



KER 8: Contribution to the EOSC Interoperability Framework: Interoperability and Integration Guidelines

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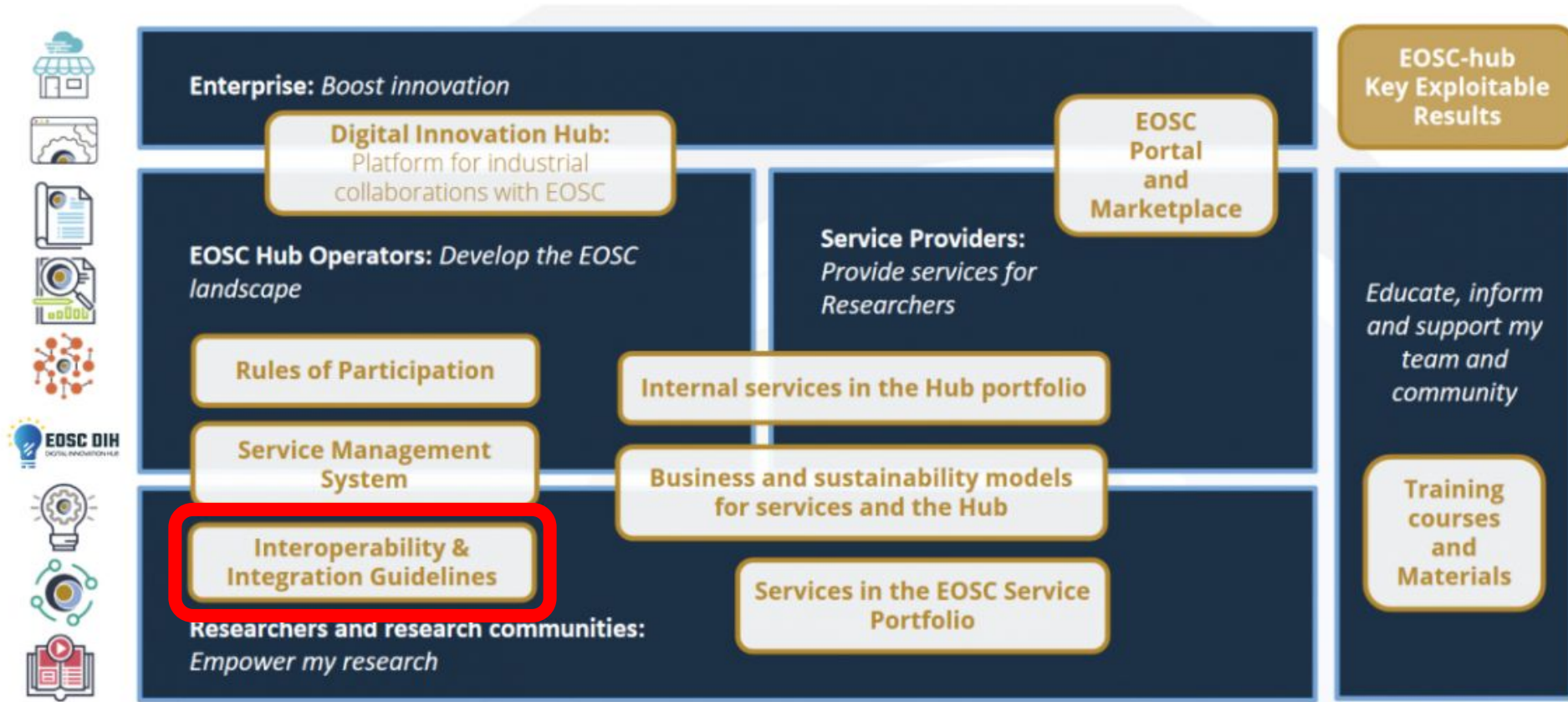
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Dissemination level: Public

Disclosing Party: Project consortium

Recipient Party: European Commission







Description

Interoperability and Integration guidelines, defining the **high-level architecture for basic EOSC technical functions and promoting EOSC standards and APIs**, will facilitate access to services, lower barriers to integrating and composing services and promote the usage of services between adjacent communities

Type

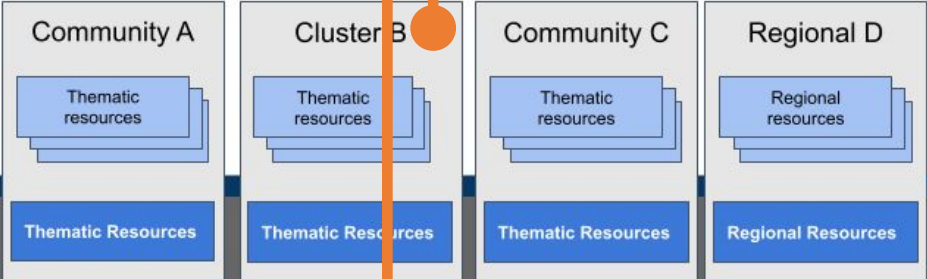
Technical specifications, policies and procedures for FAIR data management and security, documents and reports

Key innovation

EOSC services 'compliant' with the interoperability and integration guidelines will offer well established and documented interfaces for usage and integration, based on well-known standard or APIs, **facilitating (1) their exploitation** from user communities willing to create new scientific services that could **rely on well-established and documented interfaces for the integration** (e.g. a community creates a new scientific workflow reusing EOSC federation and common services, like AAI, accounting, etc.) and (2) the combined usage of EOSC services, indeed **the adoption of well-known standards and interfaces will very-likely reduce the cost to integrate services** (e.g. two accounting infrastructures can be made easily interoperable if they use the same standard usage record format, in such case accounting data extracted from them can be merged and presented in a unique view). As a consequence, less mature or **small scientific communities can leverage on EOSC services for a series of IT functions and focus on their scientific work**, access to scientific services will be open to new communities thanks to the documented interfaces and new scientific workflows can be created combining existing applications.

Contribution to the EOSC Implementation

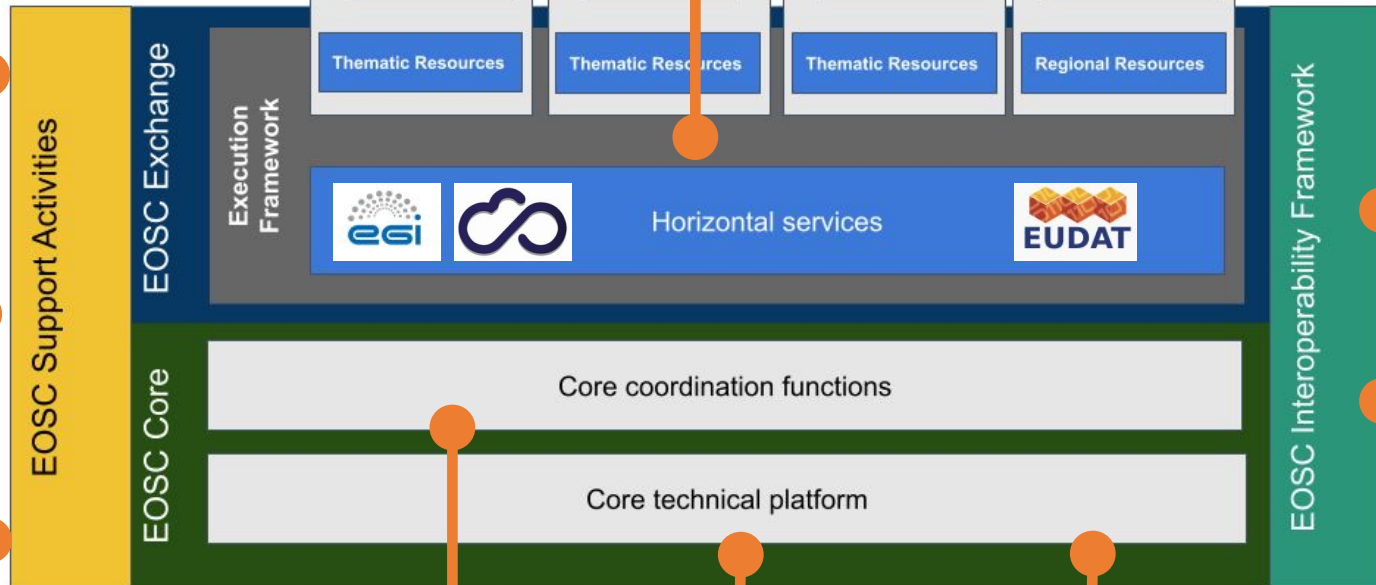
External Services in the EOSC Service Portfolio



Business and sustainability models for services and the Hub

EOSC Digital Innovation Hub (DIH): Platform for Industrial collaborations with EOSC

Training courses and material



Interoperability and Integration guidelines

EOSC Portal and Marketplace

Internal Services in the Hub Portfolio

EOSC Rules of Participation (RoP)

EOSC Service Management System (SMS)



Innovation

EOSC-hub **service integration and composability framework** based on interoperability guidelines

- facilitate the exploitation of EOSC services
- facilitate the combined usage of EOSC services

Benefits

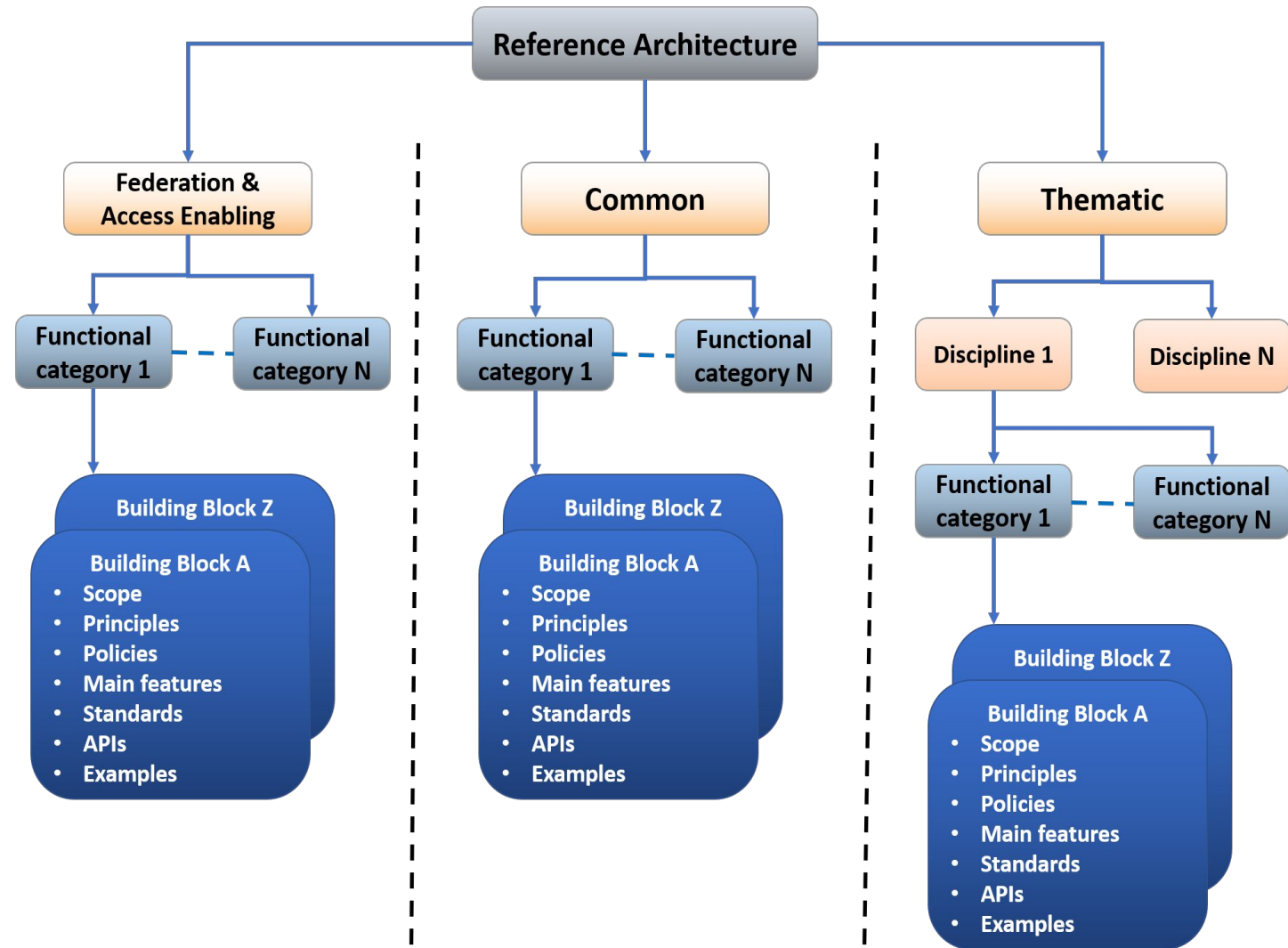
- Scientists can compose services in a easier way
- Scientist can rely on e-Infrastructures and EOSC-compliant services for implementing the basic features
- federation/core and common/horizontal services can interoperate (e.g. AAI or accounting services from different initiatives)

EOSC Interoperability guidelines

- Promote the adoption of **standards** and **well-know APIs**
- Support the end-to-end **composability** of services
- Lower the barriers to allow services to interact and work together
- Based on existing community practices, technical requirements, well-known standards and interfaces

EOSC-hub EOSC Reference Technical Architecture

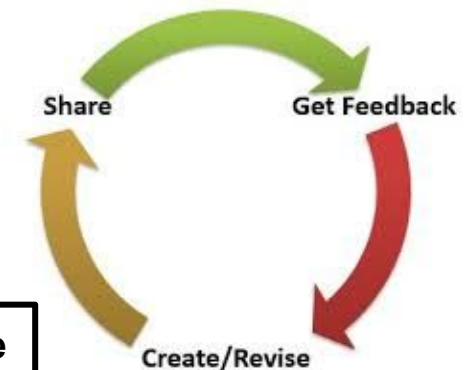
- **Reference architecture:** template solution for an architecture
- **EOSC Technical Architecture**
 - Infrastructure level
 - Framework to define the interoperability guidelines
- **Building Block**
 - basic element: scope, features, standards, APIs, etc.



- **Federation (EOSC core):** enable EOSC
- **Common/Horizontal (EOSC Exchange):** provide generic functionalities that can apply to multiple domains
- **Thematic (EOSC Exchange):** address a specific research domain

Building Blocks of the EOSC architecture

- **EOSC architecture building blocks** defined for several service types through **Architecture and Interoperability Guidelines**
 - Main features, high-level architecture, interfaces, integration options, adopted standards, etc.
- Adopted an Iterative approach to identify building blocks and improve the related guidelines
 - Started from the most relevant use cases
 - Defined the technical specification and get feedback
 - Involved external people with expertise in the area



Building Block concept adopted by the EOSC Interoperability Framework TF from the EOSC Architecture and FAIR WGs

- 2 EOSC Technical Workshops
 - 1st WS => 25-27 June 2019
 - <https://indico.egi.eu/event/4675/>
 - 2nd WS => 20 May 2020
 - <https://www.eosc-hub.eu/eosc-hub-week-2020/agenda/eosc-hub-technical-workshop>
- 2 surveys launched
 - 1st survey
 - <https://www.eosc-hub.eu/news/eosc-hub-releases-documentation-its-federation-services-let-us-know-what-you-think>
 - 2nd survey
 - <https://www.eosc-hub.eu/proposals-eosc-hub-technical-specifications-common-services>

Federation services (EOSC Core)

AAI

Helpdesk

Accounting

Monitoring

Security

Software Quality Assurance

6 Guidelines

Common/Horizontal services (EOSC Exchange)

Cloud IaaS: Container Management, VM Management, VM Orchestration

HPC/HTC: Cluster on Demand, Multitenant Job Submission, Multitenant Containerised job submission

Metadata Management and Data Discovery: Annotation Service, Data Discovery and Access, Metadata Cataloguing and Indexing

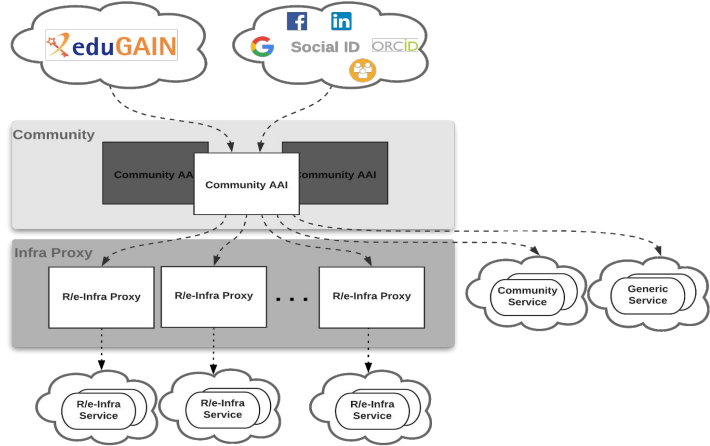
PaaS Solution: PaaS Orchestration

Workflow management, user interfaces and Data analytics: Machine Learning/Deep Learning data analytics services, Marketplace

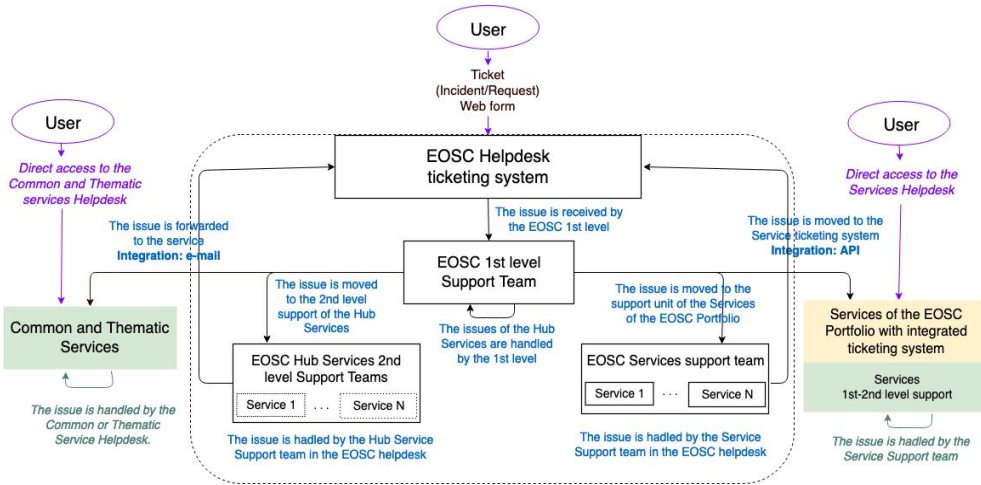
12 Guidelines

<https://www.eosc-hub.eu/technical-documentation>

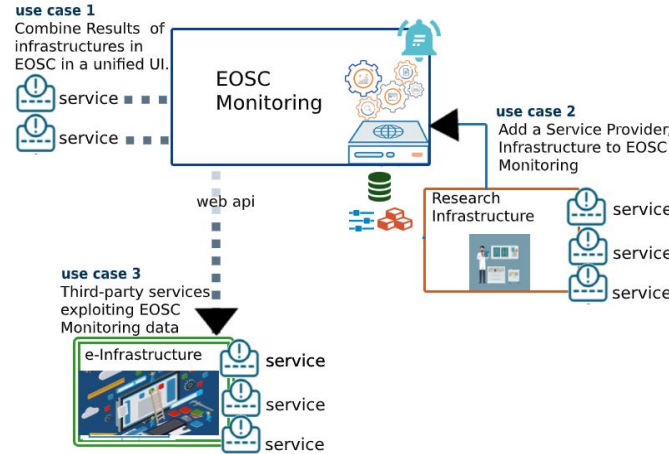
High level Architecture for Federation Services



AAI

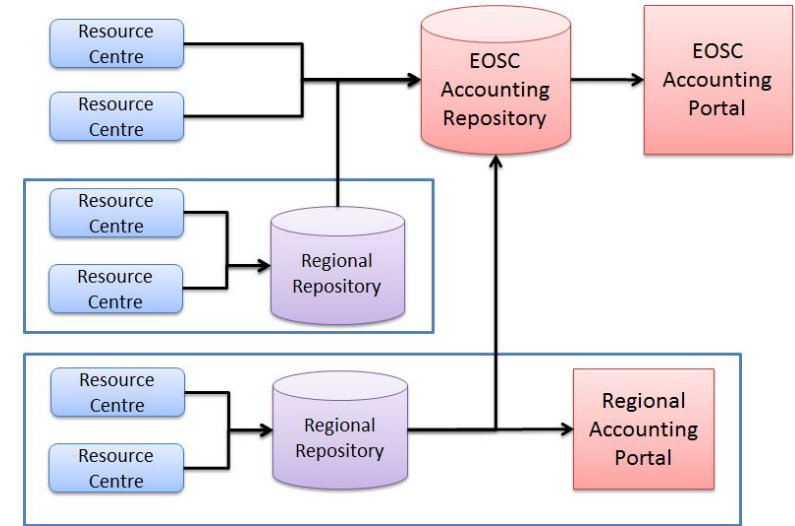


Helpdesk



Monitoring

- Functions & Central services
- Integration options
- Interoperability guidelines

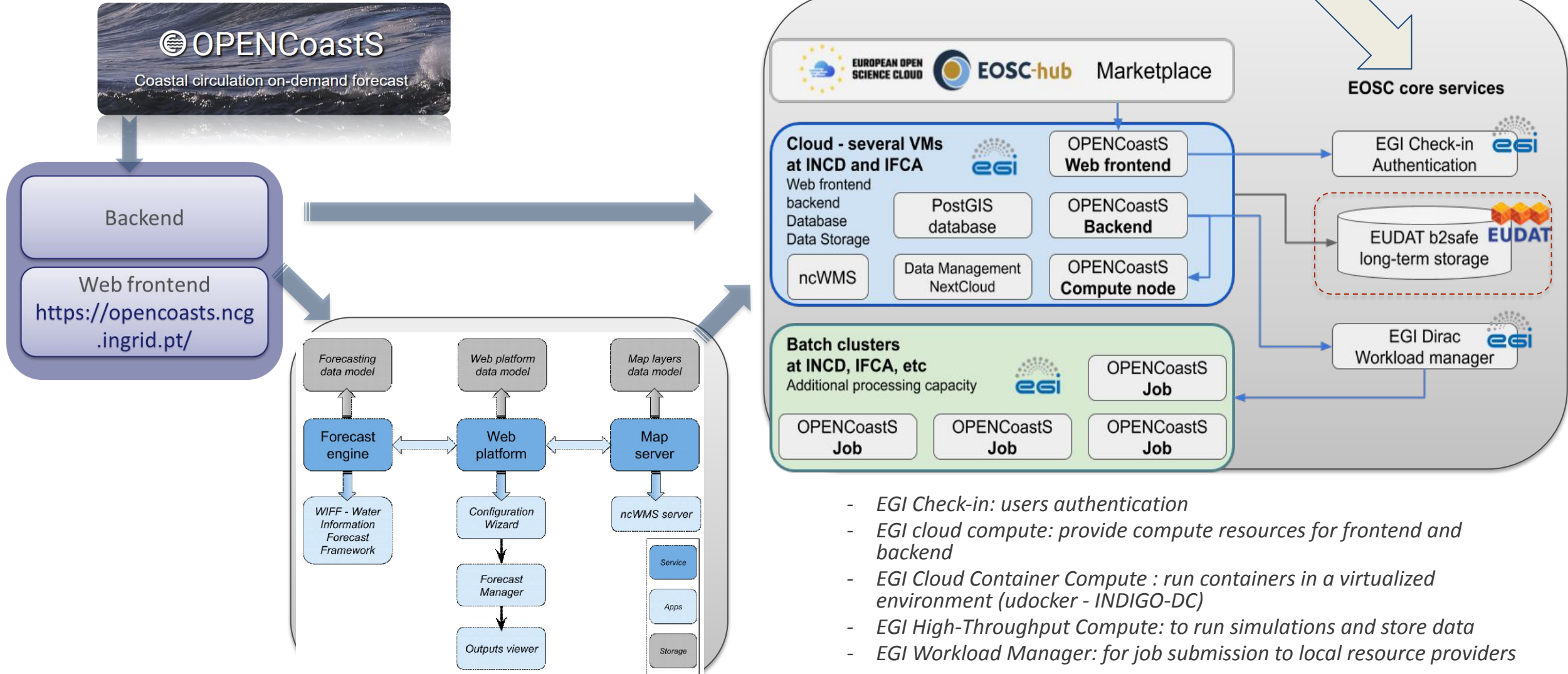


Accounting

The interoperability guidelines supported the achievement of several service integrations:

- Thematic services
 - Total of 35 integrations achieved
- Competence centers
 - Total of 22 integrations achieved
- Early Adopter pilots
 - 25 integrations of 9 different services
- Business pilots
 - 18 business pilots integrated with EOSC-hub services

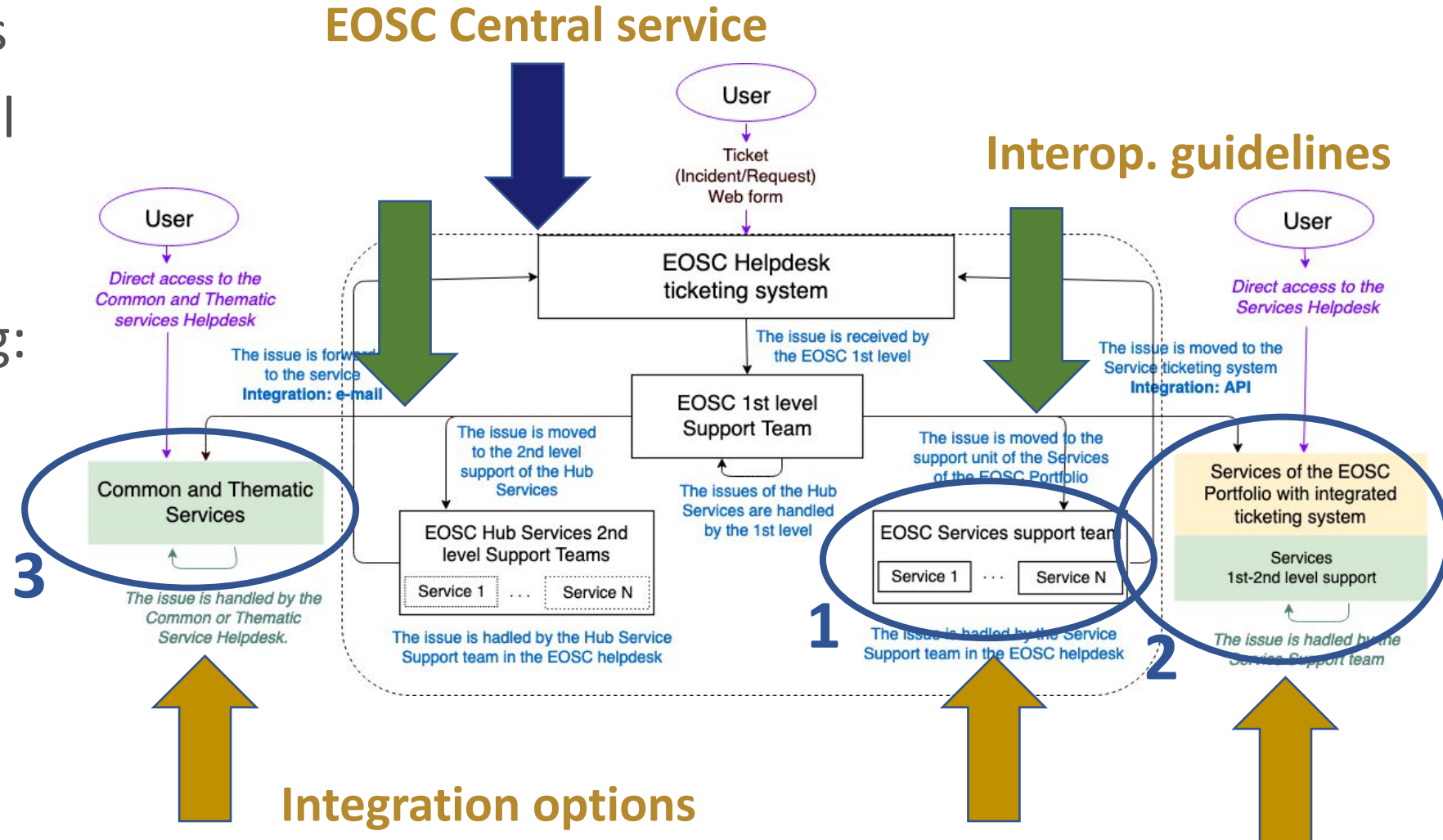
All these integration were supported thanks to effort provided by WP10.3/10.4



- EGI Check-in: users authentication
- EGI cloud compute: provide compute resources for frontend and backend
- EGI Cloud Container Compute : run containers in a virtualized environment (udocker - INDIGO-DC)
- EGI High-Throughput Compute: to run simulations and store data
- EGI Workload Manager: for job submission to local resource providers

EOSC Helpdesk provides

- 1st level support for all EOSC services
- 2nd level support for EOSC Core services (eg: Marketplace, AAI, Monitoring, ...)
- 3 integration options for all other EOSC services



What benefits does it bring?

Exploitation audience (remove rows that are not relevant)	Benefit
EOSC-CORE	Reducing the cost for integrating EOSC-Core services into the Community high-level services (AAI, Accounting, etc)
Service Providers	Providing limited set of functions and APIs and supporting very large set of communities, relying on similar solutions/services for leveraging the resources.
Researchers and research communities	Better understanding on how communities services could become part of the EOSC ecosystem. Easy path to implement EOSC Core and Exchange capabilities
Enterprise	Relying over well known and established standards/protocols/APIs to leverage the EOSC ecosystem



Exploitation

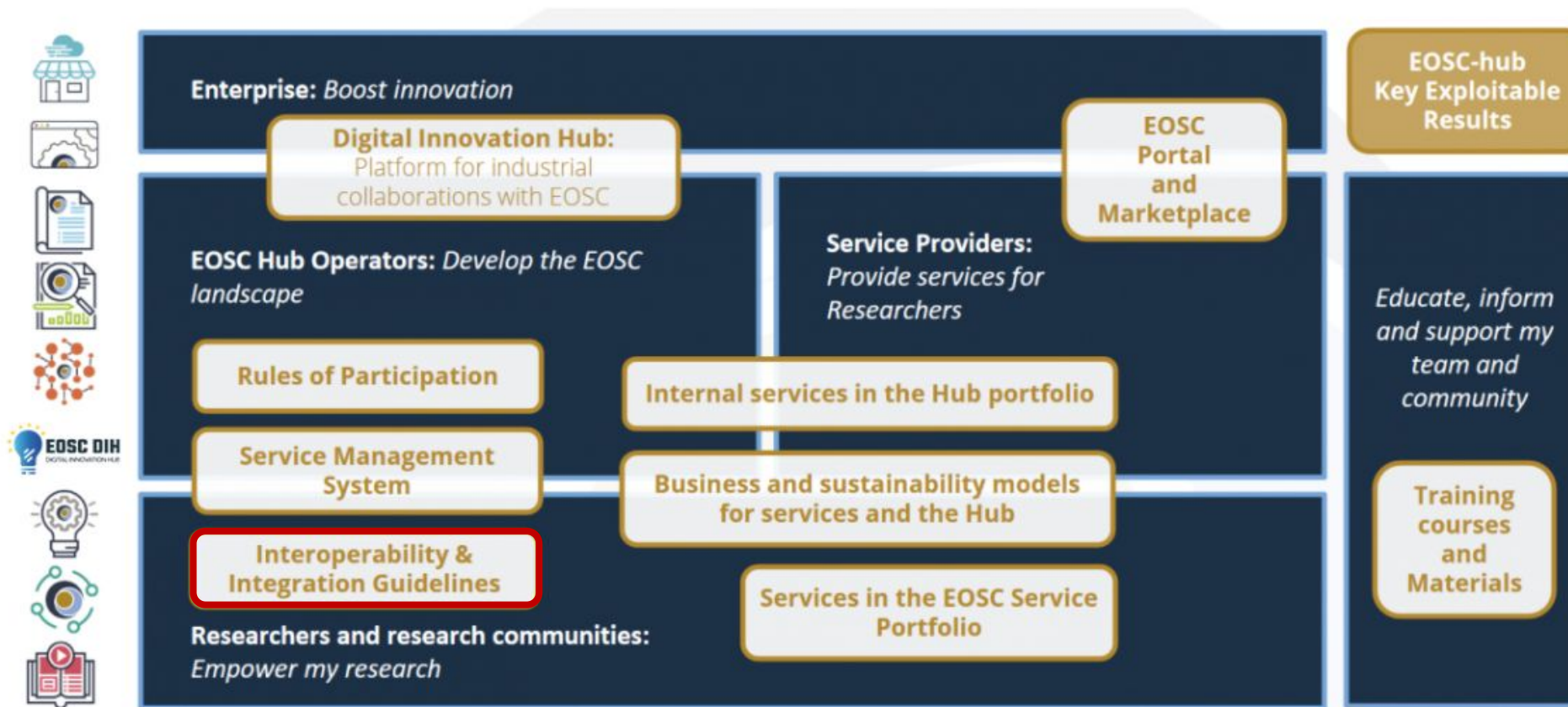
- Deep and wide exploitation of the results of this work into the EOSC landscape: see Mark slides
- Tech Specs related to the EOSC Core will deeply be used as starting point in the EOSC-Future project
- Tech Specs related to Common Services where used as starting point for next project (DICE, EGI-ACE, C-Scale, etc) and from Regional projects.

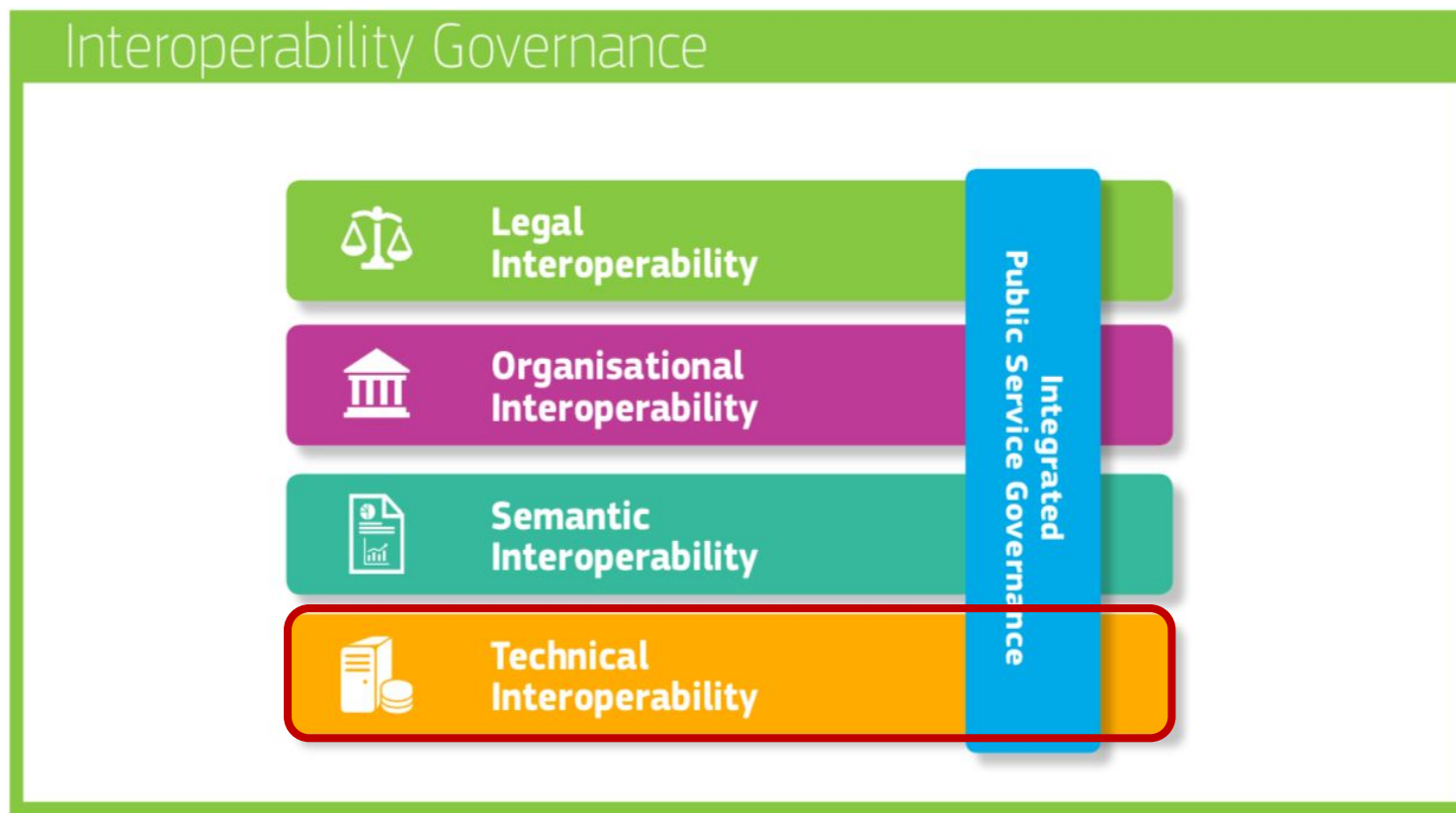
All the the documents (Technical Specifications and deliverables) are released under the CC-BY 4.0 license

- EOSC Architecture WG
- EOSC Architecture WG – AAI TF
- EOSC Architecture WG – PID Architecture TF
- EOSC FAIR WG & EAWG – EOSC Interoperability Framework TF
- EOSC Architecture WG – Definition of the Minimum Viable EOSC
- EOSC Strategic Research and Innovation Agenda



EOSC-hub KER – EOSC Interoperability Framework

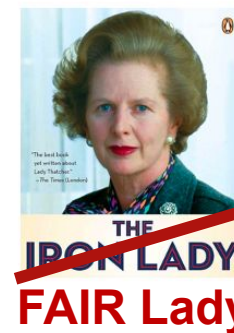




The European Interoperability Framework four levels of interoperability

EOSC-Core services

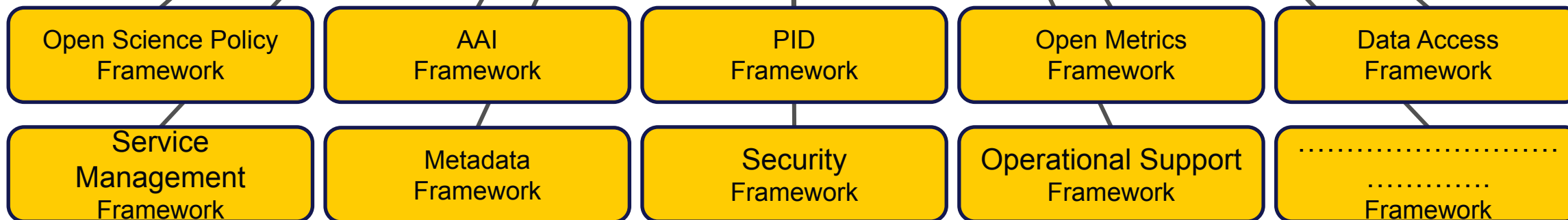
- ★ **Shared open science policy framework**, which effectively embeds a data compliance framework for open / FAIR data. It defines and applies the rules of how the data elements are published, shared and re-used.
- ★ An instantiation of the **EOSC interoperability Framework** including
 - ★ **Authentication and Authorization Interoperability (AAI) framework**,
 - ★ **Persistent Identifiers framework**: Services to generate, resolve and validate persistent identifiers (PID)
 - ★ **Interoperable metadata framework**: Within & between discipline interoperability
 - ★ **Data access framework**, whose primary role is to offer data as a service. It enables open interfaces where data consumers (users and machines) are able to discover and use data.
 - ★ **Service management and access framework**, consistent and agreed upon understanding of e-science services: what they offer, which science problem they address, what operational capacity, how accessed, who pays.
 - ★ **Open metrics framework**, which sets the rules (usage, performance, value for money, user satisfaction) for the assessment of EOSC elements, i.e., policies, access framework, services, data, business, funding and usage models.
- ★ **Security policies and procedures** to ensure consistent and coordinated security operations across the federated services. This will include incident response policies and a service request and problem management scheme
- ★ **Operational support services** for EOSC-Core and made available to those federating services connecting to the EOSC-Core.
- ★ **Web-portal** including web-content as well as supply and demand facing services providing for accessing the EOSC resources.



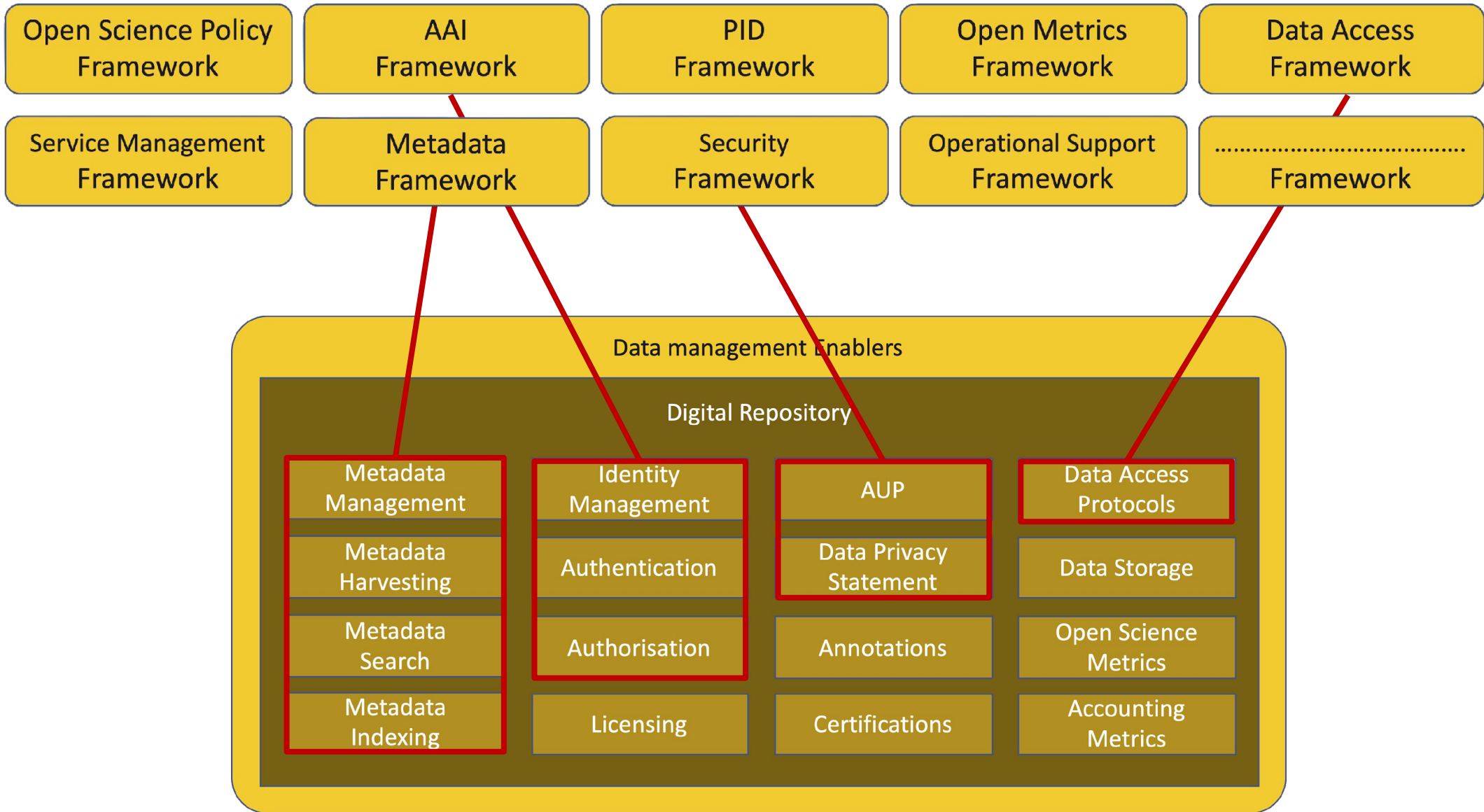
Sustainability WG
Overview EOSC Core services



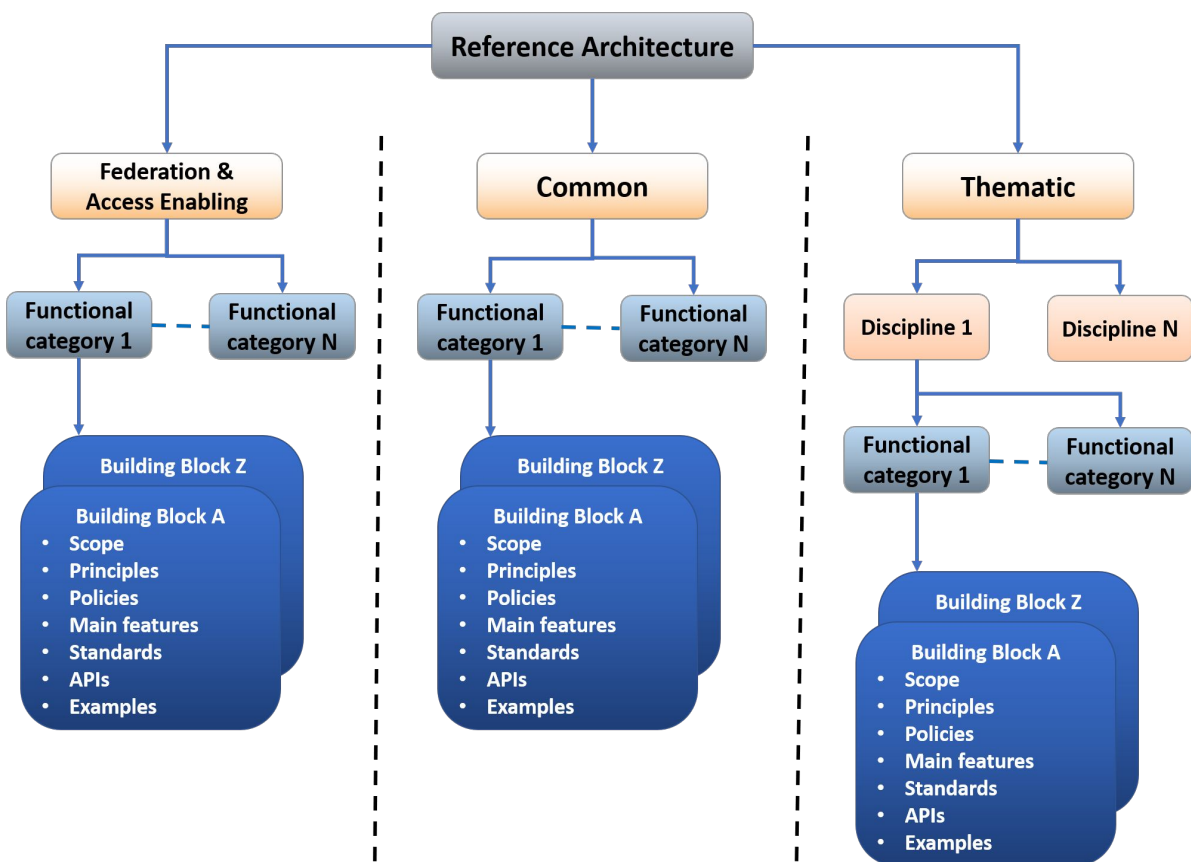
But FAIR Lady does not describe what a framework comprises of, it has only identified important frameworks



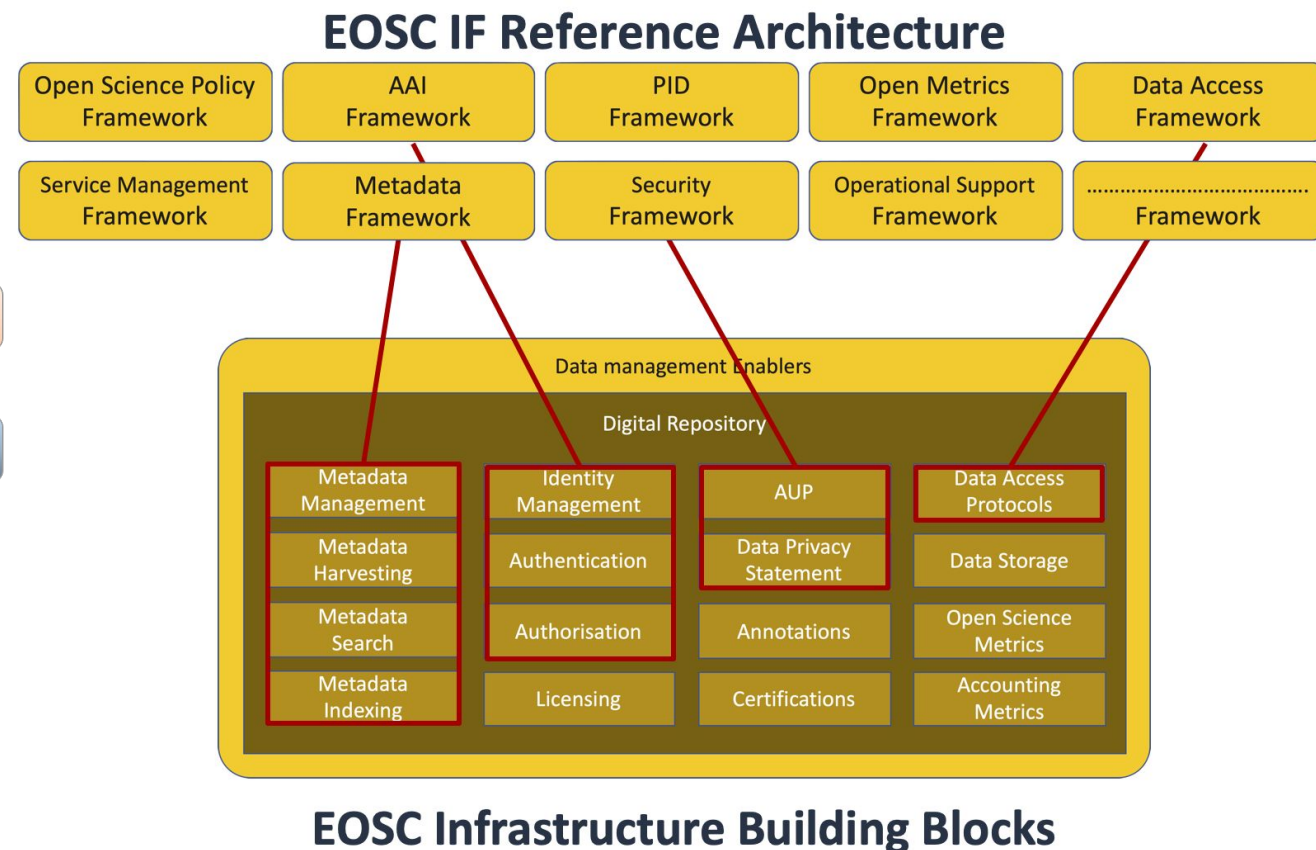
EOSC IF Reference Architecture



EOSC-hub

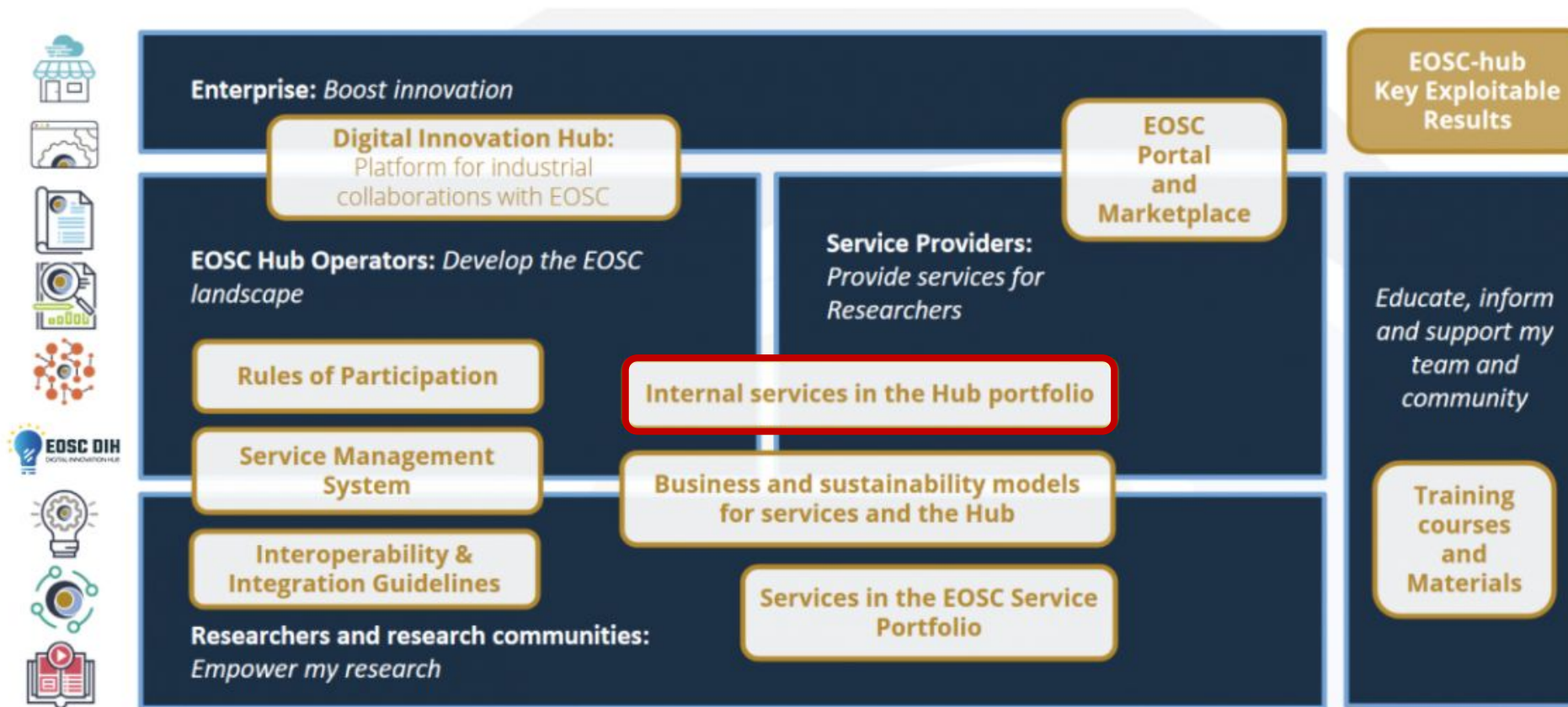


EOSC



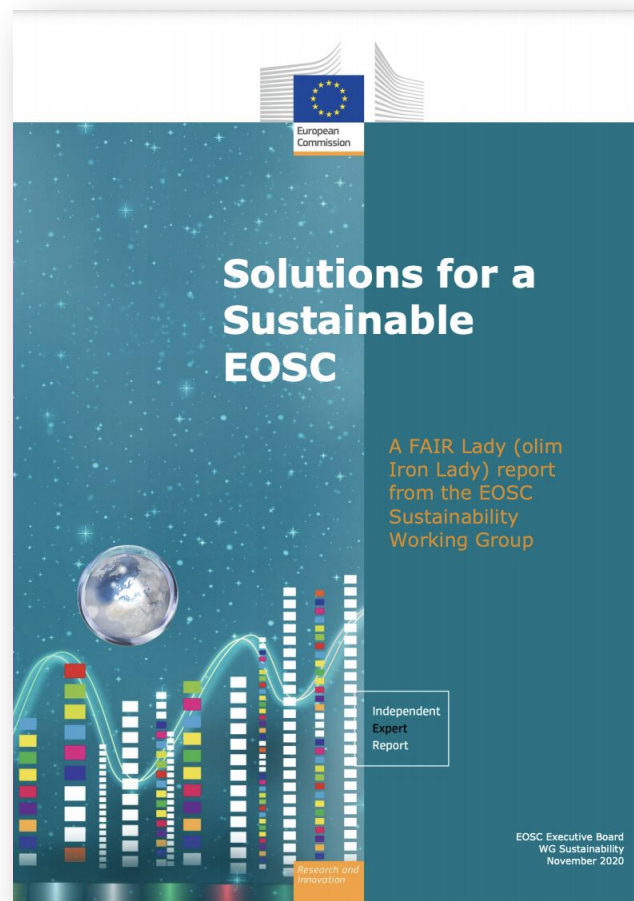
<https://www.eosc-hub.eu/deliverable/d104-eosc-hub-technical-architecture-and-standards-roadmap>

<https://op.europa.eu/s/oZVY>



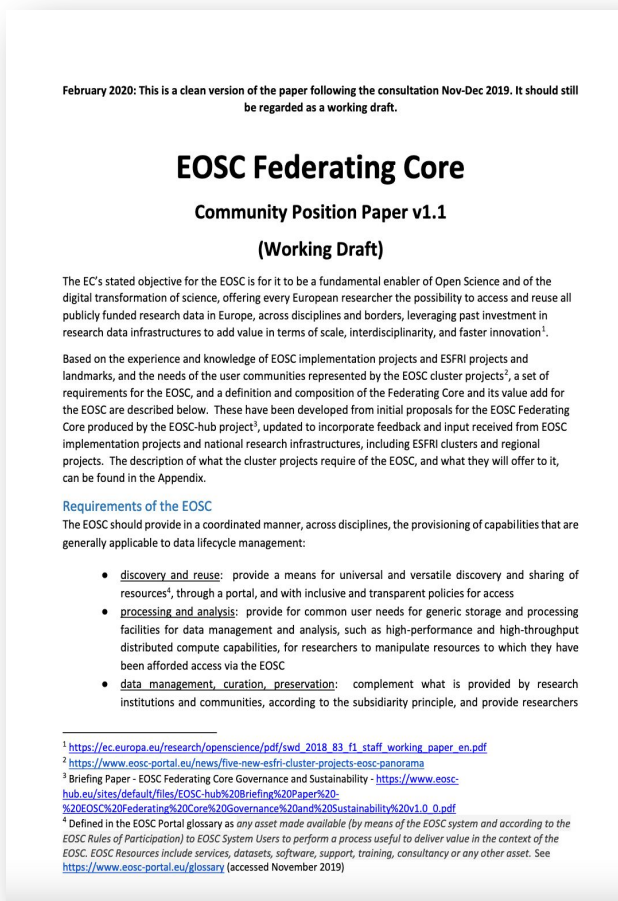
Sustainability WG

report Solutions for a sustainable EOSC
(Tinman, Iron lady, FAIR lady)



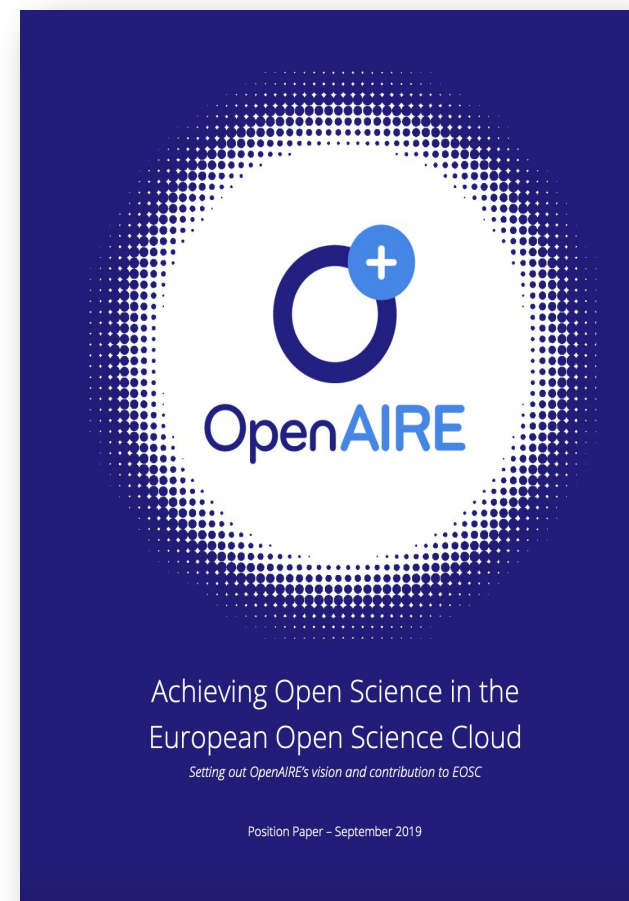
EOSC-hub

EOSC Federating Core
Community Position Paper v1.1

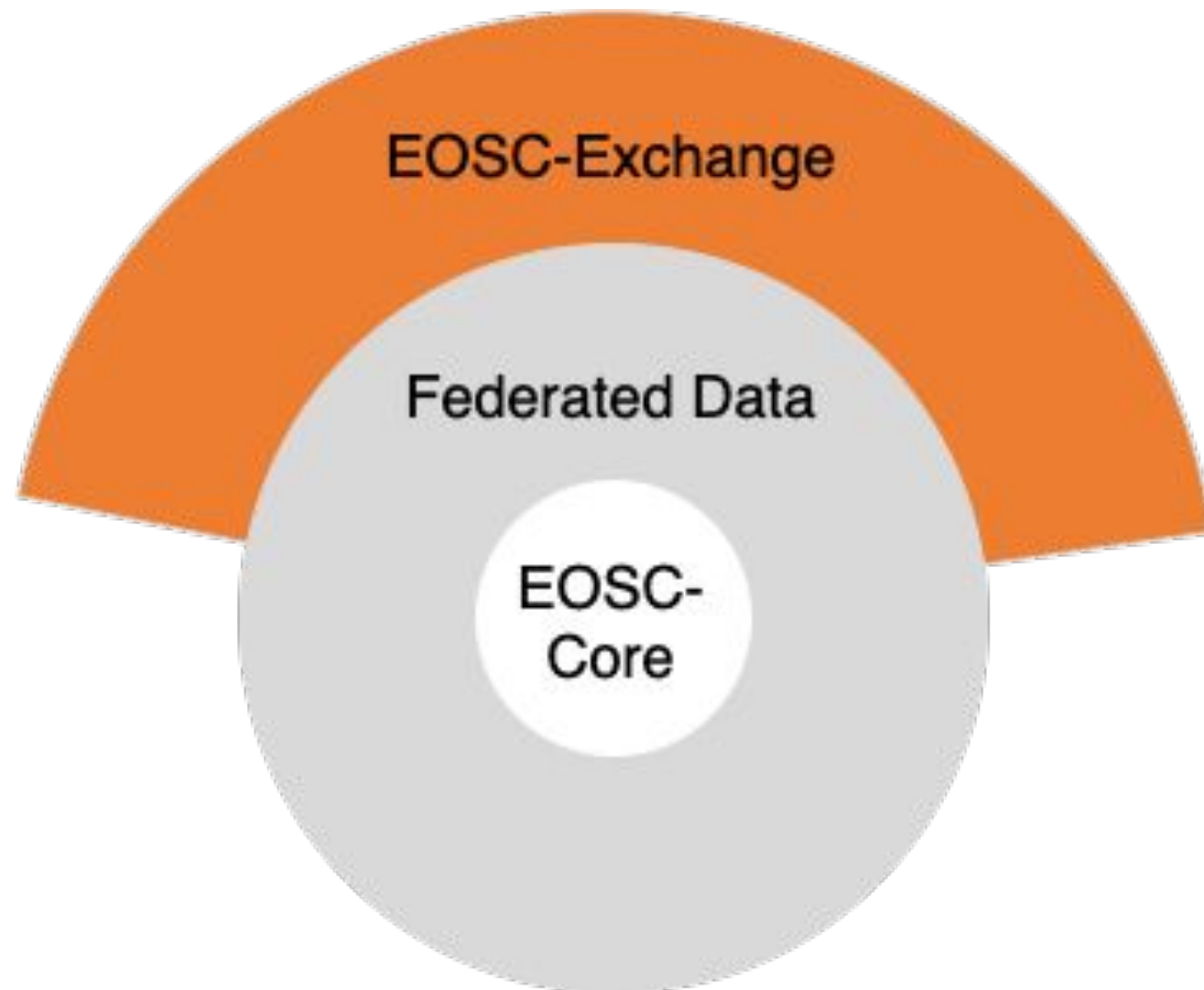


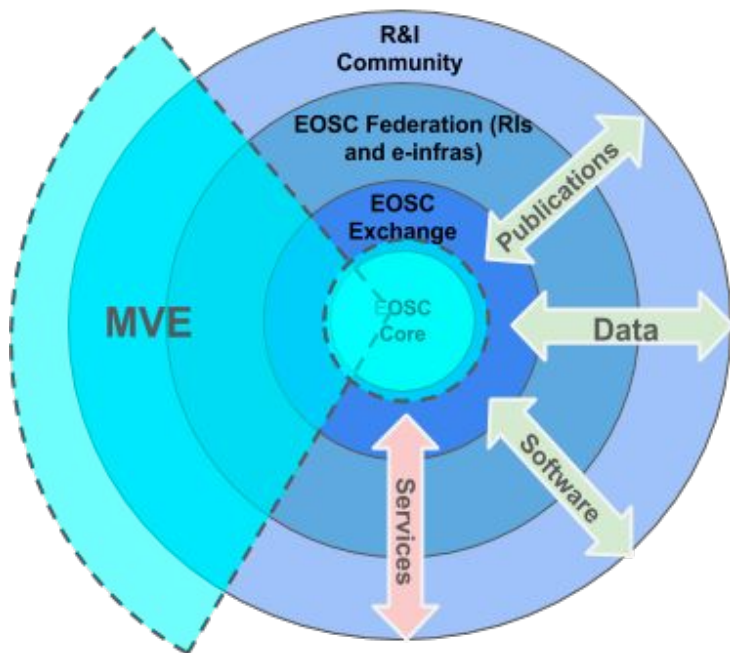
OpenAIRE

Achieving Open Science in the EOSC
Setting out OpenAIRE's vision and contribution to EOSC

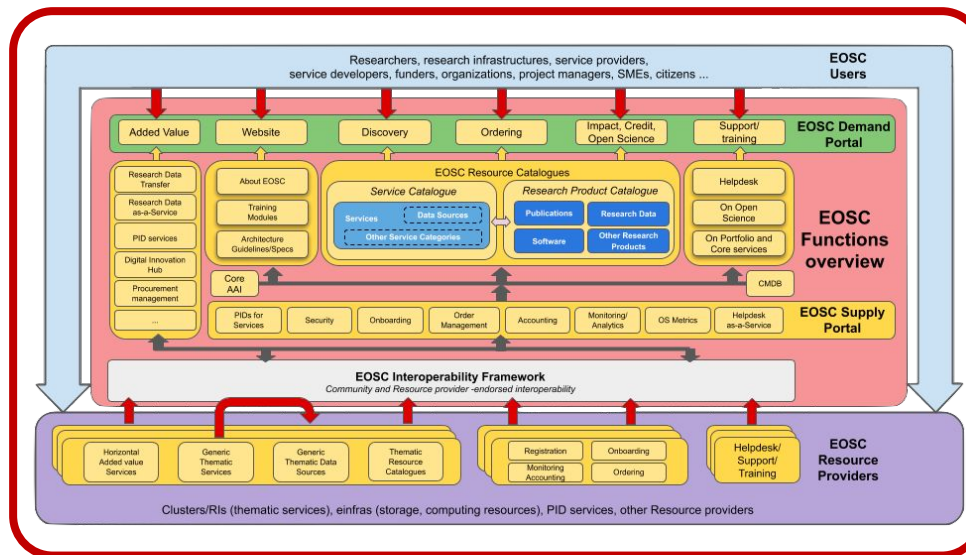


- Shared open science policy framework,
- Authentication and Authorization Interoperability (AAI) framework,
- Persistent Identifiers
- An interoperable metadata framework,
- Data access framework,
- Service management and access framework,
- An open metrics framework,
- Security policies and procedures
- Operational support services
- Web-portal





High-level diagram of the EOSC depicting the relationship between EOSC-Core, EOSC-Exchange, EOSC-Federation and the MVE



Architectural diagram illustrating EOSC-Core functions supporting the EOSC

Area	Function in the MVE	ESWG FAIR Lady	EAWG Proposal	Phase (1-3)	Functional description	Reference to SRIA action area
PID Services	PID for EOSC services	1.1 EOSC-Core: PID	EOSC needs to select and run a service (part of the EOSC-core) for providing PIDs for EOSC services	2	A way to mint/resolve PIDs for services in the EOSC landscape (core services plus onboarded ones) to allow for unique identification, citing, avoiding duplication and tracking of impact. This may be a service to generate, resolve and validate persistent identifiers (PID) or a service to connect existing PID systems.	Action Area (AA)1 Identifiers
	PIDs for research entities in EOSC	1.1 EOSC-Core: PID	Policy framework for PIDs to be defined by EOSC	1	Policy framework for PIDs for research entities, (data, sw, publications, organisations, researchers, funders, etc)	AA1 Identifiers
Portal, Catalogues & Orders	EOSC portal (website)	1.1 EOSC-Core: Web-portal	Part of EOSC-Core	1	Website with basic information about EOSC, embeds the catalogue(s) in it. Features basic user management functions.	AA5 User Environments, AA6 Resource provider Environments

Functions defined as belonging to the EOSC-Core and planned in phase 1 constitute part of the initial MVE

EOSC-hub website	https://www.eosc-hub.eu/technical-documentation
Publications	<ul style="list-style-type: none">• https://op.europa.eu/en/publication-detail/-/publication/d1bc3702-61e5-11eb-aeb5-01aa75ed71a1• https://op.europa.eu/en/publication-detail/-/publication/d787ea54-6a87-11eb-aeb5-01aa75ed71a1• https://eosc.eu/sites/default/files/EOSC-SRIA-V1.0_15Feb2021.pdf• https://op.europa.eu/en/publication-detail/-/publication/3136c3e6-4f07-11eb-b59f-01aa75ed71a1• https://eosc-hub.eu/sites/default/files/EOSC-hub%20Integration%20Report.pdf
Magazine	https://www.eosc-hub.eu/news/eosc-hub-magazine-issue-5



WPs in leading roles	WP10
WPs providing contributions	<p>WP4 (expertise to draw the interoperability guidelines)</p> <p>WP5 (expertise on EOSC Core services)</p> <p>WP6 (expertise on EOSC Common services)</p> <p>WP7 (expertise on Thematic services and providing user requirement)</p> <p>WP8 (expertise on Competence services and providing user requirements)</p> <p>WP9 (expertise on Business pilots and providing user requirements)</p>
Other information	<p>D10.1 - EOSC-hub Technical Roadmap</p> <p>D10.2 - EOSC Hub Technical Roadmap v2</p> <p>D10.3 - Technical architecture and standards roadmap</p> <p>D10.4 - EOSC Hub technical architecture and standards roadmap</p> <p>D10.5 - Requirements and gap analysis report</p> <p>D10.6 - Requirements and gap analysis report v2</p>



**Thank you
for your attention!**

Questions?



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