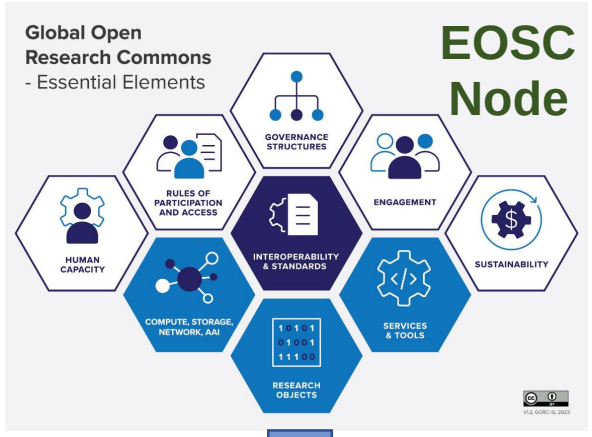
PaNOSC EOSC Node

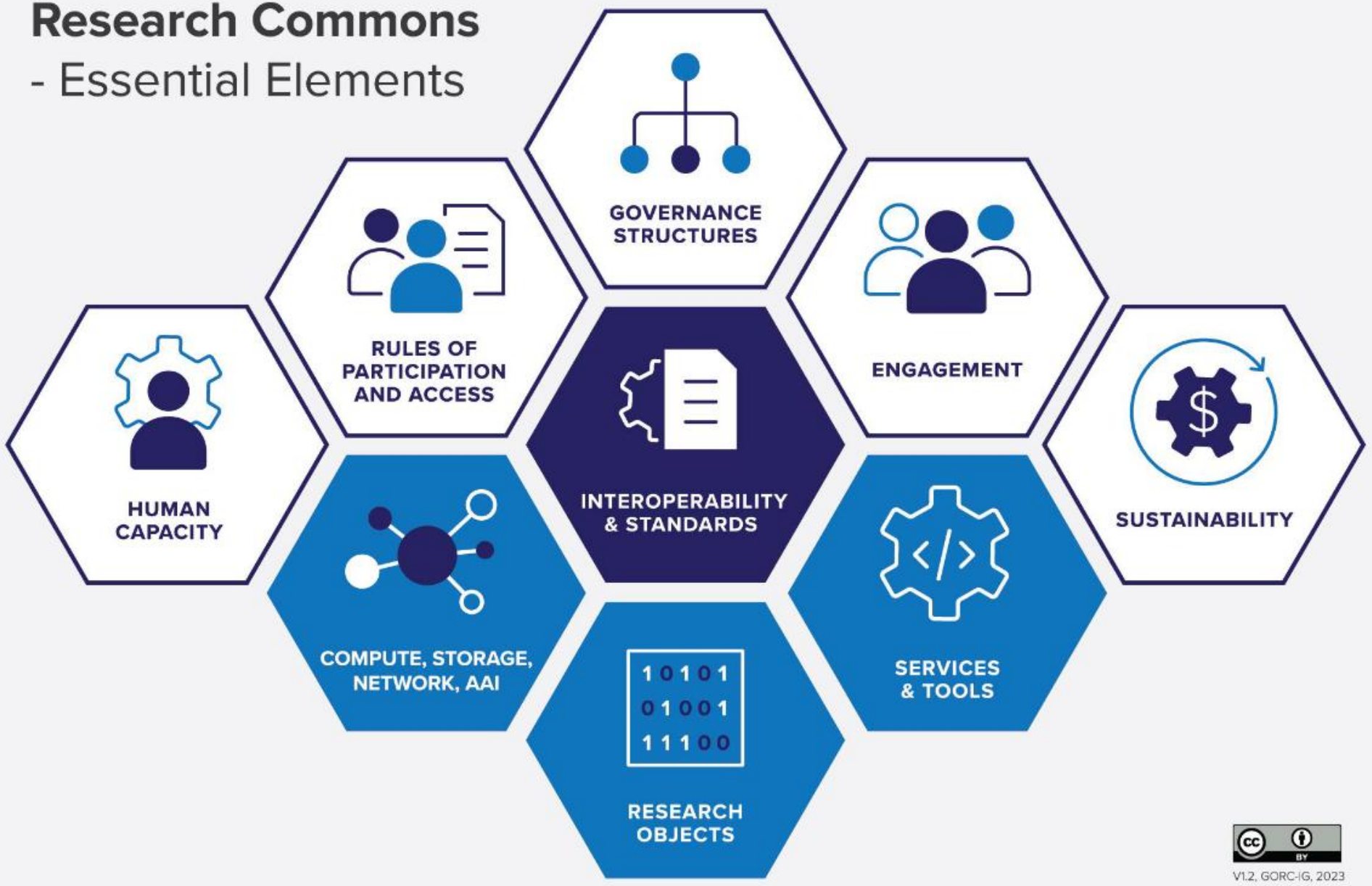
LEAPS WG3 meeting – 12th March 2025

Photons (LEAPS)



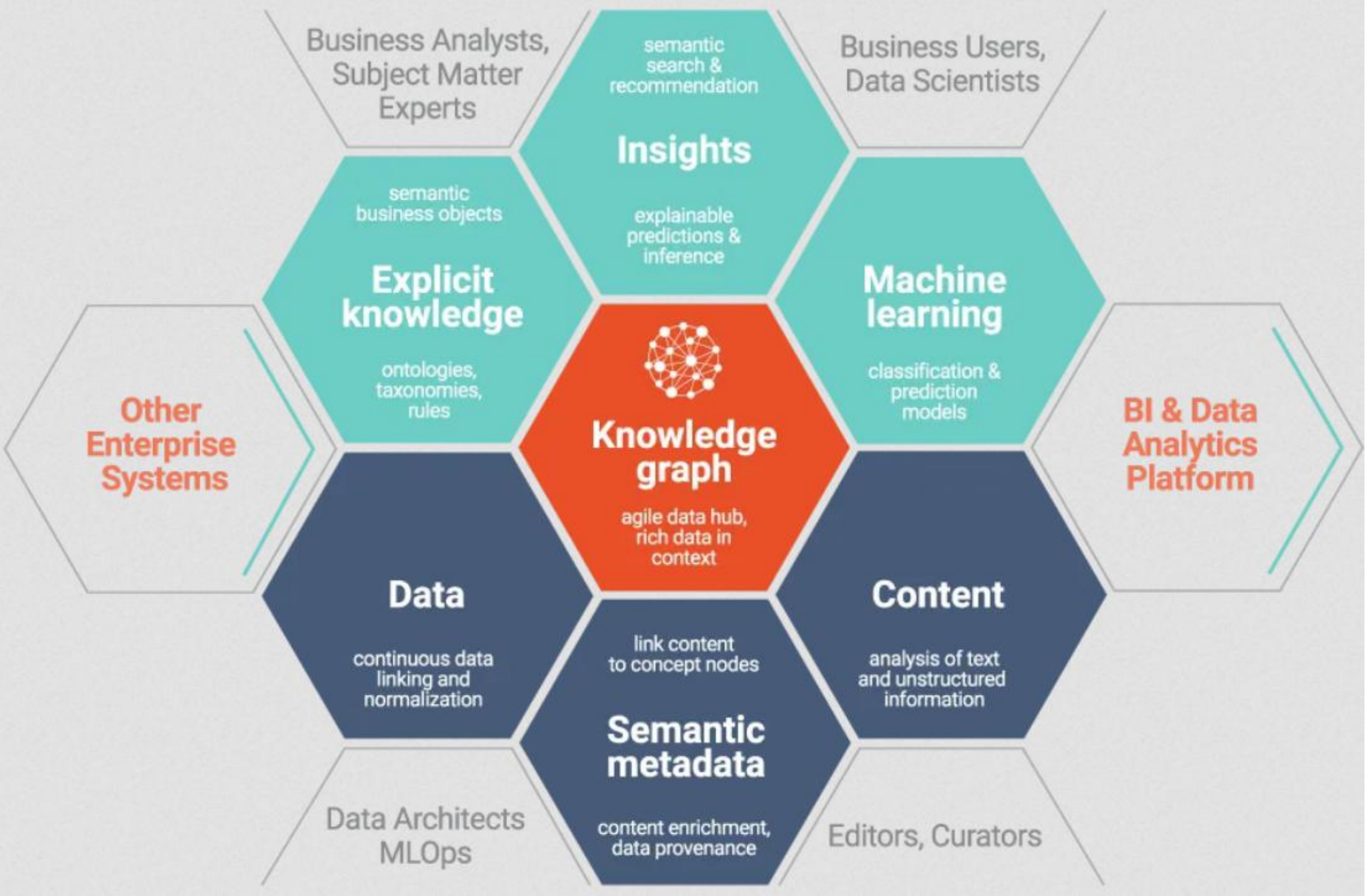
Neutrons (LENS)

Global Open Research Commons
- Essential Elements



V1.2, GORC-IG, 2023

https://doi.org/10.15497/RDA00099

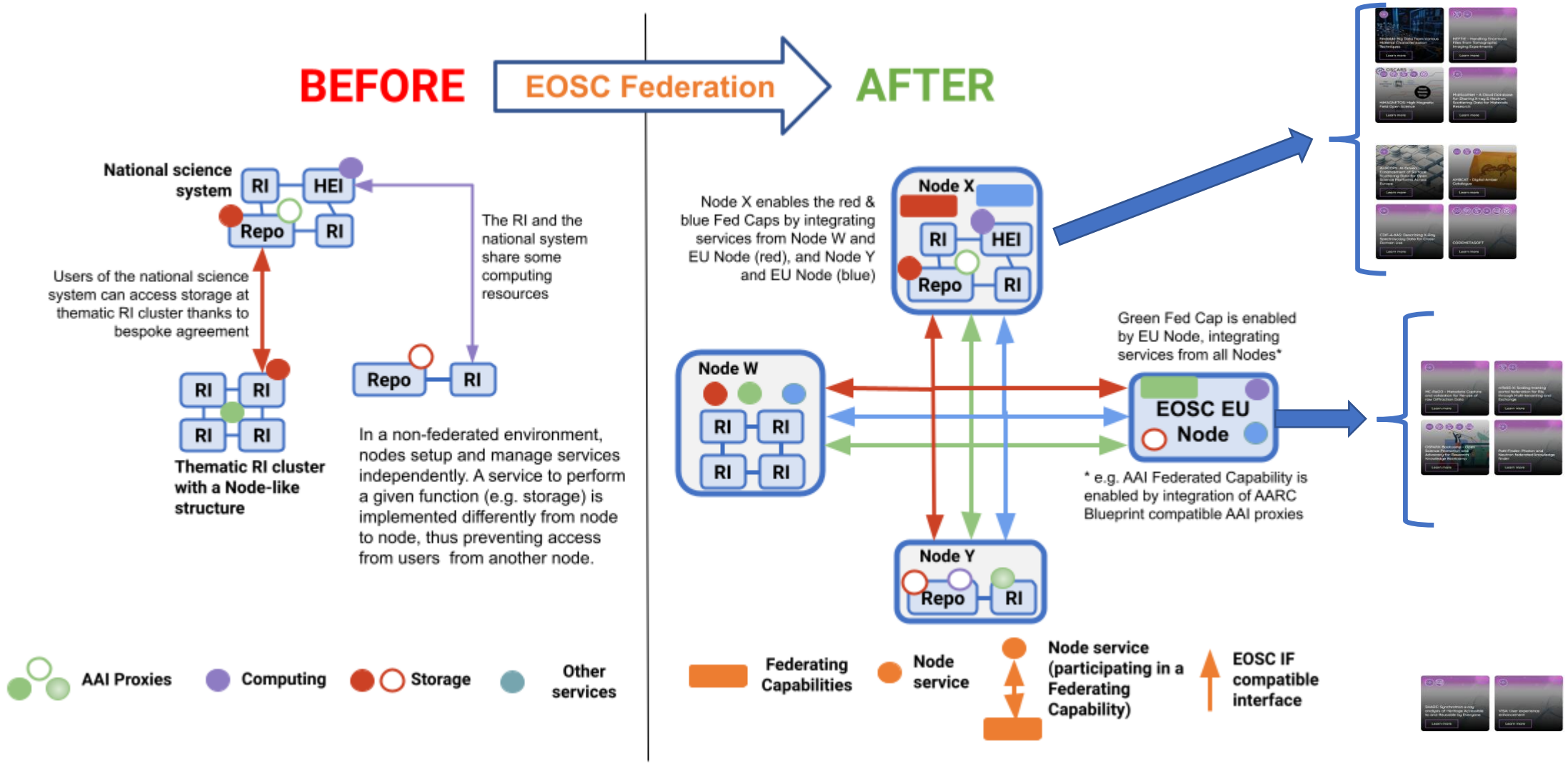


https://www.ontotext.com/knowledgehub/fundamentals/what-is-a-knowledge-graph/

Talk outline

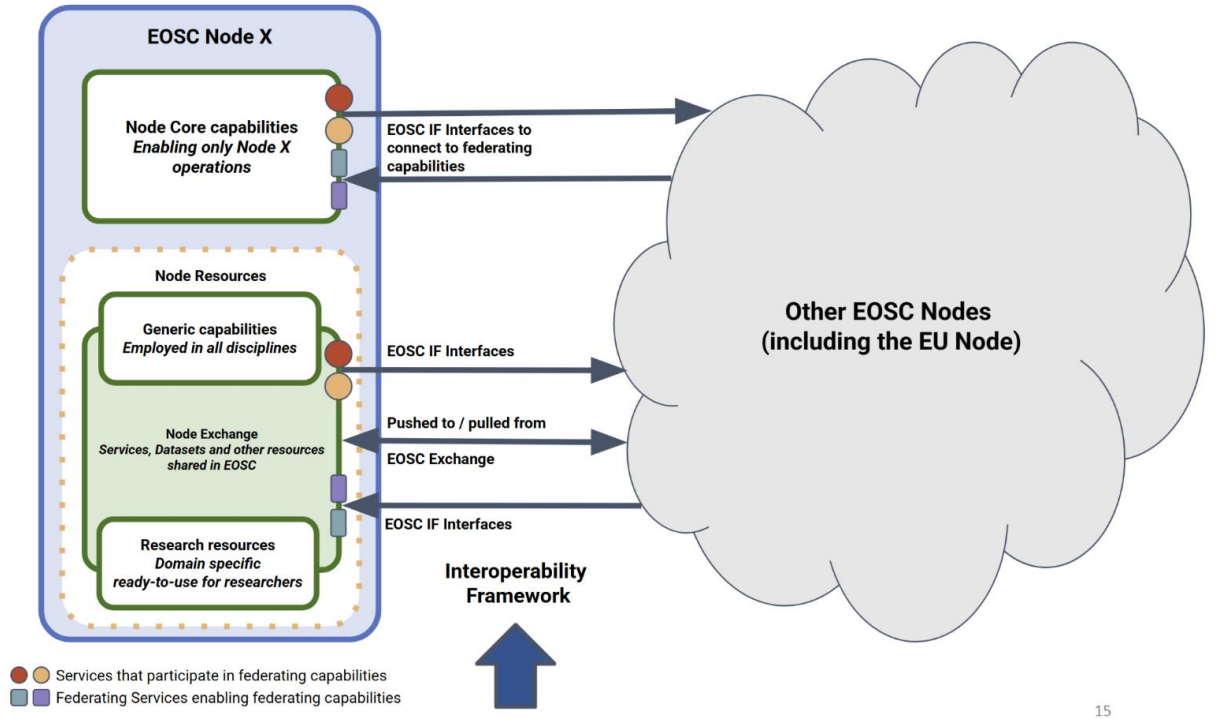
1. What is the EOSC Federation
2. What is the PaNOSC EOSC Node
3. Organisational capacities
4. Proposed federating capabilities
5. Conclusion

Vision of the EOSC Federation



What is an EOSC Node?

- EOSC Federation **a virtual infrastructure** made up of **EOSC Nodes**
- **EOSC Nodes** are organisations or groups of organisation that offer data, services and IT infrastructure
- EOSC Nodes must **federate services** by linking to some or all the other Nodes
- The EOSC Federation is **under construction**, lots of details need to be worked out
- The Federation will start with **13 Nodes** and should be operational by **November 2025**



First wave of EOSC Nodes + EU Node

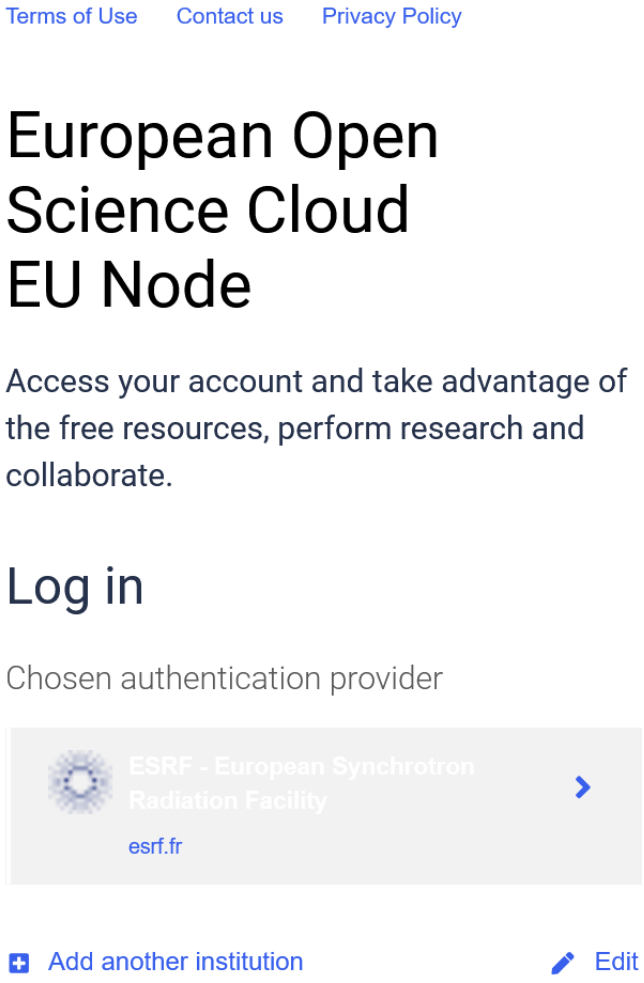
- BBMRI ERIC
- CERN
- CNR (Blue-Cloud 2026)
- CNRS (Data Terra)
- CSC – IT Center for Science
- CVTI SR
- Life Science Research Node (on behalf of four Life Science Research Infrastructures: ELIXIR, EMBL, Euro-BioImaging ERIC, and Instruct-ERIC)
- ESRF (PaNOSC)
- EUDAT
- Foundation ICSC
- NCN
- NFDI
- SURF

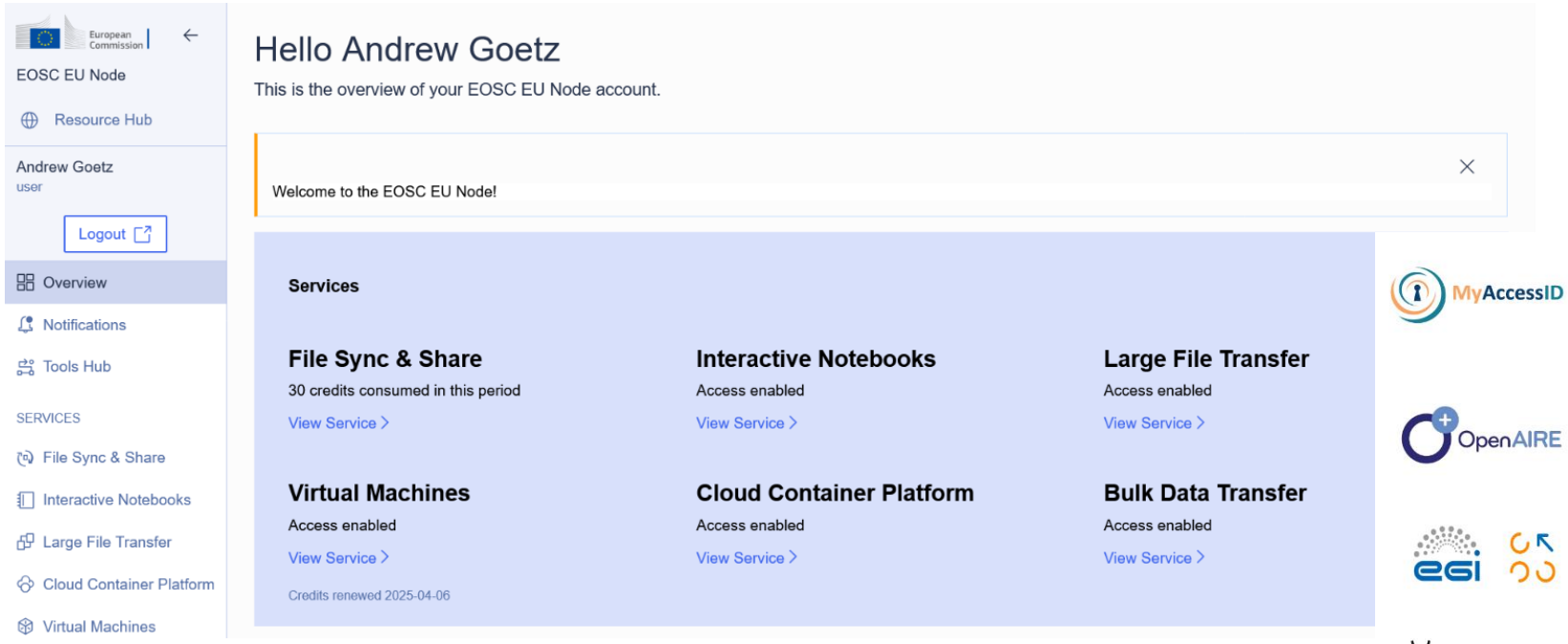
https://eosc.eu/news/2025/02/eoscs-build-up-phase-to-begin-with-march-kick-off/

What is the EOSC EU Node?

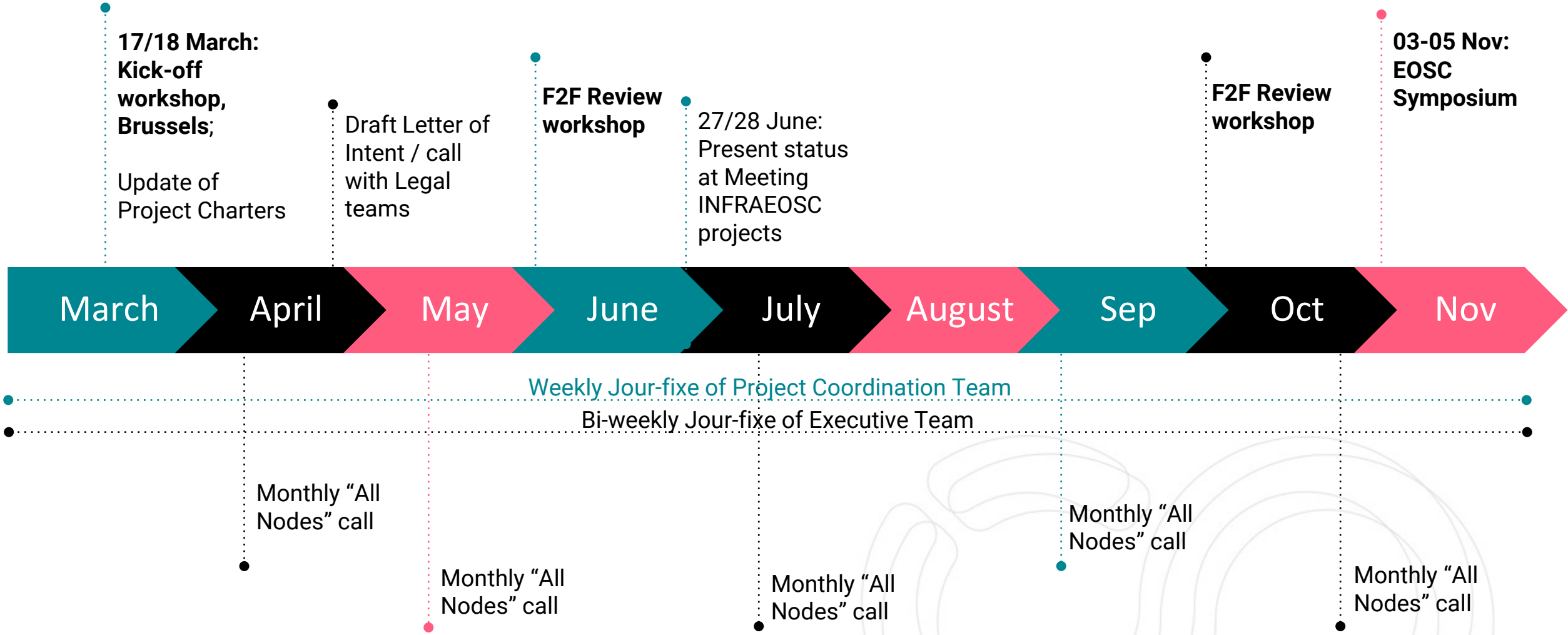
https://open-science-cloud.ec.europa.eu/

- A free resource for all EU researchers offering IT services like file sharing, VMs, containers, file transfer, common AAI, resources
- All researchers have 500 credits/3 months on the EU Node

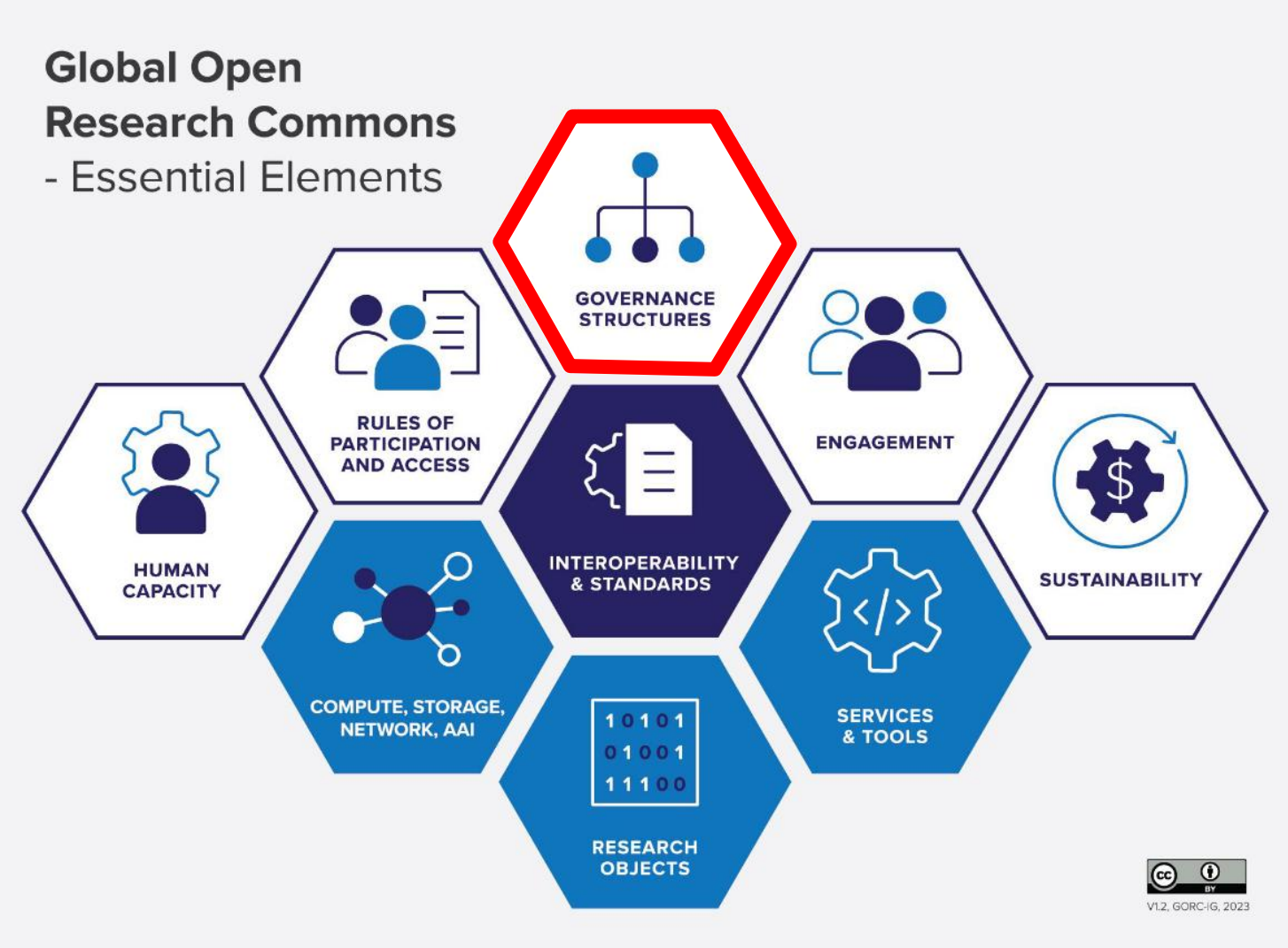




Tentative Timeline for build-up phase of the EOSC Federation



Governance structures



GOVERNANCE STRUCTURES

ESRF
The European Synchrotron

HZDR
HELMHOLTZ ZENTRUM DRESDEN ROSSENDORF

European XFEL

ess EUROPEAN SPALLATION SOURCE

ALBA

Elettra Sincrotrone Trieste

NEUTRONS FOR SOCIETY

MAX IV

UKRI Science and Technology Facilities Council
ISIS Neutron and Muon Source

PAUL SCHERRER INSTITUT
PSI

DESY.

Setting up a Governance structure

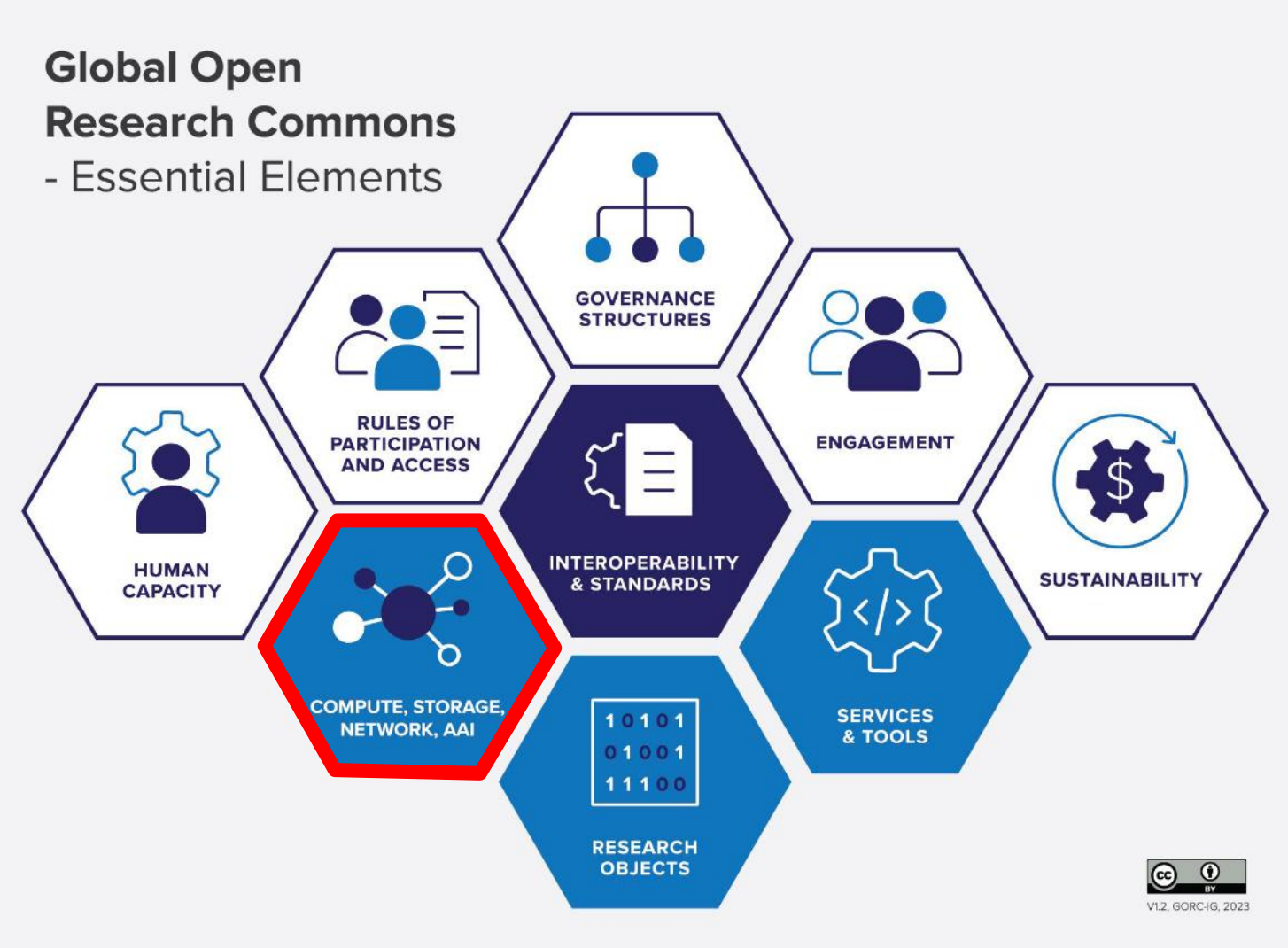
- Each partner will sign a **Letter of Intent** indicating what resources they will contribute to the PaNOSC EOSC Node
  - Resources include FAIR Data Sources, Software, Services, Compute, Storage, Expertise, …
- An **MoU** will be setup between the **Partners** participating in the PaNOSC node to define legal + technical responsibilities :
  - PaNOSC will require a real commitment from all Partners
- **ESRF** will sign a **Letter of Intent** with the EOSC **Federation Management Organisation** on behalf of the Partners
  - There are potentially a lot of policies which the FMO could require each Node to agree to

Expected EOSC Federation Policies …

- **IT Governance documentation**
- **Project/Programme Charter**
- **Architecture Design Plan and the Architecture Canvas: including hosting, DNS, network**
- **IT Security Plan: security model, security architecture and IT security impact assessment**
- **Technical Data Protection Plan and Data Protection Impact Assessment (questionnaire)**
- **Operational Disaster Recovery Plan (including implementation plan)**
- **Evaluation of the IT Security Plan: provide input to the IT Security Risk Report**
- **Service Interoperability Plan**
- **Data protection policies and procedures**
- **Risk and Compliance Assessment Plan: Controls for risk, compliance, continuity & recovery + cost-benefit analysis**
- **Risk Registry**
- **Personal Data Protection Impact Assessment (GDPR)**
- **Data Processing Agreement**

- Deployment strategies, integration plans, charters, progress, risks and timelines
- Deployment Plan
- Configuration Plan
- Operational quality plans, service reviews, verification and test session results and defects status and resolution
- Capacity Plan
- Verification, Validation and Testing Plan
- Operations, Maintenance and Support Plan
- Incident Reporting Plan (including setup of ticketing system and workflows)
- Stakeholder and community engagement strategy
- Communications Plan
- Documentation Plan: user/admin manuals and release notes
- Training Development Plan
- Production roll-out of service components including web-service API’s and associated documentation

Compute, Storage, Network, AAI



Many solutions (see below) are in production since years and serve **thousands of users daily,** we are ready to accept EOSC users

COMPUTE, STORAGE NETWORK, AAI

Virtual Machines

Interactive Notebooks

Bulk Data Transfer

INTEROPERABILITY & STANDARDS

eduGAIN

umbrella

VISA

jupyter

CernVM-FS

APPTAINER

globus
a uchicago non-profit service

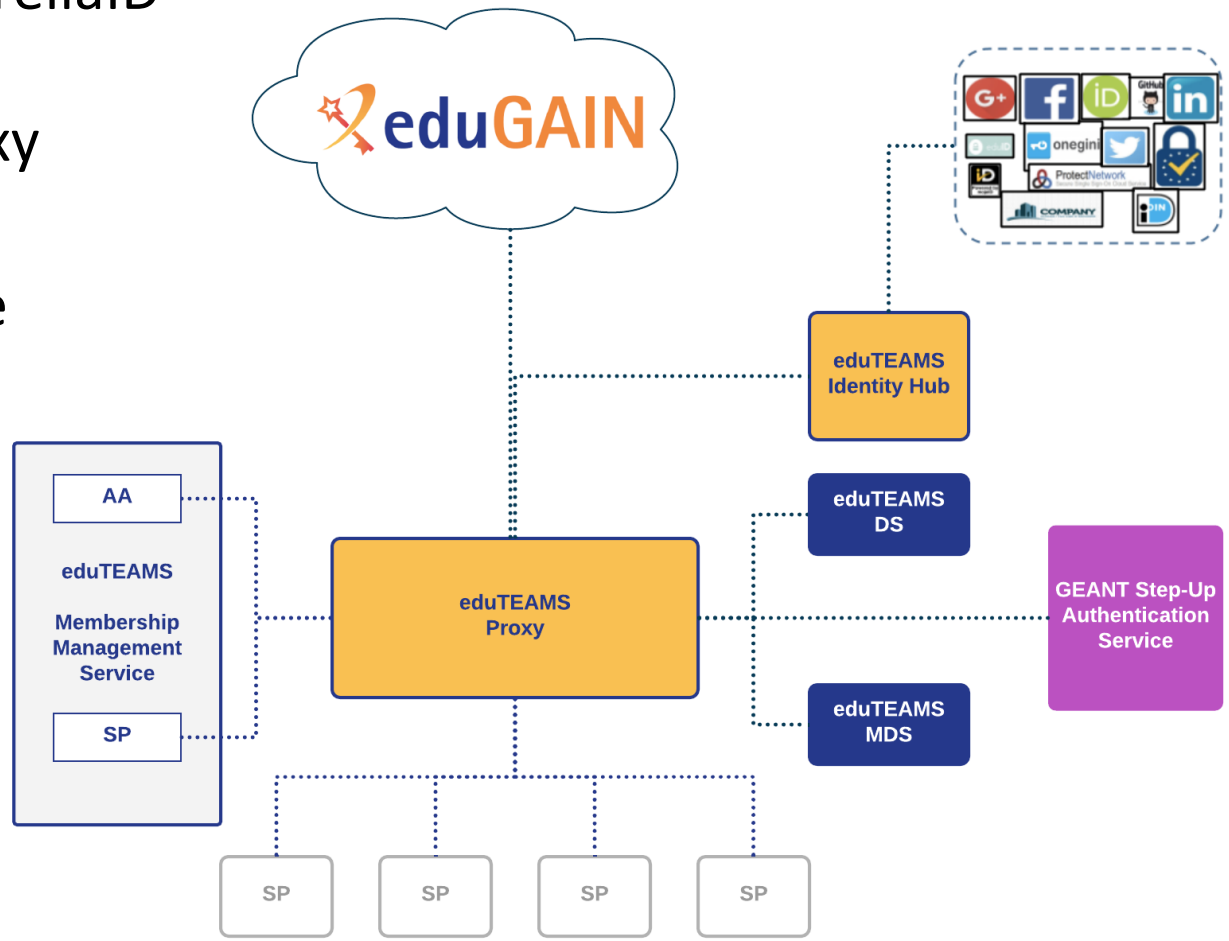
ESRF
The European Synchrotron

NEUTRONS FOR SOCIETY

SOLEIL SYNCHROTRON

Techical requirement – EOSC AAI

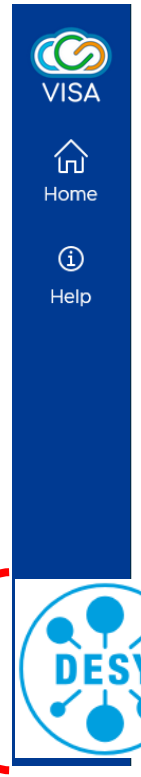
- **PaNOSC AAI service**:
  - PaNOSC has a community AAI – UmbrellaID
  - Compliant with AARC BPA since the integration of GEANT eduTEAMS Proxy
  - Ready to move to **MyAccessId**
  - Provides user with an SSO experience
- **PaNOSC Node developments**:
  - Switch to fully support eduTEAMS
  - Replace Umbrella IdP
- → **Goal**: **EOSC Users can login to PaNOSC services + PaNOSC Users can login to EOSC services using their institutional identity**

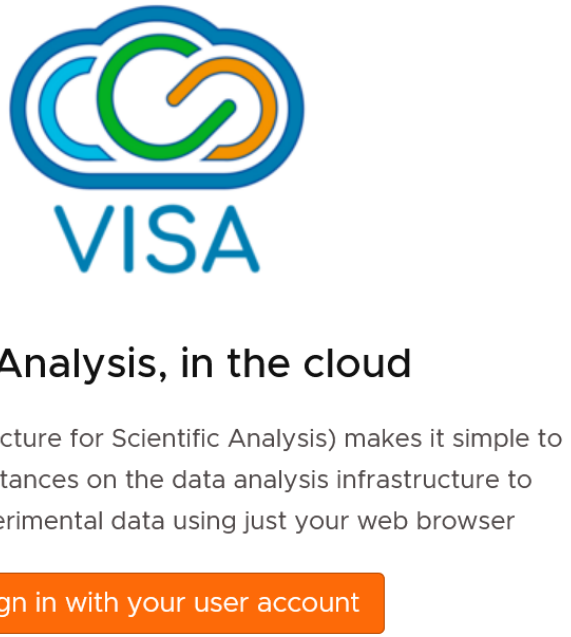


Federating capabilities – VISA VRE

- **PaNOSC Virtual Research Environment**:
  - Developed at ILL, runs on OpenStack (same as EU Node)
  - Provides remote data analysis close to **(huge) data**
  - Provides limited access to EOSC researchers
  - Partners have signed an MoU
- **Future developments**:
  - Integration of EOSC AAI
  - Support EU Node to scale out
  - Technical improvements in OSCARS project

https://visa.esrf.fr





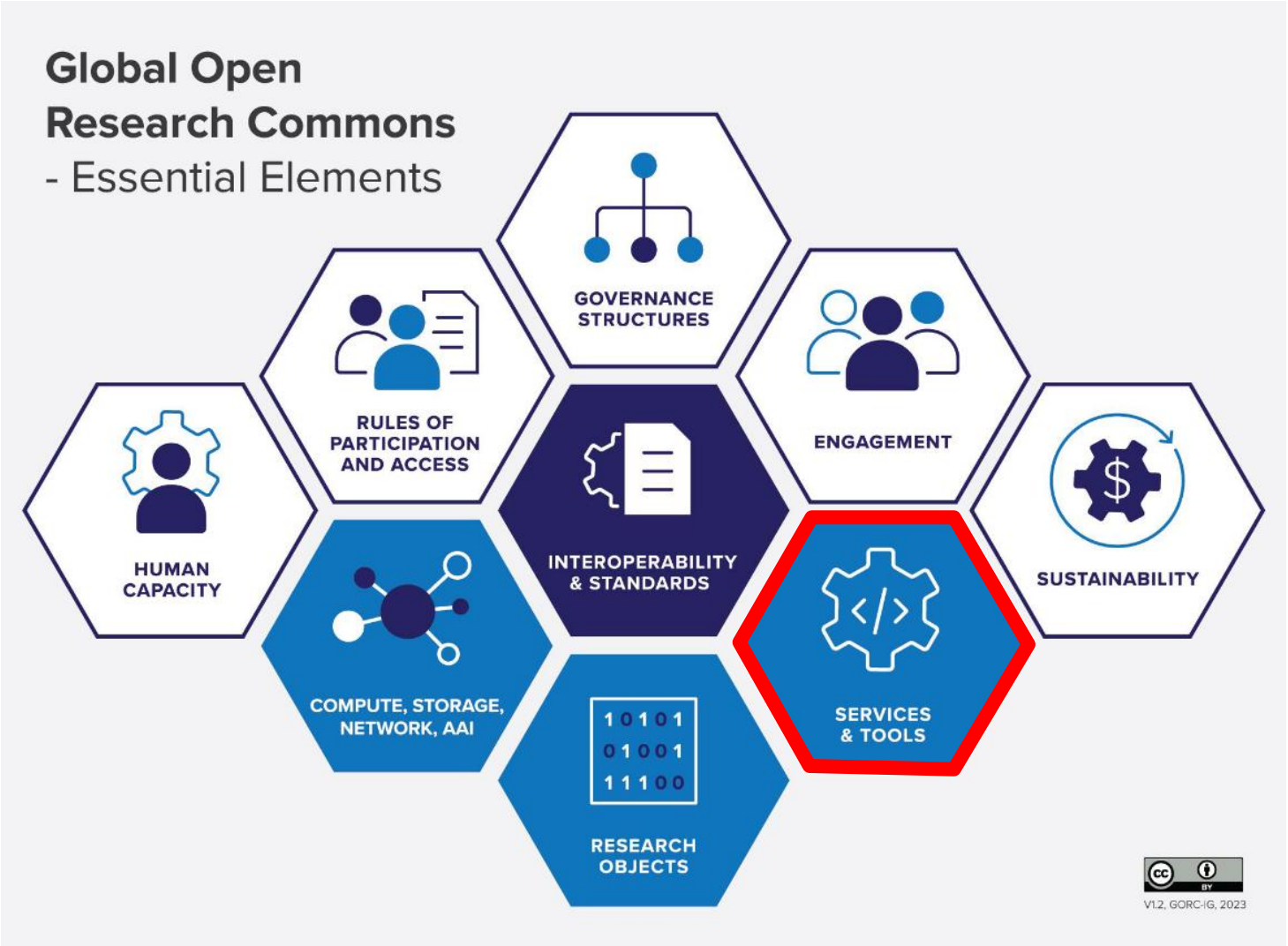
Technical requirements – Cybersecurity

- **PaNOSC Cybersecurity preparation:**
  - PaNOSC has setup a cybersecurity WG
  - Over 30 institutes across clusters joined
  - Very active WG with regular meetings
  - Implementing CS standard processes across RIs and facilities

- **EOSC Federation Handbook requirements**

✓ 1. Establish an efficient framework to control all security aspects
✓ 2. Use the best practices and guidelines
✓ 3. Provide an incident response capability
✓ 4. Provide adequate Access Control mechanisms via AAI/SSO
✓ 5. Organise Training and increase awareness
✓ 6. Ensure Data Protection and ~~Encryption~~

Services & Tools



SERVICES & TOOLS

Photon and Neutron Training

Training Platform

panosc Open Data Search Portal

PaN-Finder

Resource Hub

search for software...

PaNdata Software Catalogue

INTEROPERABILITY & STANDARDS

elixir TeSS

PaNET

doi

HZDR HELMHOLTZ ZENTRUM DRESDEN ROSSENDORF

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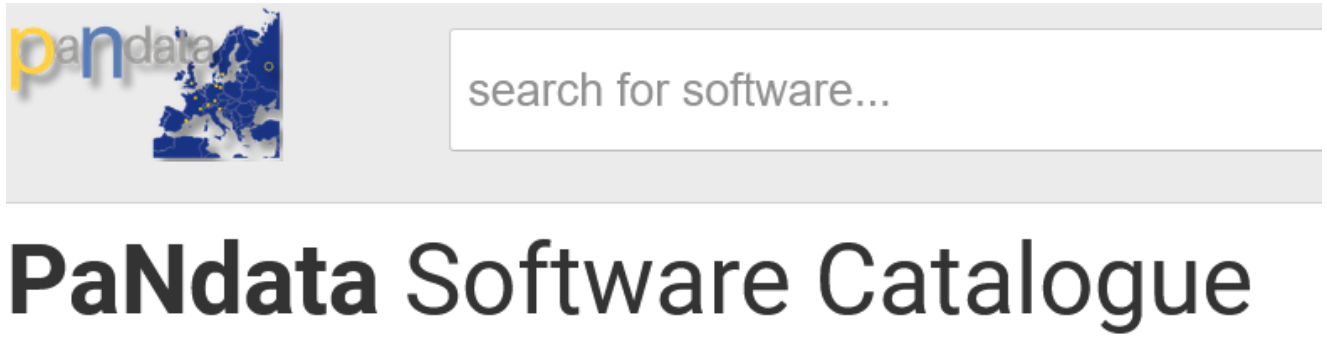
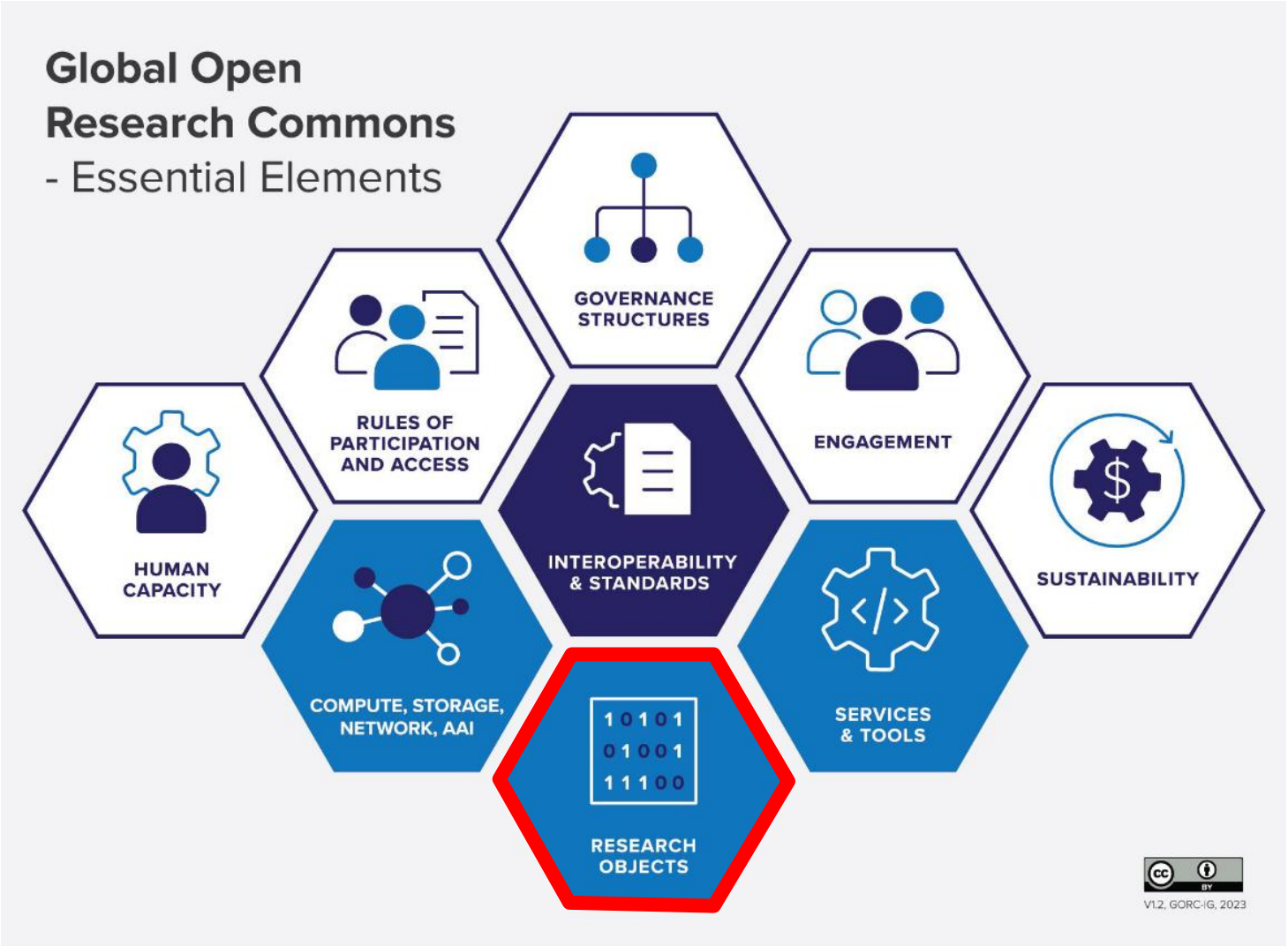
Federating capabilities – software packaging

- **PaNOSC CVMFS service**:
  - PaNOSC packages software for CVMFS as containers or modules
  - ~100 software packages already
  - Shared with other PaN facilities
- **Future developments**:
  - Share software packages with other EOSC Federation nodes
  - Provide CVMFS as a transversal service in the Federation
  - Integrate in revivied SW catalogue



Research Objects



SERVICES & TOOLS

panosc Open Data Search Portal

PaN-Finder

Resource Hub

federated search

Data Catalogs

RESEARCH OBJECTS

Resource Hub

ESRF The European Synchrotron

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ess EUROPEAN SPALLATION SOURCE

INTEROPERABILITY & STANDARDS

NeXus

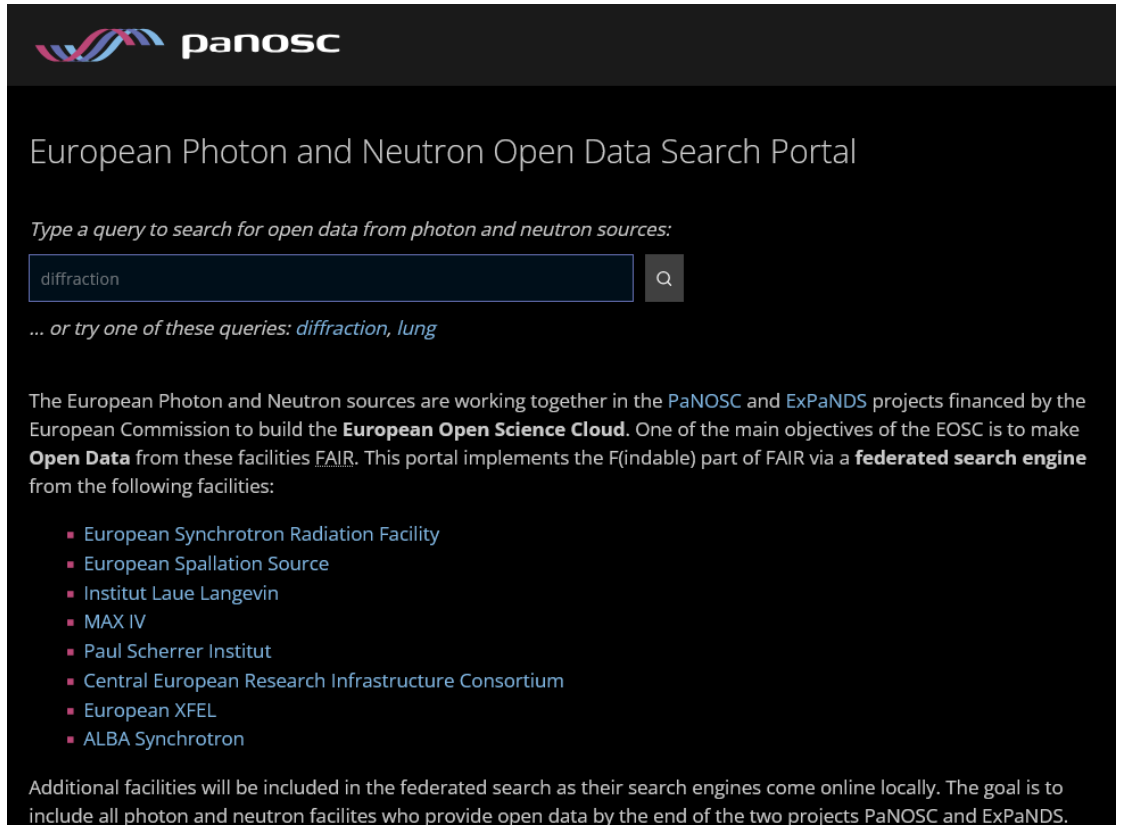
PaNET

doi

Federating capabilities – data repositories

- **PaNOSC data repositories**:
  - All implement OAI-PMH standard protocol
  - Metadata indexed by OpenAIRE + EUDAT
- **PaNOSC federating capabilities:**
  - Can be ingested in the EU Node catalog
  - Federated search API supported by all facility data portals e.g. Human Organ Atlas
- **Future developments**:
  - Improved search engine
  - An AI-enabled search engine PanFinder
  - Machine actionable searching and downloading of data

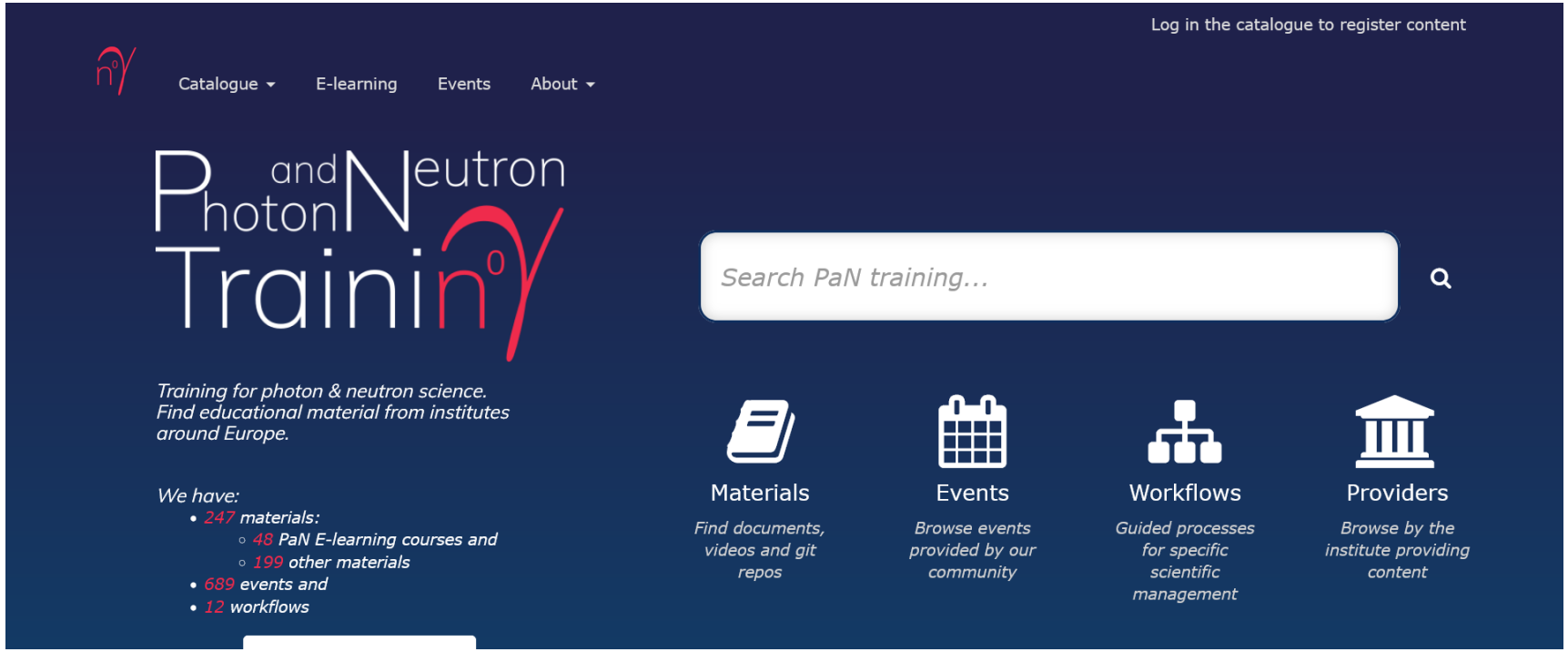
https://data.panosc.eu



Federating capabilities – training catalogue

- **PaNOSC training catalogue**:
  - Based on Tess from Elixir
  - Federation with other TeSS catalogues possible
- **Future developments**:
  - Federation of PaNOSC and Elixir and other training catalogues goal of mTess-X OSCARS project

https://pan-training.eu/



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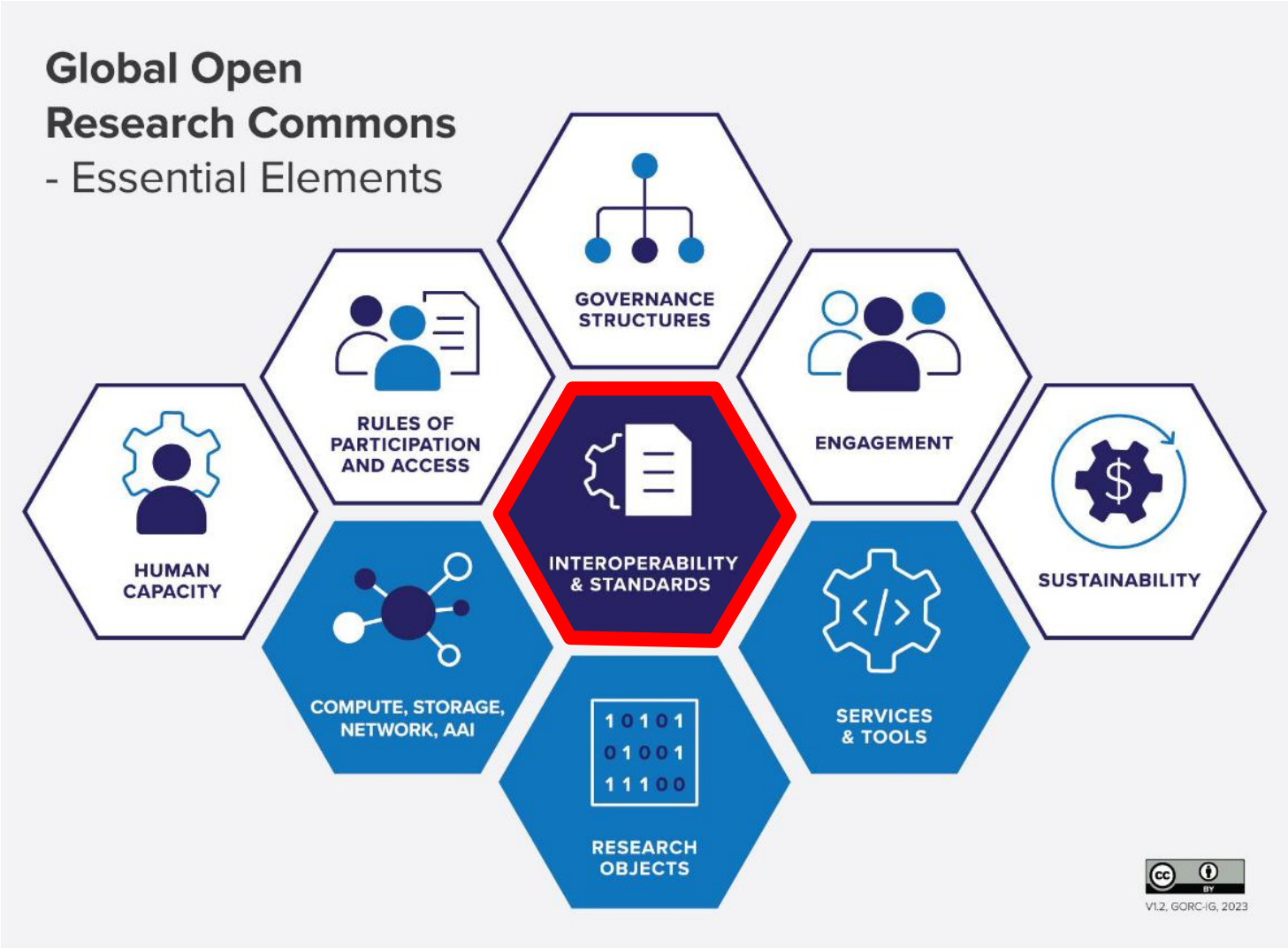
Interoperability & Standards



Human Reference Atlas
3D Multiscale Biomolecular Hu

COD

NOMAD

RIJKS MUSEUM

Paleobiology Data

MORPHOBANK
HOMOLOGY OF PHENOTYPES OVER THE WEB &
A database of peer-reviewed morphological matrices

PDBe
Protein Data Bank in Europe

EMDB
Electron Microscopy Data Bank

Examples of Linking PaN data to community databases

Data Catalogs

RESEARCH OBJECTS
Resource Hub

ESRF
The European Synchrotron

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ISIS Neutron and Muon Source

ESS
EUROPEAN SPALLATION SOURCE

INTEROPERABILITY & STANDARDS

NeXus

PaNET

doi

Multi-node end-to-end use cases

- **PaNOSC is a service oriented community, it shares data + researchers** with most EOSC Nodes e.g. **ELIXIR, NFDI, SURF, Blue-Cloud, Data Terra, EUDAT, BBMRI, CERN**, …
- **Linking PaNOSC data repositories** to de-facto community standards e.g. PDB, EMDB, COD, Human Atlas, Cultural Heritage, Paleontology, Materials Science (NOMAD), … **will increase the scientific impact of data**
- **Link training catalogues** across Nodes (e.g. Elixir) and domains
- **Data and software sharing** between PaNOSC and NFDI
- **Facilitate access to IT infrastructures** for researchers at a national level

PaNOSC EOSC Node milestones for 2025

ID	Milestone Description for build-up phase 1	Target Delivery Date
0	Specify requirements for PaNOSC Node partners	March 2025
1	Setup PaNOSC Node governance	April 2025
2	Setup PaNOSC Node website	May 2025
3	Onboard PaNOSC partners to PaNOSC node	July 2025
4	Connect PaNOSC to EOSC AAI; Federate PaNOSC data and services	September 2025
5	Setup Helpdesk and monitoring service	October 2025
6	Demonstrate Use Cases for PaNOSC Node	November 2025

Engagement with other organisations

- **PaNOSC node** will start off with 11 partners but **will encourage all LEAPS and LENS partners** (~28) to join the first LEAPS+LENS joint service

- **PaNOSC has strong links to various scientific communities and journals** which it would propose to join the PaNOSC node with their services and data e.g. International Union of Crystallography, Crystallography Open Database

PaNOSC Gap Analysis for EOSC Federation

- The **EOSC Federation is missing a common approach on how to integrate scientific data and research objects**

- The role of the **EOSC EU Node** is **not** to provide:
  1. **A data search engine for researchers**
  2. **Domain specific knowledge for researchers**
- The role of the **EOSC EU Node is** to provide:
  1. **A search engine for directing users to the right node(s)**

- **PaNOSC node** needs to :
  - Improve search engine for finding scientific data and services
  - Improve data encryption and authentication

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Égalité
Fraternité

Horizon Europe INFRA Work Programme 2025

Opening: ~ 6 May 2025; Deadline: ~ 18 September 2025

Preliminary !

Topic HORIZON-INFRA-2025-01-...	Title	Type	Budget total [M€]	#projets
EOSC-01	Development and onboarding of **EOSC Nodes** into the **EOSC Federation**	RIA	30	5
~~EOSC-02~~	~~Synergies and interplay of EOSC with Common European Data Spaces~~	~~RIA~~	~~10~~	~~1~~
EOSC-02	**FAIR** Integration for Enhanced Research Data in the EOSC ecosystem and beyond	RIA	16	2
EOSC-03	Advancing **AI-readiness** and Machine-Actionability in the EOSC Ecosystem	RIA	15	2
EOSC-04	**Data stewards, skills and training** for Open Science and FAIR practices	CSA	8	1
EOSC-05	Using **Generative AI** (GenAI4EU) for Scientific Research via EOSC	RIA	34	5
2025-EOSC-01			**103**	**15**

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HORIZON-INFRA-2025 Calendrier (prévu)

- Soumission des propositions du 6 mai 2025 au 18 septembre 2025
- Évaluation des propositions d'octobre 2025 à janvier 2026
- Annonce des résultats au comité de programme et aux candidats - février/mars 2026
- *Grants* signées (TTG) – mai 2026

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EOSC dans FP10

eosc

- Se mettre d'accord sur un modèle de gouvernance et de financement pour l'EOSC dans le cadre du FP10 (après Horizon Europe)
- Meilleures connexions avec les autres espaces de données européens (par ex. EHDS, Green Deal Data Space, ECCCH)
- Partenariat co-programmé - un modèle plutôt faible
- Une voie possible : cofinancer les contributions tangibles à l'EOSC (ETP, services, e-infras, ...)
- *Co-fund actions* financées par la CE et les États membres participants par le biais d'agences de financement nationales (ANR)
- Rôle de l'association EOSC : gérer la fédération EOSC
- EOSC EU Node : financé par le CE

Conclusion

- The **EOSC Federation is a unique opportunity for PaNOSC** to continue the work started over a decade ago on **FAIR data** and **Open Science** and which has changed the way researchers work

- **Impact of creating the PaNOSC Node**:
  1. **Increase the quality of data by making them FAIR(er) for AI**
  2. **Significantly increase the scientific impact of data from PaNs**
  3. **Improve the IT infrastructure services by adopting common standards**
  4. **Learn from other EOSC projects e.g. AI4EOSC, FIDELIS, FAIRS4FAIR, …**
  5. **Increase the collaborations between PaNs, clusters, communities, world-wide**
  6. **Change the culture of PaN RIs + researchers by preserving FAIR data for the future**

- **PaNOSC** brings **scientific resource objects** into the **EOSC Federation** and the EOSC Federation provides the **Open Science community!**

panosc
photon and neutron
open science cluster

EOSC Node will only work if we work together as a TEAM!

Backup Slide(s)

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Horizon Europe INFRA-EOSC 2025

Preliminary !

Topic HORIZON-INFRA-2025-01-…	**Data stewards, skills and training for Open Science and FAIR practices** **Description non exhaustive (2)**
EOSC-04 CSA 8 M€ 1 projet prévu	Expected Outcome: • Definition of **consistent core curricula for data stewards** throughout Europe • **Enhanced data steward skills**, enhancing their ability to manage and interpret complex data • Advancement of **Open Science education** throughout all research career stages • Expansion and strengthening of existing **competence networks** broadening their scope across countries and disciplines and improving their readiness to support the uptake of OS and of EOSC. Development of a sustainable coordination network model to support synergies and continued growth. • Mainstreaming transparent, aligned, and interoperable Open Science practices and promoting efficiency and trustworthiness in the management of FAIR digital objects. Proposals are expected to cover the following activities: • Coordinating European-level actions to make data steward curricula management consistent • Enhancing data steward and researcher curricula with Open Science and FAIR practices, • Addressing diverse data steward levels, including support staff and researchers • Collaborating with existing competence centres • Leveraging national networks and related institutional initiatives for European-level coordination. • Launching outreach programs targeting early-career researchers and less-structured communities. • Offering support to countries and institutions that are underrepresented Take account results of Skills4EOSC and FAIR-IMPACT, align with CoARA, EOSC Partnership / EOSC Federation

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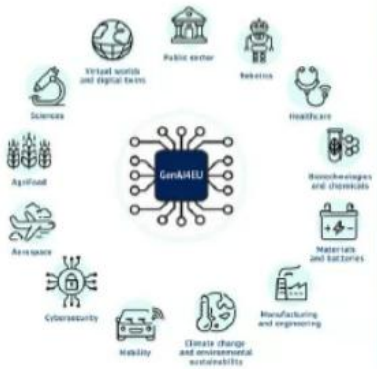
Horizon Europe INFRA-EOSC 2025

Preliminary !

Topic HORIZON-INFRA-2025-01-…	Description non exhaustive
EOSC-05 RIA **34 M€** 5 projets prévu  	Using **Generative AI** (GenAI4EU) for Scientific Research via EOSC Scope: Demonstrate and foster the use of Generative AI for Scientific Research, in line with GenAI4EU, throughout the research data lifecycle supported by EOSC. Generative AI can be used for activities such as writing, data generation and analysis, reporting and many others, for **improving productivity**. This enables lifting science beyond the human scale by facilitating the **deployment and use of smart algorithms, machine learning and AI services** onto the Web of FAIR Data. The awareness and readiness of using Generative AI for scientific research must be raised by training activities. AI-powered natural language interfaces can transform the way researchers interact with open science infrastructures, how they discover and combine relevant data, software and application assets. EOSC should evolve towards offering such capabilities in ways that ensure unbiased and trustworthy responses. This includes adopting **FAIR practices for AI-trained models** as well, to address challenges ranging from reproducibility to trustworthiness. **Open Data and Open Research Software** are essential for reliable, trustworthy, and transparent GenAI. They ensure that datasets and algorithms are well-documented, accessible, and reproducible, enabling others to validate and understand GenAI algorithms. This transparency fosters trust, supports ethical standards, and ensures compliance with regulations, particularly important in the field of GenAI Grants awarded under this topic will be linked, through collaboration agreements, to the grants from HORIZON-INFRA-2025-01-EOSC-03 (Advancing AI-readiness and Machine-Actionability in the EOSC Ecosystem)