

SLICES-RI Interoperability Framework

In compliance with EOSC-IF

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Outline

- SLICES-RI and related SLICES-DS and SLICES-PP projects
- European Open Science Status Overview
- EOSC Interoperability Framework
 - Components and technical view
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Deliverable D4.2 SLICES infrastructure and services integration with EOSC and Open Science – *SLICES Interoperability Framework*

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 - 3.2. EOSC INTEROPERABILITY RECOMMENDATIONS
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7. CONCLUSION

	HORIZON 2020 H2020 - INFRADEV-2019-3	
	D4.2	SLICES infrastructure and services integration with EOSC and Open Science (initial proposal)
Acronym	SLICES-DS	
Project Title	Scientific Large-scale Infrastructure for Computing/Communication Experimental Studies – Design Study	
Grand Agreement	951850	
Project Duration	24 Months (01/09/2020 – 31/08/2022)	
Due Date	31 August 2021 (M12)	
Submission Date	6 September 2021 (M13)	
Authors	Kishor Joshi (UvA), Yuri Demchenko (UvA), Panayiotis Andreou (UCLAN), Stavroula Maglavra (UTH), Christian Perez (INRIA), Carmen Guerrero (U3CM), Peter Van Daele (IMEC), Cédric Crettaz (MI), Émilie Mespoulhes (SU)	
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SLICES Interoperability Framework – Goals

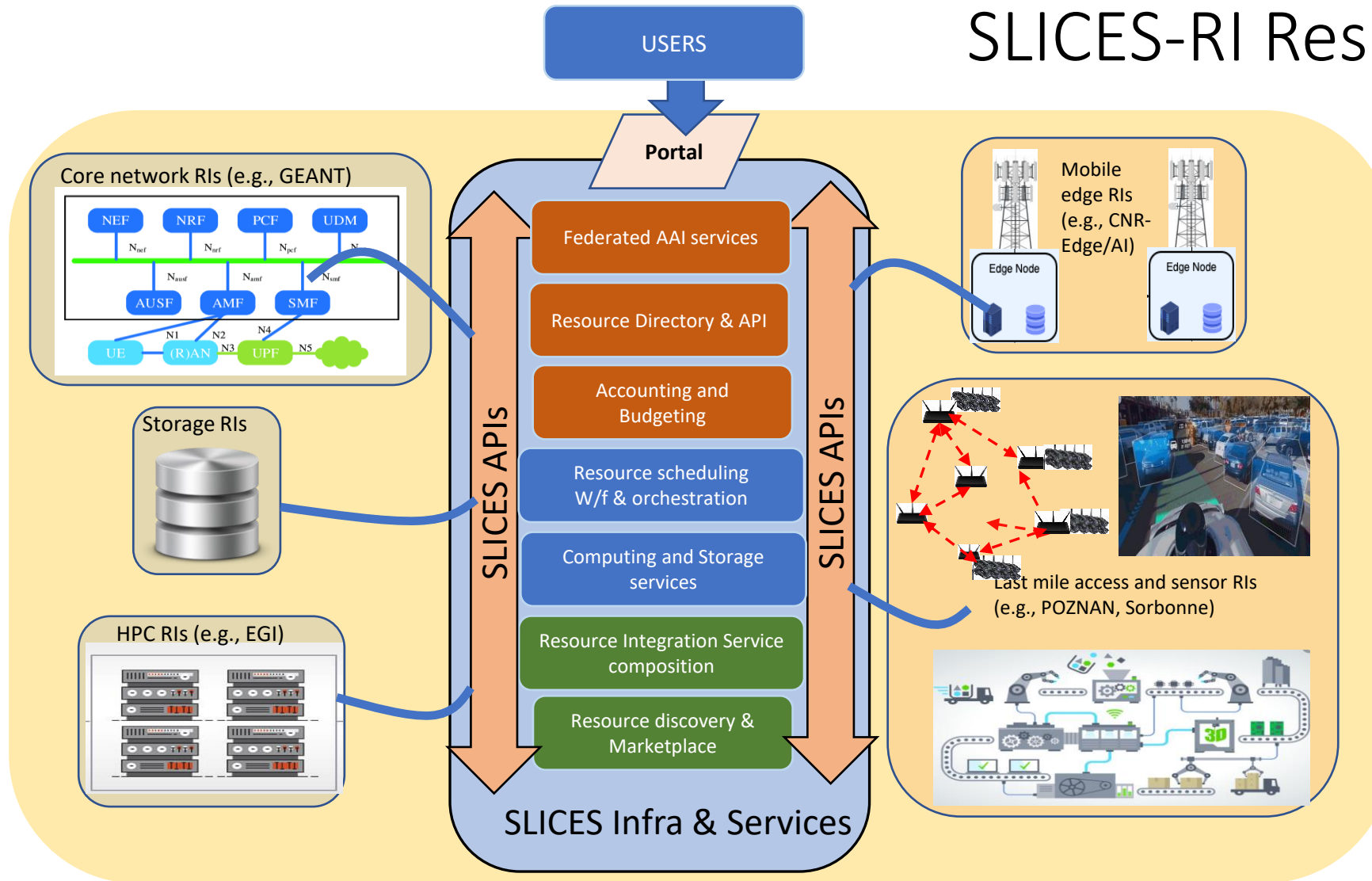
- *Requirements to SLICES interoperability and connection with EOSC*
- *What infrastructure services from EOSC can be re-used?*
- *How to access EOSC data resource and how to publish SLICES data to EOSC?*
- *What and how SLICES can contribute to EOSC?*

Why interoperate and connect with EOSC

- *EOSC initiatives are accepted by ESFRI and EC*
- *Mandatory in Horizon Europe proposals: DMP, FAIR, Open Science, PID/Zenodo, **ORE (new)** as well as liaison with EOSC*
- *EOSC is a model Federated Scientific Data Infrastructure and community*

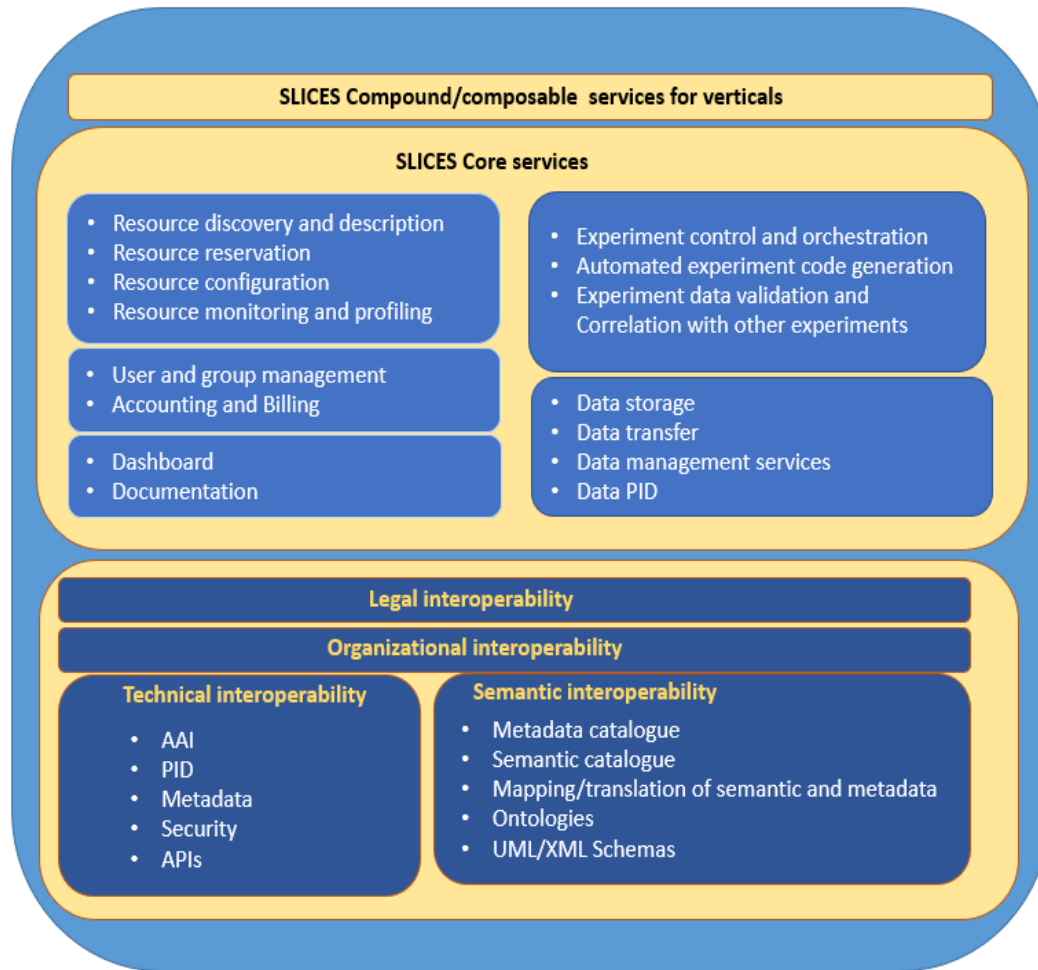


SLICES-RI Research Landscape



- Extensive digital technologies
- Supporting network and compute infrastructure
- Multiple testbeds and experimental facilities

Conceptual view of the SLICES Interoperability Architecture



- Provides vision and roadmap to achieving interoperability with EOSC
- Some services can be used from EOSC, some services will require API with EOSC services of metadata mapping

EOSC Status: Minimum Viable EOSC and EOSC Core

- Architecture defining (infrastructure) components
 - Metadata Framework (FAIR data enabling services)
 - PID framework/Infrastructure and service
 - Federated Authentication, Authorisation Interoperability (AAI) Framework
 - Data Access framework
 - Service Management and Access framework
 - Open Metrics Framework
- Policy and Governance
 - Shared Open Science policy framework
 - A minimum legal metadata framework as part of the FAIR compliance framework
 - An open metrics framework
- Portal providing web access to the EOSC services
- EOSC is an important stage in the European RI integration

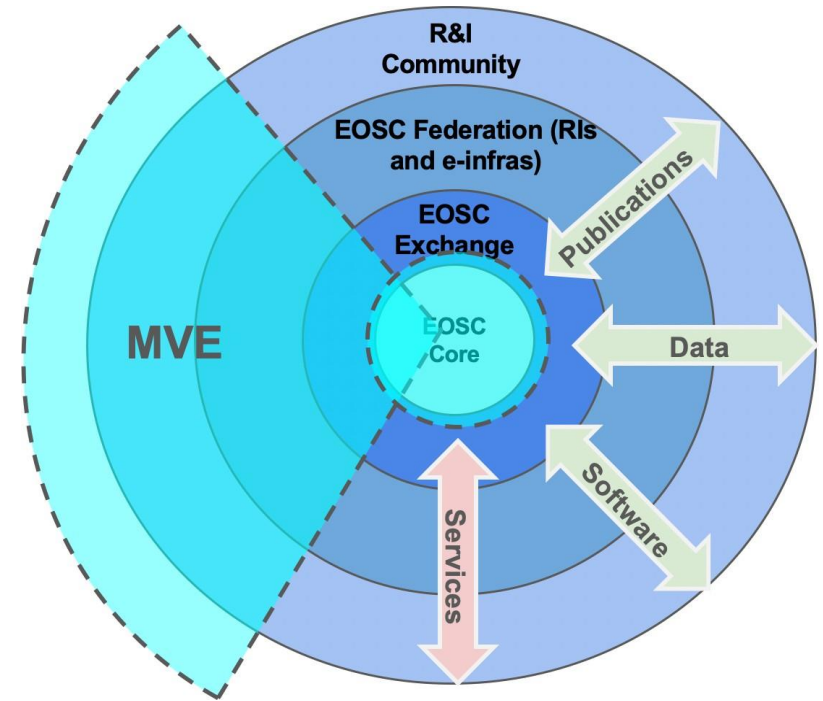
Demand from User community:

Modern RI platform using recent development by industry (for future technology exchange)

EOSC challenges: to incorporate recent technology development into ERA

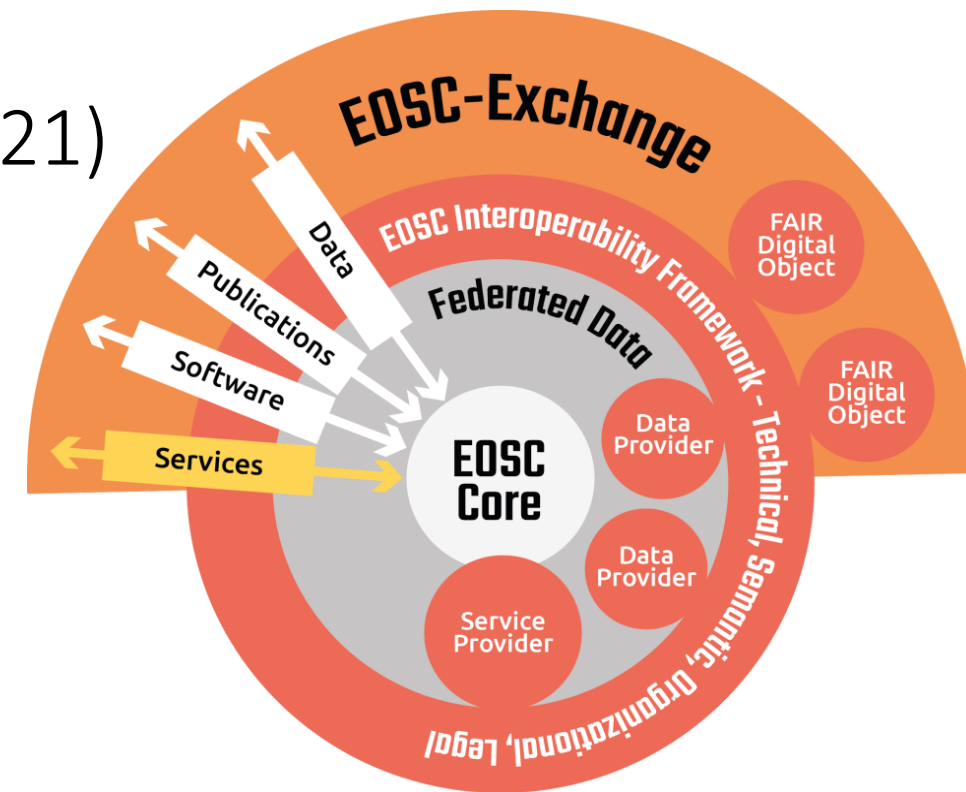
EOSC Conceptual Architecture

- EOSC-Core
 - Minimum architecture elements to enable the Federation
- EOSC-Exchange
 - Evolving Federation to serve the needs of research communities
 - Widening to the general public and the private sector
- EOSC Federation (RIs and e-Infra)
- Research and Innovation Community
- Minimal Viable EOSC (aka MVE)
 - Minimum Federation to bring value to users



EOSC Interoperability Framework (Feb 5, 2021)

- Authentication and Authorization Interoperability (AAI) framework
- PID Framework
- Metadata framework
 - Resource and Provider Metadata profiles
- Data access framework
- Service management and access framework
- Open metrics framework
- Security framework
- Support framework



- Defines 4 layers
 - Technical
 - Semantic
 - Organisational
 - Legal

<https://op.europa.eu/en/publication-detail/-/publication/d787ea54-6a87-11eb-aeb5-01aa75ed71a1/language-en/format-PDF/source-194348068>

EOSC Interoperability Framework Feb 5, 2021

Layer	Recommendation
Technical (services but not yet infra)	<ul style="list-style-type: none">• Open Specifications for EOSC Services.• A common security and privacy framework (including Authorisation and Authentication Infrastructure).• Easy-to-understand Service-Level Agreements for all EOSC resource providers.• Easy access to data sources available in different formats.• Coarse-grained and fine-grained dataset (and other research object) search tools.• A clear EOSC PID policy.
Semantic (Metadata)	<ul style="list-style-type: none">• Clear and precise, publicly-available definitions for all concepts, metadata and data schemas.• Semantic artefacts preferably with open licenses.• Associated documentation for semantic artefacts.• Repositories of semantic artefacts, rules with a clear governance framework.• A minimum metadata model (and crosswalks) to ease discovery over existing federated research data and metadata.• Extensibility options to allow for disciplinary metadata.• Clear protocols and building blocks for the federation/harvesting of semantic artefacts catalogues.

EOSC Interoperability Framework Feb 5, 2021

Layer	Recommendation
Organisational	<ul style="list-style-type: none">• Interoperability-focused rules of participation recommendations.• Usage recommendations of standardised data formats and/or vocabularies, and with their corresponding metadata.• A clear management of permanent organisation names and functions.
Legal	<ul style="list-style-type: none">• Standardised human and machine-readable licenses, with a centralised source of knowledge and support on copyright and licenses.• Permissive licenses for metadata (and preferably for data, whenever possible). And CC0 preferred over CC BY 4.0.• Identification of different parts of a dataset with different licenses.• Clearly marked instances of expired or non-existent copyright, as well as for orphan data.• EOSC-recommended licenses and their compatibility with Member States' recommended licenses.• Tracking of license evolution over time for datasets.• Harmonised policy and guidance to dealing with cases where patent filing or trade secrets may be compromised by disclosure.• GDPR-compliance for personal data.• Additional restrictions on access and use of data only applied in cases of applicable legislation or legitimate reasons.• Harmonised terms of use across repositories• Alignment between Member States national legislations and EOSC.

SLICES – EOSC Interoperability and Integration

- Solution in automated provisioning of infrastructure services and instantiated virtual user environment provisioned on demand
- Leveraging platform architecture model
 - Well developed by TeleManagement Forum DPRA (Digital Platform Reference Architecture)
 - Widely implemented by industry: Cloud providers, Platform providers

Leveraging Platform Concept for RI for Interoperability

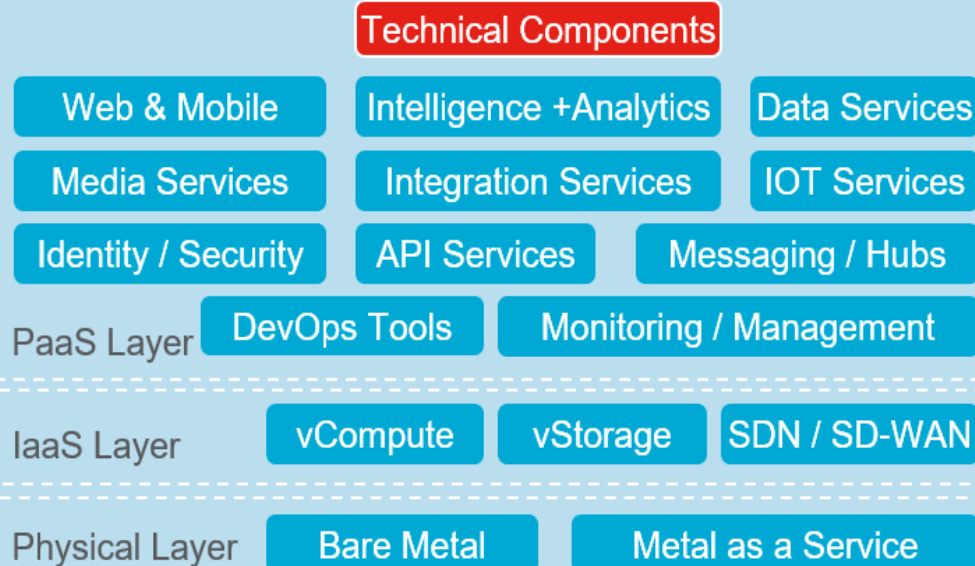
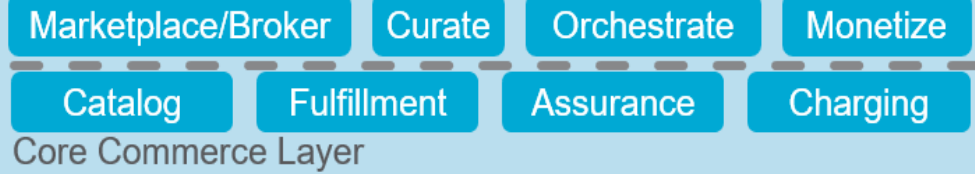
- There is a need for defining and building new type of infrastructure for EOSC projects
 - *Current EOSC pilot projects successfully demonstrated inter-/multi-domain data integration/federation*
 - However, each pilot project built own underlying infrastructure
- Future EOSC/RI infrastructure should provide functionality
 - (1) **automate deploying specialized RIs** with focus on scientific data integration
 - (2) create a repository of infrastructure/services **design patterns** and common templates
 - (3) facilitate cooperative/business relations between partners
 - (4) apply **governance and compliance policies by-design**
- Learn from and leverage best industry practice and infrastructure development trends
 - Hyperconverged Infrastructure and 5G e2e network slicing
 - Telecom industry developed platform and cloud native models
 - DevOps and SRE (Site Reliability Engineering) and extensions to DataOps/MLOps

Adopting TMForum DPRA

- TMForum DPRA (Digital Platform Reference Architecture) defines a telecom services provider platform that allows delivering a fully functional service platform/infrastructure for customers
 - IG1157 Digital Platform Reference Architecture Concepts and Principles v5.0.1, 21 July 2020 [online] <https://www.tmforum.org/resources/reference/ig1157-digital-platform-reference-architecture-concepts-and-principles-v5-0-0/>
 - Actualisation Platform is defined as the main DPRA component that enables creating customer/tenant service ecosystem
 - Implements platform economy concept
- Part of the TMForum Open Digital Architecture (ODA)
 - IG1167 TM Forum Exploratory Report ODA Functional Architecture, 31 Jan 2020 [online] <https://www.tmforum.org/resources/exploratory-report/ig1167-oda-functional-architecture-v5-0/>

TMForum: Actualisation Platform View

Actualization Platform View



Tenant Components

Core Commerce Components

Hyper-Scale
Datacenters (Cloud)

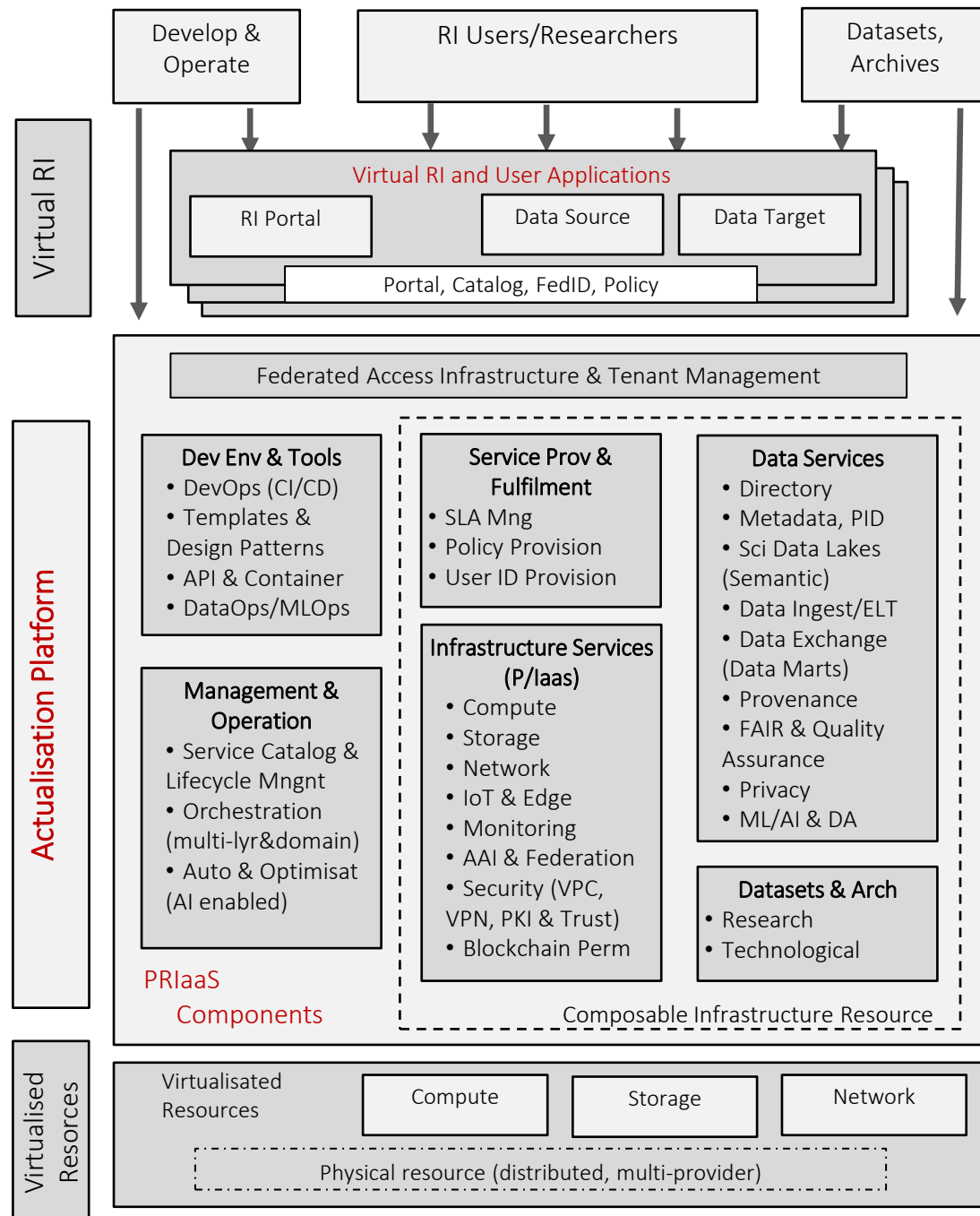
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Access Network
(Cloud)

The Actualisation Platform components:

- Common infrastructure and platform services
- Data and digital content services
- Catalog Lifecycle Management & Federation Platform
- Integration, orchestration, and DevOps
- Security and Identity Management
- Core commerce services including **Fulfillment Platform** Component and customer facing services

PRlaaS Architecture Model (in progress)



Actualisation Platform Components

- Core Infrastructure Services (IaaS & PaaS)
- Data Services
- Management and Operation, SRE
- Development Environment and Tools
 - DevOps
 - Templates and Patterns
- Service Provisioning and Fulfilment
- Datasets and Archives
- Federated Access Infrastructure + IoT Edge and Tenants Management
- Virtual RIs and Portal

Discussion

- Involving professional ICT and infrastructure professionals in the EOSC architecture and infrastructure development
 - Combining bottom up and expert/top down approach based on industry best practices
 - Avoid isolation from the industry developments and trends
- Introduce Virtualised User Environment architecture layer for instantiation of the allocated/committed resources
- SLICES development to support for federated reproducible experimentation on the whole scope of digital infrastructure technologies

