardization, and assess the costs and concerns associated with AI integration

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LEO CHILOANE
South African
Environmental Observation
Network (NRF-SAEON)



INMACULADA FIGUEROA
Ministry of Science,
Innovation, and
Universities of Spain



HILARY HANAHOE
Research Data
Alliance (RDA)



NIGEL SMITH
TRIUMF Canada's
particle accelerator
centre



LESLEY WYBORN
Australian National
University (ANU)

The logo for the International Conference on Radio Interference (ICRI) 2024. It features the text 'ICRI' in a large, bold, white sans-serif font, with the year '2024' stacked vertically to its right. The entire logo is enclosed in a thin white rectangular border.

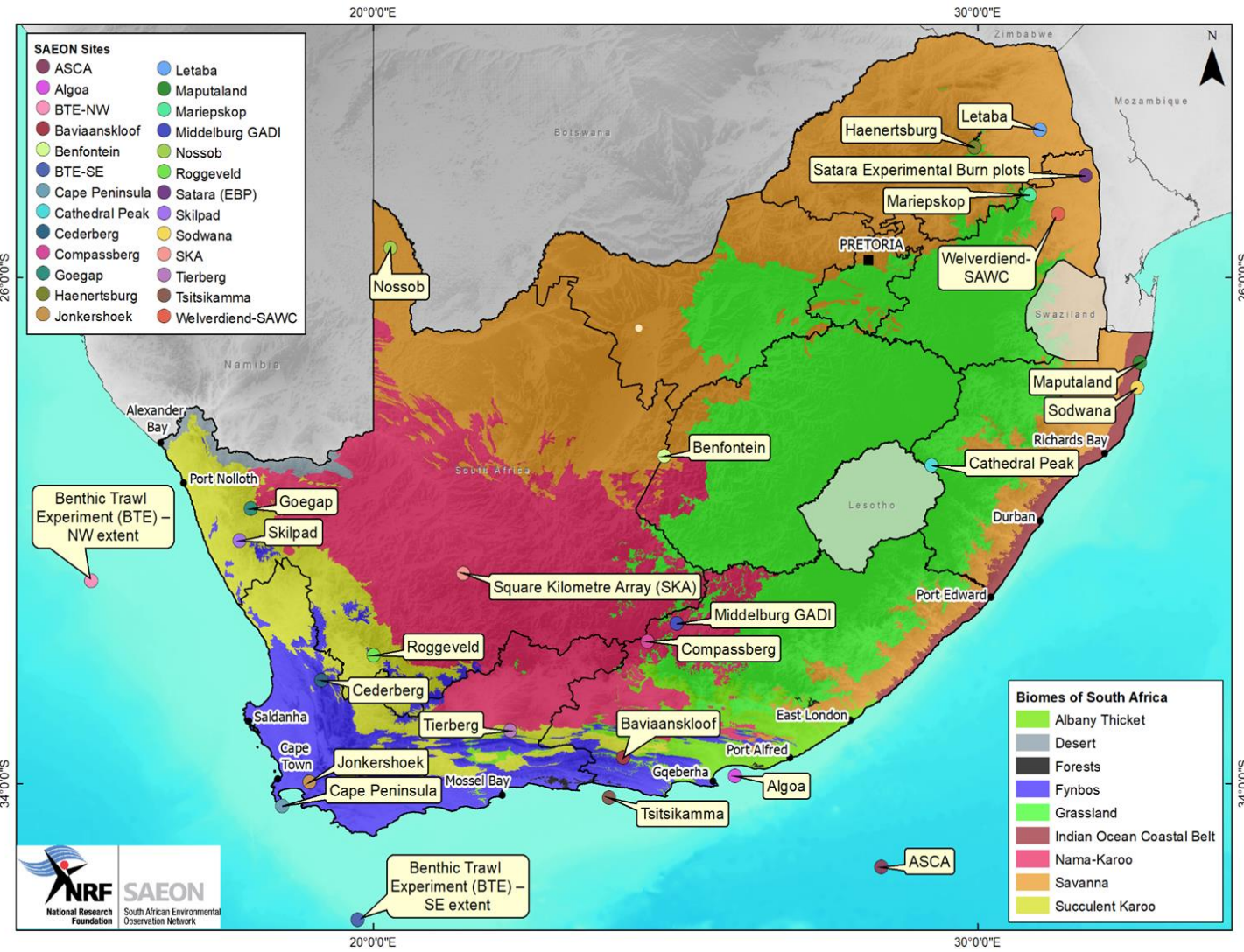
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PANELLIST PERSPECTIVES

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South African Environmental Observation Network (SAEON): An institutional data infrastructure perspective



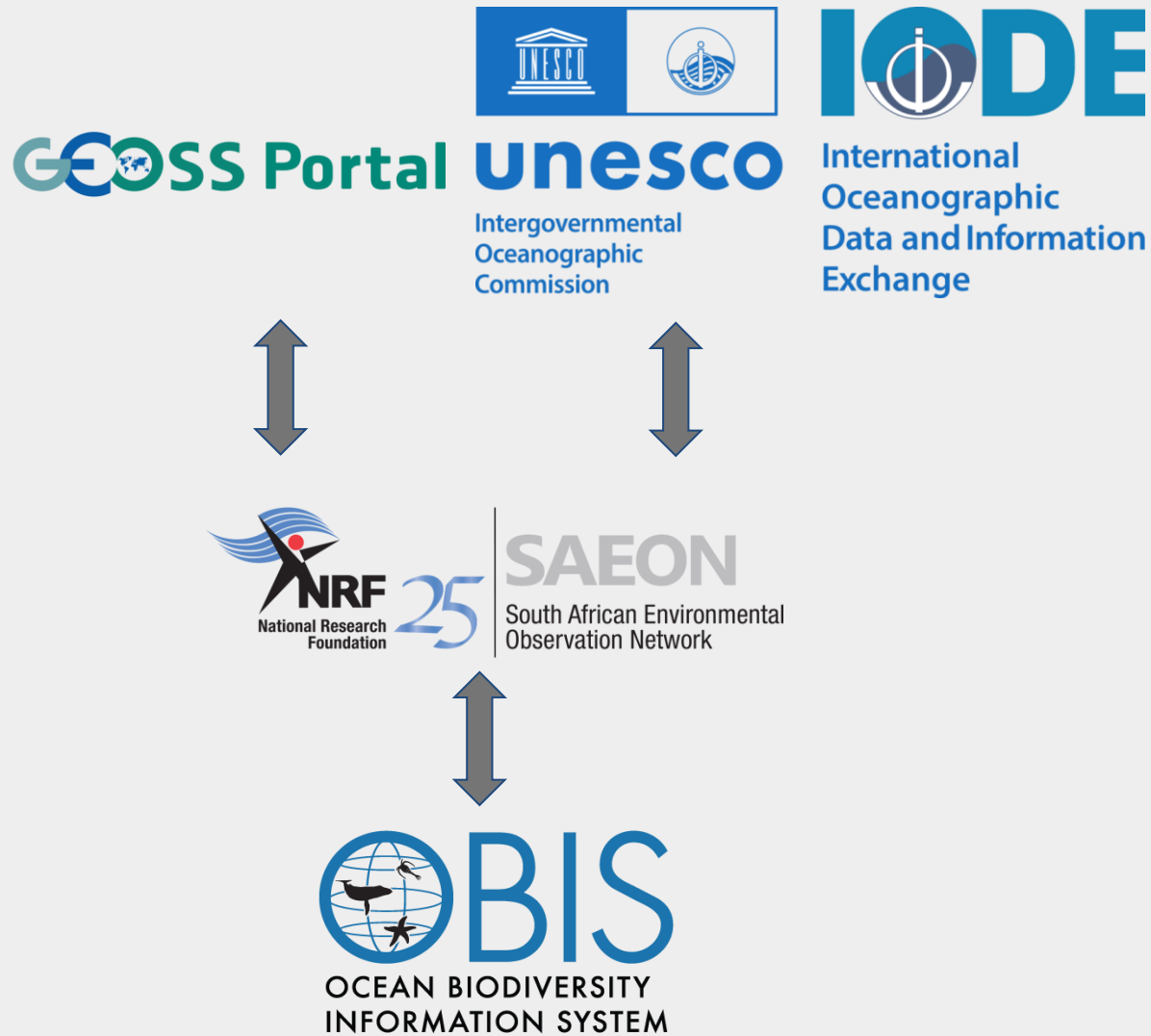
Complexities in scaling up to a global level

- **Heterogeneity:** data from multiple environmental science disciplines (marine and terrestrial) produced within the same organisation
- **Not possible to implement a universal solution** to standardisation for a multidisciplinary organisation
- **Differences in institutional data policies** a barrier to developing a centralised national and regional data infrastructure
- **Open access to data**, in a decision ready format, is essential to respond to global change

Technical implementation approach

- Developed a system of systems for data aggregation
- Development of downstream data products to enable decision support at a national level
- Focus is on sharing of metadata via standardised services to avoid cost implications of hosting large volumes of data.
- Data hosting services prioritised for partners without infrastructure

Scaling to global level, standardisation across disciplines and interoperability



Impact of AI in the organisation: collaboration and human capacity development

- Current partnership with Zindi Africa:
 - Zindi hosts the largest community of African data scientists, working to solve the world's most pressing challenges using machine learning and AI
 - They connect data scientists with organizations and provide a place to learn and connect

ZIND!

In this challenge, you must determine the precise date a flood occurred and distinguish between time series with and without flood events. By successfully predicting the day a flood occurred, the model will contribute to building a complete historical catalogue of urban floods across South Africa. This catalogue will be implemented by the South African Environmental Observation Network (SAEON), providing critical data to identify previously missed flood events and to improve future flood forecasting and response strategies.

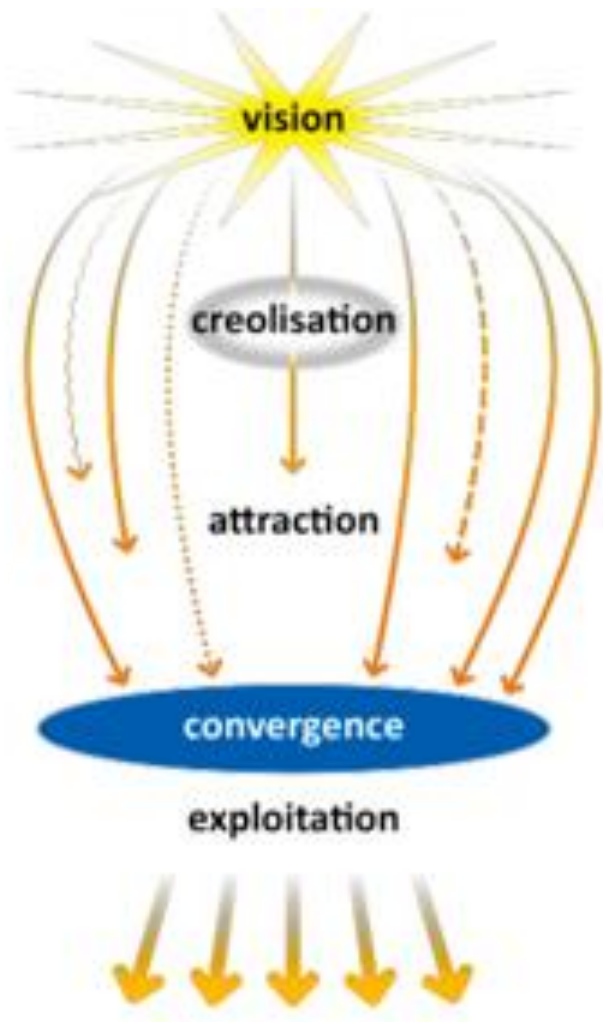
By creating a detailed archive of past urban floods, SAEON will have access to a powerful tool for analysing flood patterns, understanding the impact of urbanisation on flooding, and identifying vulnerable areas that may be at higher risk in the future. This archive can be used to improve early warning systems, optimise resource allocation during emergencies, and inform urban planning to reduce flood risk.

Google DeepMind

NRF 25 SAEON
National Research Foundation South African Environmental Observation Network

South African Risk and Vulnerability Atlas
MAPPING THE WAY TO A RESILIENT FUTURE

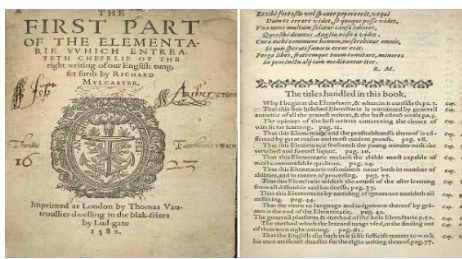
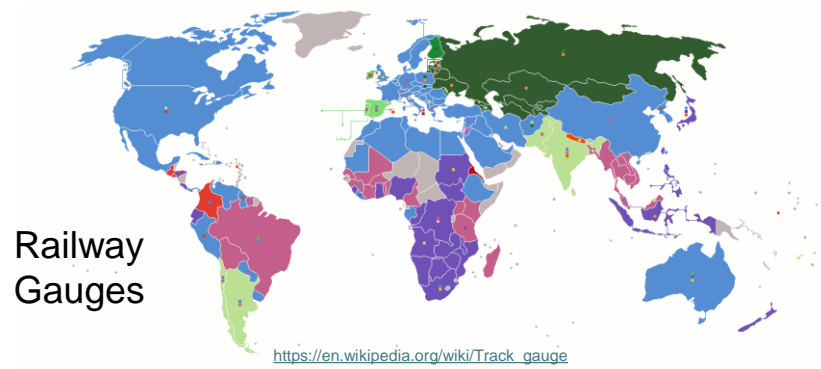
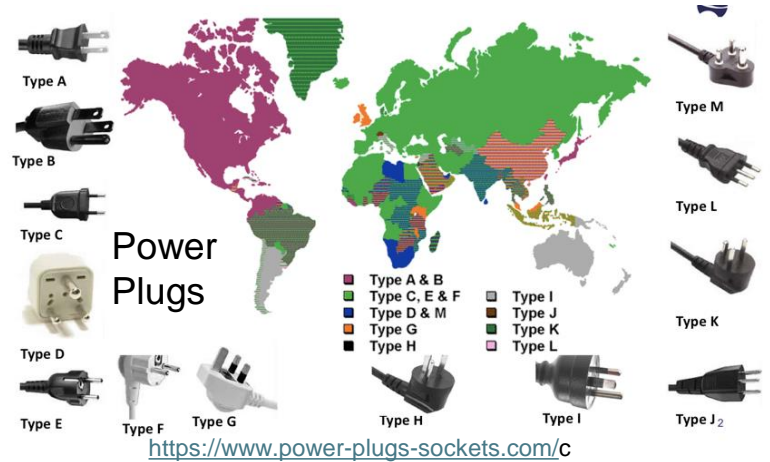
Learning from History in Building Infras



1436 AD

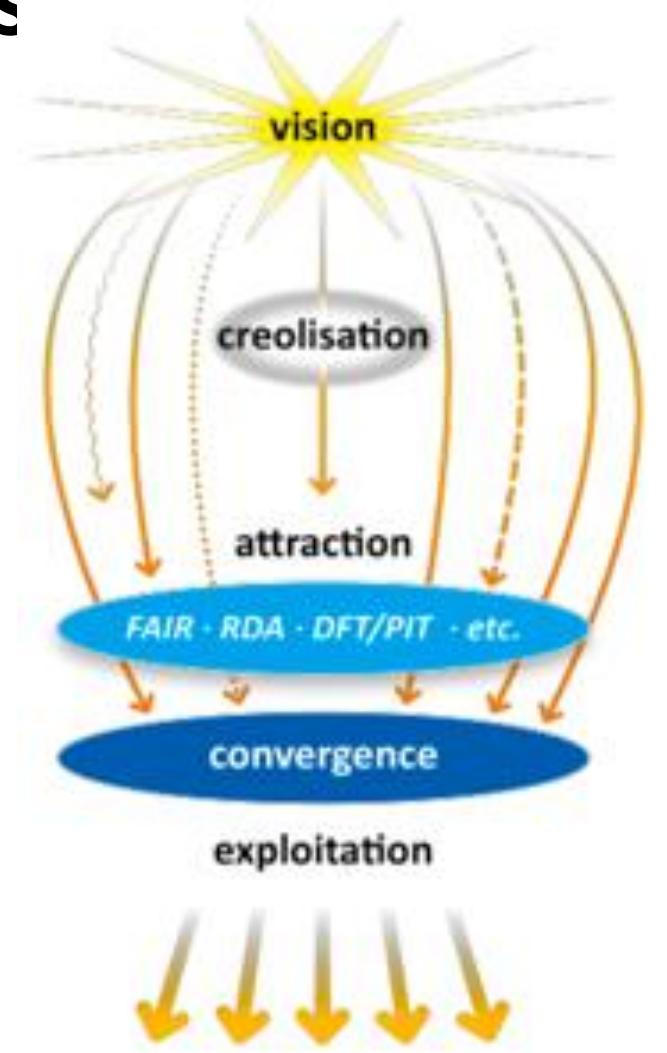


<https://www.ripples.com/weird-news/gutenberg-printing-press>



<https://www.bl.uk/learning/timeline/external/mulcaster-tl.jpg>

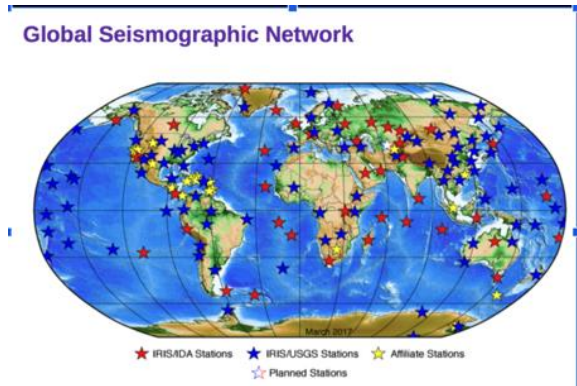
1604 AD
1755 AD



Wittenburg, P., and Strawn, G., 2018. Common Patterns in Revolutionary Infrastructures and Data

<https://doi.org/10.23728/b2share.4e8ac36c0dd343da81fd9e83e72805a0>

Scaling up: PC to HPC, Long Tail to Exascale – we need those dictionaries!!



All above the line have achieved some forms of global standards for discipline scientific content

Earth System Grid Federation
An open source effort providing a robust, distributed data and computation platform, enabling world wide access to Peta/Exa-scale scientific data.

GBIF | Global Biodiversity Information Facility
Free and open access to biodiversity data

OCCURRENCES SPECIES DATASETS PUBLISHERS RESOURCES

WHAT IS GBIF? ABOUT GBIF SPAIN

Crystallographic Information Framework

The International Union of Crystallography is the sponsor of the **Crystallographic Information Framework**, a standard for information interchange in crystallography.

The acronym CIF is used both for the *Crystallographic Information File*, the data exchange standard file format of Hall, Allen & Brown (1991) (see [Documentation](#)), and for the *Crystallographic Information Framework*, a broader system of exchange protocols based on data dictionaries and relational rules expressible in different machine-readable manifestations, including, but not restricted to, Crystallographic Information File and XML.

IUPAC Color Books
An authoritative resource for chemical nomenclature, terminology, and symbols. Terminology definitions are drafted by international committees of experts in the appropriate chemistry subdisciplines

IUGG UGGI
International Union of Geodesy and Geophysics
Union Géodésique et Géophysique Internationale

IACS
INTERNATIONAL ASSOCIATION OF CRYOSPHERIC SCIENCES (IACS)

IAG
INTERNATIONAL ASSOCIATION OF GEODESY (IAG)

IAGA
INTERNATIONAL ASSOCIATION OF GEOMAGNETISM AND AERONOMY (IAGA)

IAHS
INTERNATIONAL ASSOCIATION OF HYDROLOGICAL SCIENCES (IAHS)

IAMAS
INTERNATIONAL ASSOCIATION OF METEOROLOGY AND ATMOSPHERIC SCIENCES (IAMAS)

IAPSO
INTERNATIONAL ASSOCIATION FOR THE PHYSICAL SCIENCES OF THE OCEANS (IAPSO)

IASPEI
INTERNATIONAL ASSOCIATION OF SEISMOLOGY AND PHYSICS OF THE EARTH'S INTERIOR (IASPEI)

IAVCEI
INTERNATIONAL ASSOCIATION OF VOLCANOLOGY AND CHEMISTRY OF THE EARTH'S INTERIOR (IAVCEI)

Geophysics

Societies/Associations/Commissions

geochemical society EUROPEAN ASSOCIATION OF GEOCHEMISTRY **SEGH** IUGS Commission on "Global Geochemical Baselines" Mapping the Geochemistry of the Earth's Land Surface

IAGC International Association of GeoChemistry

IAG **IAVCEI** INTERNATIONAL ASSOCIATION OF VOLCANOLOGY AND CHEMISTRY OF THE EARTH'S INTERIOR The Meteoritical Society **CGI** Commission for the Management and Application of Geochemistry Information

Science Unions

IUGG International Union of Geodesy and Geophysics

IUCr International Union of Crystallography (IUCr) **IUPAC** INTERNATIONAL UNION OF PURE AND APPLIED CHEMISTRY

IUGS International Union of Geological Sciences

IUSS International Union of Soil Sciences

Geochemistry



What is TRIUMF?

TRIUMF is Canada's particle accelerator centre. We are a world-class hub of research, education, and innovation that is home to ~600 staff and students, utilising a suite of particle accelerators, including the world's largest

TRIUMF operates at the interface between academia, government, and industry. Owned and operated by a consortium of 21 Canadian universities

Supported by federal and provincial governments, the Canadian research funding agencies and the Canada Foundation for Innovation, TRIUMF hosts ~\$2B of infrastructure and \$100M annual operational budget

TRIUMF's Research Programme

TRIUMF's work **addresses the most compelling challenges in contemporary science** and connects fundamental scientific research through to commercialisation.

We act as an interface to major sub-atomic physics communities and research infrastructures around the world, such as CERN and J-PARC

TRIUMF Innovations translates the work we do for societal benefit, such as the development of new therapeutic radioisotopes and electronics irradiation services



TRIUMF is located on the traditional, ancestral, and unceded territory of the Musqueam people, who for millennia have passed on their culture, history, and traditions from one generation to the next on this site.

TRIUMF's home on the UBC campus has always been a seat of learning.



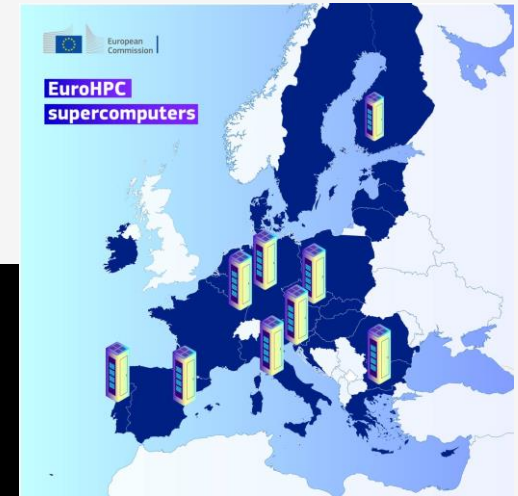
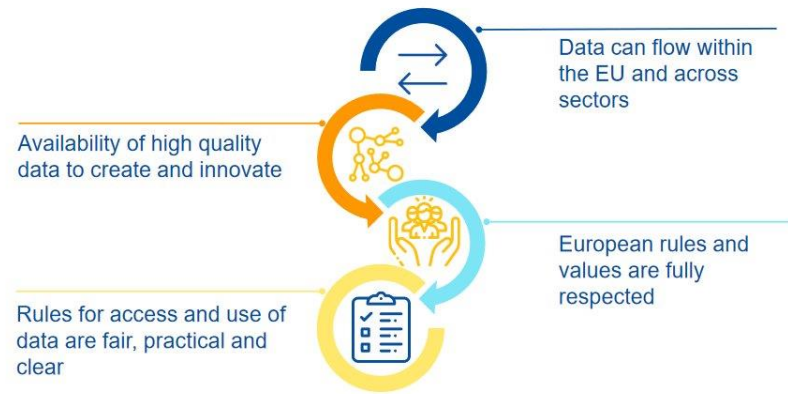


EuroHPC
Joint Undertaking



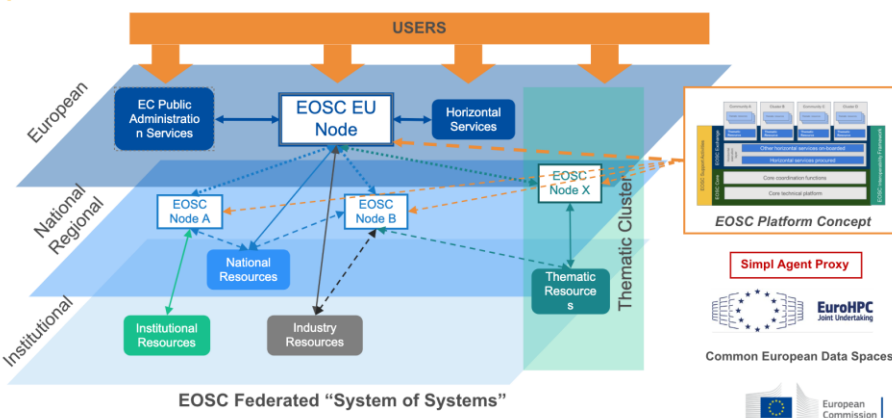
ESFRI-EOSC Task Force

A common European data space, a single market for data



- LUMI
- LEONARDO
- MareNostrum5
- MeluXina
- Vega
- Discoverer
- Karolina
- Deucalion
- JUPITER in Germany
- Jules Verne and Daedalus

EOSC EU Node – Federation Approach



Barcelona Supercomputing Center
Centro Nacional de Supercomputación

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The text 'PANEL DISCUSSION' in a large, bold, black font, positioned on a white, torn-edge background that cuts across the bottom of the image.

PANEL DISCUSSION

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With respect to economies of scale, international or cross border or cross disciplinary cooperation and collaboration both supports and augments opportunities and investments for research infrastructures. Would you agree with that statement?

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When speaking with each of you, people and skills emerge as an important component of successful infrastructures. Is there sufficient emphasis on and funding for the human component of data infrastructures?

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With respect to data interoperability, we have the FAIR (Findable, Accessible, Interoperable and Reusable) principles and now the CARE (Collective benefits, Authority to control, Responsibility and Ethics) principles, couldn't infrastructures just implement them (data standards) and the problem would be solved?

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Artificial Intelligence (AI): is here to stay and there are many positive and negative statements concerning AI. With respect to data and research infrastructures will it resolve all the challenges that still have to be tackled or will it complicate things even more?

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Do you see AI, the availability and lack of resources and competencies, creating a divide across the globe? Creating a two-tier system where the “haves” define the processes, standards, protocols, etc. while the “have nots” just have to take those on board? Within the context of data and research infrastructures what are your top 2-3 urgent things that need to be done now to avoid such a scenario

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The text 'CLOSING STATEMENTS' in a large, bold, black font, positioned on a white, torn-edge background that separates the top image from the bottom section.

CLOSING STATEMENTS

The website address 'icri2024.au' in an orange font, located in the bottom right corner of the image.

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Save the Date!



INTERNATIONAL DATA WEEK

13-16 October 2025
Brisbane, Australia

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idw2025.org

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THANK YOU

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