ESCAPE interoperability of data and services

Mark Allen, Xavier Espinal, Kay Graf, John Swinbank, Elena Cuoco, Ian Bird, Stephen Serjeant, Giovanni Lamanna, Julie Chaudan, Tamas Gal, Marco Molinaro

ESCAPE - The European Science Cluster of Astronomy & Particle Physics ESFRI Research Infrastructures has received funding from the European Union's Horizon 2020 research and innovation programme under the Grant Agreement n° 824064.

ESCAPE: Astronomy and Particle Physics ESFRIs

* Builds on communities' complementary excellences in data stewardship:
  * Astronomy Virtual Observatory infrastructure
  * HENP expertise in Exabyte-scale data management and large-scale distributed computing
* Builds on existing inter-RI synergies, intersections; overlapping competence and authority of national stakeholders
* Recognises that ESCAPE communities will be Exascale data generators, early adopters of ICT and data management innovations, push state-of-the-art
* Both Observatory- and Facility- operations require global, open access to data, long term curation, and sustainability

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ESCAPE PARTNERs

The ESCAPE cluster comprises world-class research facilities in astronomy and particle physics. **ELT, CTA, SKA, KM3NeT, EST, HL-LHC, FAIR, JIV-ERIC, LSST, EGO-Virgo.**
(Credit: ESCAPE)

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ESCAPE Work Programme

Data Lake:

* Build a scalable, federated, data infrastructure as the basis of open science for the ESFRI projects within ESCAPE. Enable connection to compute and storage resources.

Software Repository:

* Repository of "scientific software" as a major component of the “data” to be curated in EOSC. Implementation of a community-based approach for the continuous development of shared software and for training of researchers and data scientists.

Virtual Observatory:

* Extend the VO *FAIR* standards, methods within a broader scientific context; prepare the VO to interface the large data volumes anticipated from new facilities.

Science Platforms:

* Flexible science platforms to enable the open data analysis tailored by and for each facility as well as a global one for transversal workflows.

Citizen Science:

* Open gateway for citizen science on ESCAPE data archives and ESFRI community

Lightning talk – this morning, S. Serjeant

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*Promoting, implementing and committing to **Open Science***

ESCAPE EOSC cell

- **Envisage ESCAPE services moving into the EOSC-Exchange layer, and connections to the Interoperability Framework.**
- **Rely on EOSC-Core for underpinning aspects, e.g. AAI**

ESCAPE OSSR | Open-source Scientific Software and Service Repository

Catalogue & Repository of resources

Datasets
Software & services
Tutorials
Training
Publications

ESCAPE VO | Virtual Observatory

Virtual Observatory

TSP's

RI-Specific Science Platforms

ESCAPE SAP | Science Analysis Platform

Science Platforms

Workflows, notebooks, deployment platforms, packaging

ESCAPE CS | Citizen Science

Citizen Science

Data Lake

FAIR data management
Content discovery and delivery

ESCAPE DIOS | Data Infrastructure for Open Science

GÉANT

HPC

PRACE
EuroHPC Joint Undertaking

HTC

Grid clusters, etc

Private/public clouds

Commercial clouds

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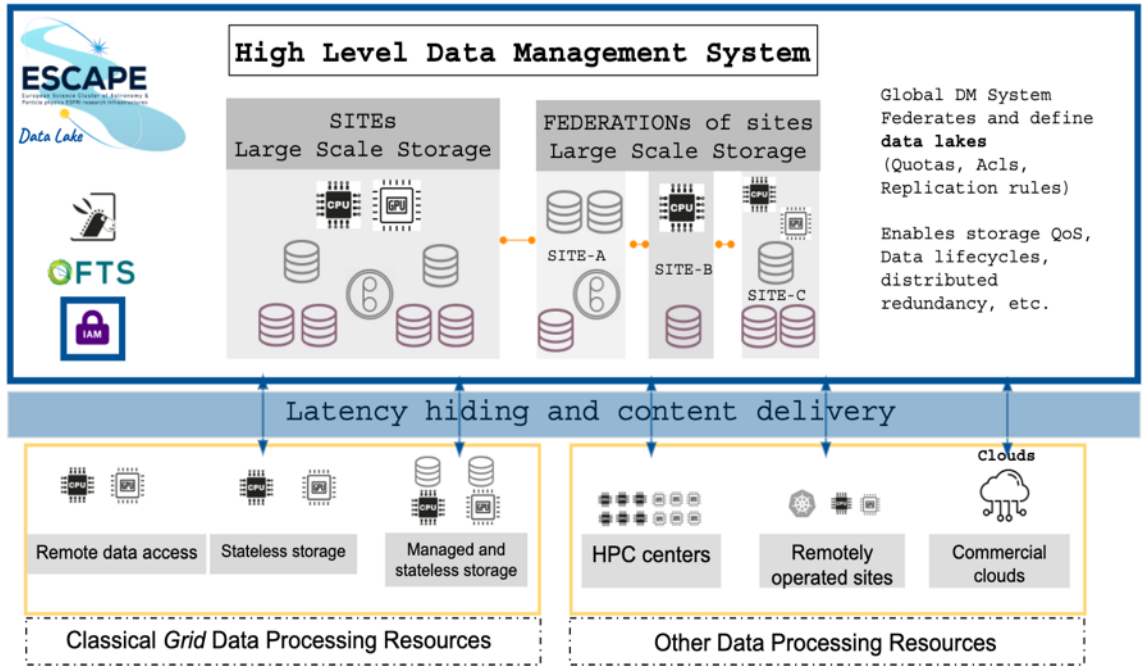
The ESCAPE Data Infrastructure for Open Science

The ESCAPE **D**ata **I**nfrastructure for **O**pen **S**cience (DIOS) aims at **delivering a prototype of the Data Lake concept,** a **common** storage infrastructure that:

- Provides **global data management** orchestration

- Delivers **Open Access and FAIR data services**: trustable data repositories; enable data management policies; transparent data access layer.

- Science **projects to drive** the service requirements to address their needs.



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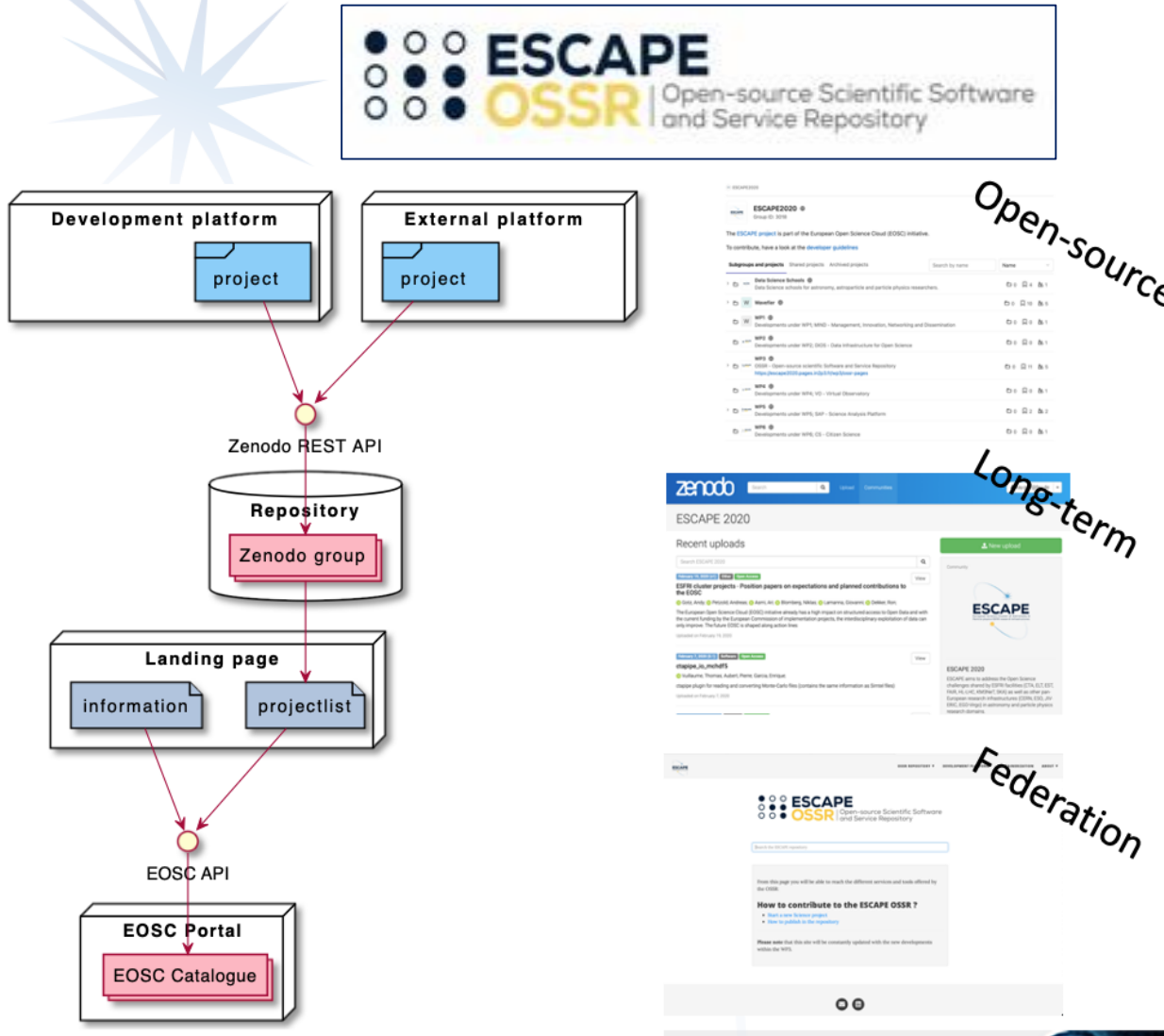
Software Repository as Part of the EOSC Catalogue

Objectives:

* shared open science **software and services** based on FAIR principles
* Foster interoperability, **software re-use and cross-fertilisation** between ESFRIs (e.g. simulation)
* Offer an **open innovation environment** for standards (e.g. data-formats) and shared novel commuity software

OSSR deliverables:

* Establish a **community-foundation**
* Expose/share software to users via the **EOSC catalogue**
* **Train** and bring together the scientists/users
* **Provide a scheme to acknowledge and reward scientists** for their commitment



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Astronomy Virtual Observatory framework as part of EOSC

Integration of an existing operational interoperability framework

* Domain specific thematic services supporting Open Science

Brings Astronomy metadata standards into EOSC context

* IVOA standards responding to the needs of ESFRI, RIs and researchers
* *See Astronomy use case in SRIA v1 – pg. 211, and EOSC Interoperability Framework*

EOSC to enable next steps of the astronomical Virtual Obsevatory

* Connection to computing and integration into ESCAPE platform
* Scalability for big data

Data stewardship practices of Astrophysics in EOSC context

Developing the vision of next generation astro ESFRI archives

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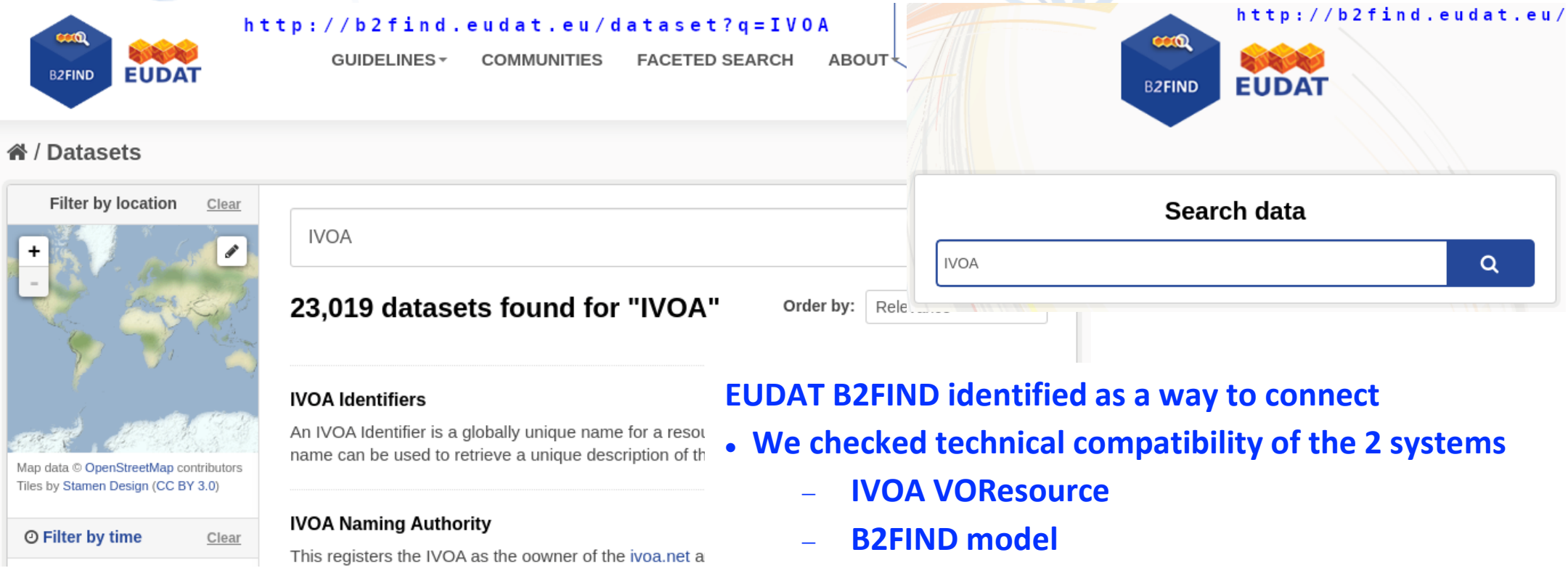
E.g. technical interoperability:
IVOA Registry into EOSC via EUDAT B2FIND



EUDAT B2FIND identified as a way to connect

- **We checked technical compatibility of the 2 systems**
  - **IVOA VOResource**
  - **B2FIND model**
- **Both use OAI-PMH**
- **IVOA RegTAP service (@GAVO) has a DataCite extension**
  - **works as the harvest-able endpoint for the IVOA Registry**

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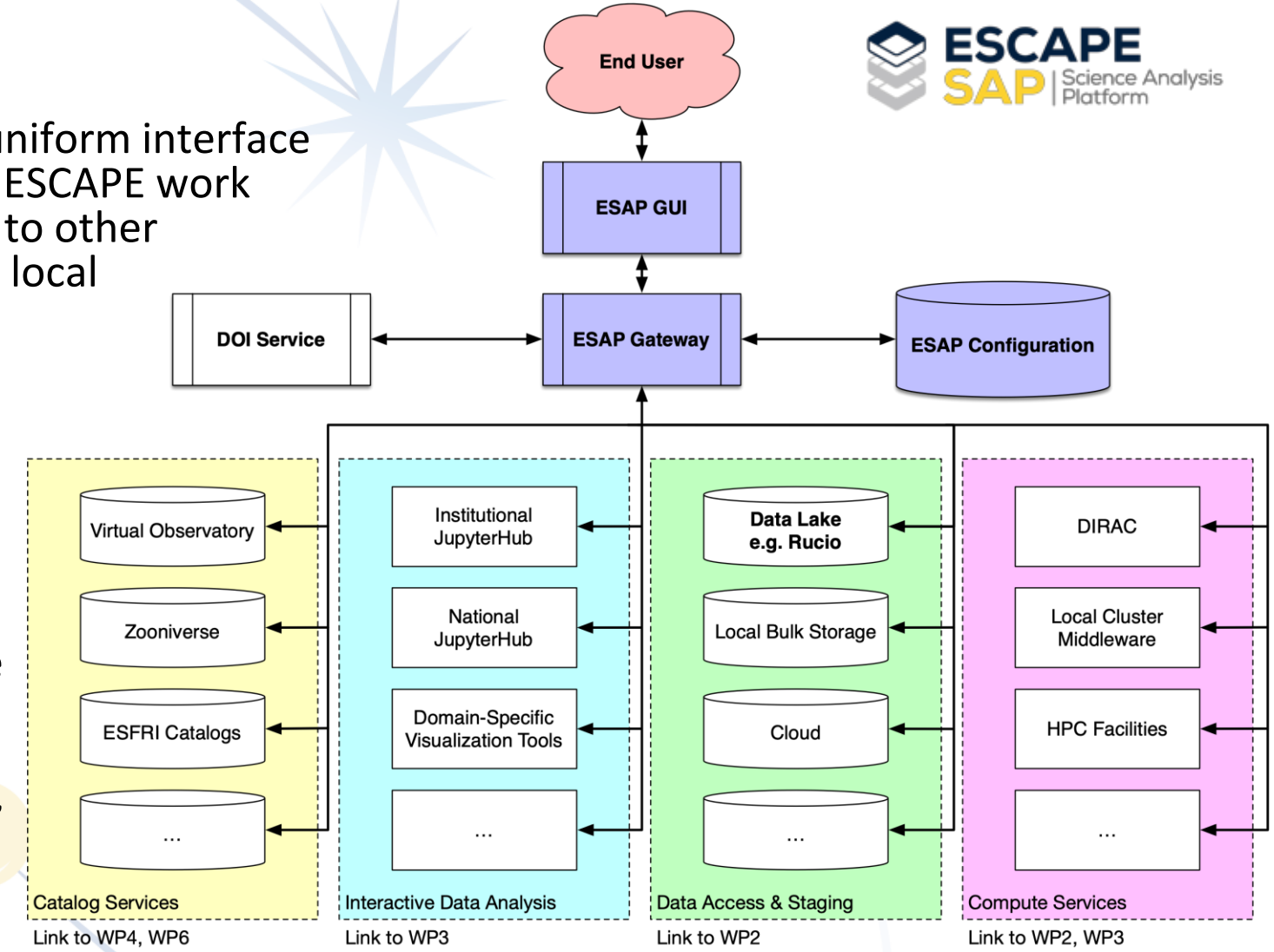
Integration of ESCAPE services in the Science Analysis Platform

* The Science Analysis Platform provides a uniform interface to the capabilities developed by the other ESCAPE work packages, to ESFRI-specific resources, and to other services available through EOSC or in their local environment.
* The ESAP Gateway acts as the hub of a range of pluggable, independent microservices.
* The ESAP GUI mediates user access through an attractive and consistent interface
* The capabilities of the ESAP system can be extended by adding new microservices: ESAP can adapt to its environment, be it deployed at a small scale on local systems, or in service of major infrastructure.



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Connecting to EOSC… a work in progress

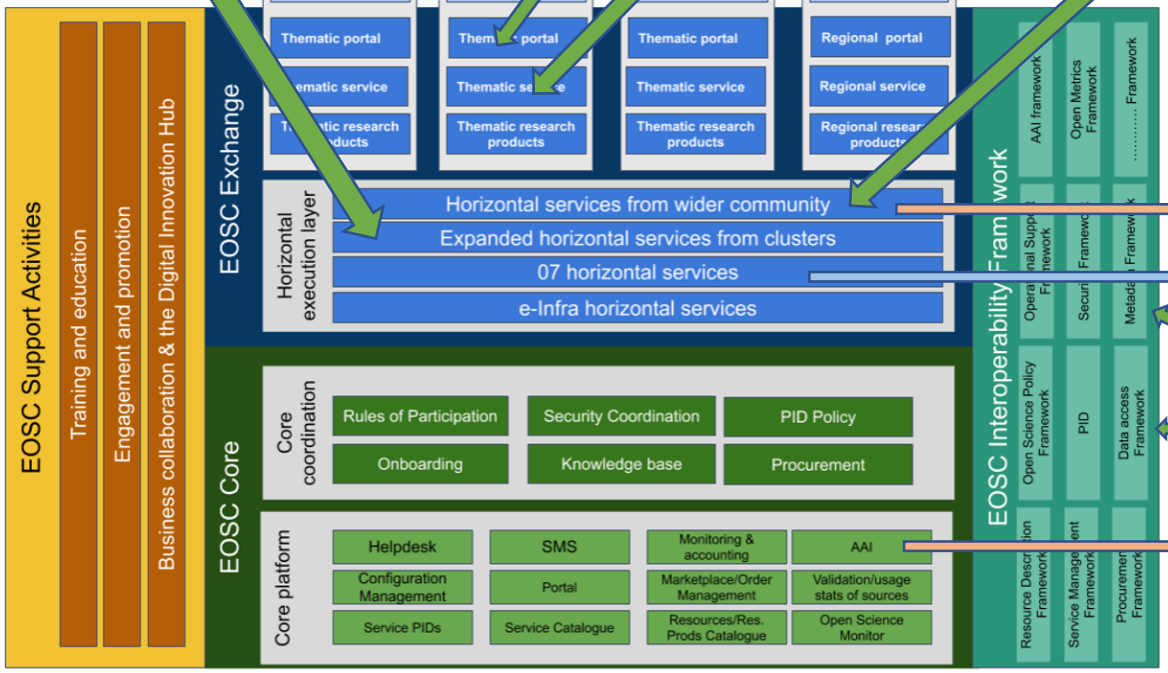
DIOS, OSSR
Data Lake
Software Repository

ESCAPE

ESAP Science Analysis Platform

Virtual Observatory services, ESFRI workflows

Citizen Science



+ Test Science Projects

to enhance the researcher participation in EOSC

Generic services, e.g. notebook service, citizen science frameworks, …

Funded compute & storage resources

IVOA and other existing standards

AAI integration with DIOS

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ESCAPE brings together Astronomy, Astrophysics, Astro-Particle, High Energy and Nuclear Physics communities

Summary

Broader synergies within a large scientific community and for innovation/society

Broader synergies with the other Science Clusters , e-infrastructures for EOSC

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