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D6.2a

Workflows developed from the Moderation Process to Onboard External Providers

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D6.2a / Workflows developed from the Moderation Process to Onboard External Providers

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Abstract

Deliverable 6.2a – version 2: "Workflows developed from the Moderation Process to Onboard External Providers" at M18 – September 2022 – is composed of a demonstrator video and the present report. It details the proposed workflows for the integration of Research Services with EOSC-Core Services. These workflows are being validated through the implementation of the Service Integration Roadmap, a robust mechanism for managing the Service Integration process. The status of Service Integration at M18 is provided. The demonstrator video outlines how external providers can integrate EOSC-Core Services with their own service offer, taking the specific example of the EOSC Authentication and Authorization Infrastructure (AAI) integrated with the SSH Open Marketplace, a discovery portal for Social Sciences and Humanities researchers.

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Table of Contents

Table of Figures

Table of Tables

Glossary

EOSC Future project Glossary is incorporated by reference: https://wiki.eoscfuture.eu/x/JQCK.
In addition to the project Glossary, the following terms are used:

Acronym	Definition
AAI	Authentication and Authorization Infrastructure. A service (or distributed set of services) which enables users to be identified and to access protected information, other services, or functionality.
Community AAI	The purpose of the Community AAI is to streamline researchers' access to services, both those provided by their own infrastructure (if they have one) as well as the services provided by infrastructures that are shared with other communities.
Composability	Resource composability means the combined or integrated usage of two or more resources to provide researchers with added value or innovative solutions facilitating and enabling research use cases and fostering collaboration between diverse research communities.
EOSC-Core Service	A service, provided in the context of European Open Science Cloud (EOSC), that provides core EOSC functionality or stimulates interoperability between services offered within the EOSC ecosystem.
Infrastructure Proxy	The Infrastructure Proxy, enables Infrastructures with a large number of resources, to provide them through a single integration point, where the Infrastructure can maintain centrally all the relevant policies and business logic for making available these resources to multiple communities.
Research Service	A service, provided by a research service provider, such as Research Infrastructures, Science Clusters, or other external research service providers, to facilitate data-driven research in any scientific discipline.
Science Clusters	The European Strategy Forum on Research Infrastructures (ESFRI) was established to shape collaboration in five thematic areas to pave the way for Open Access data for the EOSC. • EOSC-Life - https://www.eosc-life.eu/ • ENVRI-FAIR - https://envri.eu/home-envri-fair/ • ESCAPE - https://projectescape.eu/ • SSHOC - https://www.sshopencloud.eu/ • PaNOSC - https://www.panosc.eu/ https://eosc-portal.eu/esfri-thematic-cluster-projects
Science Projects	To showcase the impact joint open data research projects can have and how the EOSC can support them, ten Science Projects are developed within EOSC Future. These projects will demonstrate and drive the integration of research data and services across scientific domains. They will show the role the European Open Science Cloud can play in each stage of the research process. At the same time, these projects will allow us to finetune the EOSC by closely monitoring researchers' real-life data needs and requirements for cross-domain and composability features. https://eoscfuture.eu/data-in-action/
SSH	Social Sciences and Humanities

1 Executive Summary

Deliverable 6.2a – version 2 "Workflows developed from the Moderation Process to Onboard External Providers" (M18, September 2022) is composed of the present report and of a demonstrator video. The report outlines how external providers, such as research service providers from ESFRI Research Infrastructures or Science Clusters, can integrate EOSC-Core Services with their own service offer. It takes the specific example of the EOSC Authentication and Authorization Infrastructure (AAI) integrated with the SSH Open Marketplace[1], a discovery portal for Social Sciences and Humanities researchers. The different steps of this integration workflow are described and documented.

The report includes a first iteration of the workflows envisioned to support any type of integration with the EOSC-Core Services, and to ensure the transition from a use cases logic to a more comprehensive service integration process. The aim of these workflows is to ensure that research service providers will be able to find their way and the appropriate support to plug their service offering into the EOSC system. This includes a first iteration of the different possible levels of integration per EOSC-Core Service.

Finally, the deliverable outlines the next steps, including the development of a "Service Integration Roadmap" for monitoring service integration targets in three phases. The first version of this report reported the status of the service integration work at M11 (February 2022). The second version of this report (M18, September 2022) additionally includes the first iteration of the "Service Integration Matrix", which details the current status of the service integration activities. The crucial role of an effective communication in the next phase of service integration is emphasised, along with the true validation of research services integration in EOSC being their take-up and use by the research community. A final version of these workflows will be provided in D6.2b (due at M30). The service integration requirements stem from these cross-domain Science Projects.

[1] https://marketplace.sshopencloud.eu

2 Introduction

The integration of research services with EOSC-Core Services is one of the essential building blocks for enabling interdisciplinary data-driven research through the EOSC. To facilitate the service integration process, a set of workflows, as well as a monitoring framework needs to be developed. This work is being undertaken within task 6.2 "Integration of EOSC-Core Services into European Research Practice" of the EOSC Future project. The first version of this report reported the status of the service integration work at M11 (February 2022). The second version of this report (M18, September 2022) additionally includes the first iteration of the "Service Integration Matrix", which details the current status of the service integration activities. This deliverable builds further on previous work on service integration undertaken in the context of the EOSC-hub project where an Integration handbook for service providers was developed [17].

Chapter 3 of the report outlines the process being undertaken to develop a set of Service Integration workflows, to interconnect the EOSC-Core Services with Research Services provided by the Science Clusters, to meet the needs of EOSC Future's Interdisciplinary/cross-domain Science Projects. Firstly, the foundations of Service Integration, including the different types of possible integrations, are described. Following which, further details are provided about both the Research Services to be integrated, as well as the EOSC-Core Services that are available for integration. This includes a first iteration of the different possible levels of integration per EOSC-Core Service. In the last section of this chapter the framework to monitor this process, the "Service Integration Roadmap" is introduced, including the scheduling of three phases (Phase 1, M12-M18; Phase 2, M19-M24 and Phase 3, M25-M30), to help ensure the achievement of the Key Performance Indicators (KPIs) of 10 services integrations by M18 (September 2022), 20 by M24 (March 2023) and 30 by M30 (September 2023). By September 2022, the Task 6.2 team identified over of **50 Research Services** (from the Science Clusters and their related Research Infrastructures and the Science Projects) with "Integration potential" with EOSC-Core Services. A first iteration of the **Service Integration Matrix**[2], providing the details of this service integrations has been provided.

In chapter 4, a use case demonstrates what is meant by EOSC-Core integration based on a service provided by the Social Sciences and Humanities Open Cluster. The demonstrator showcases the integration of the EOSC-Core Service Authentication and Authorization Infrastructure (AAI) with the SSH Open Marketplace, a discovery portal for SSH resources. The two main audiences of the demonstrator are:

research service providers by providing real-life workflow examples of EOSC integration and

policy makers by demonstrating the added-value and usefulness of integration between e-Infrastructures providing the EOSC-Core Services & ESFRIs providing research services.

A second and final version of the present demonstrator is planned in September 2023 - at Month 30 - and will include an integration workflow for all available EOSC-Core Services of interest for research service providers.

[2] https://docs.google.com/spreadsheets/d/1V1VVpPpTSsBwgYh2FNQ63ChlafeyAWTboGrIgVRr7fU/edit#gid=0

3 Towards a set of Service Integration Workflows

Enabling **interdisciplinary data-driven research** is one of the founding principles of EOSC. The integration of research services with EOSC-Core Services is one of the essential building blocks in this process. The objective of task 6.2 "Integration of EOSC-Core Services into European Research Practice" is to monitor the integration of EOSC-Core Services with external services. In the context of EOSC Future, external services are research services provided by, for example, by ESFRI Research Infrastructures or Science Clusters. Within EOSC Future, 10 interdisciplinary Science Projects have been selected [11], which attempt to provide the evidence needed in order to address complex scientific questions on pressing societal issues such as the climate crisis and Covid-19. The service integration requirements stem from these cross-domain Science Projects. However, it is important to note that the ultimate validation of service integration in EOSC is their take-up and use by the research community.

The role of the task 6.2 team, led by DARIAH, is to act as a matchmaker or broker between e-Infrastructures providing EOSC-Core Services and Research Infrastructures and Science Clusters providing research services, which directly meet the needs identified by the Science Projects. To facilitate the service integration process, a set of workflows is being developed. By the end of the project, it is anticipated that a portfolio of workflows will have been developed. For example, it is expected that there will be at least one service integration workflow per EOSC-Core Service. A "Service Integration Roadmap" will monitor the overall process. From a technical perspective, this "Service Integration Roadmap" will be supported by a specific JIRA instance [10], for tracking and resolving issues as part of the technical integration process.

3.1 What is Service Integration?

A first important step in the process is to understand what "service integration" means in practice. EOSC is a complex system of systems serving a diverse, heterogenous, and multi-disciplinary research community. As a result, research service integration with EOSC-Core Services is also a socio-technological activity, which needs to take into account the broad range of research service providers throughout the European research infrastructure landscape including their varied needs and individual priorities.

Service integration can happen at several levels within the EOSC ecosystem. To capture the diversity of possible interactions between the different EOSC layers, distinctions between different sorts of integration and composability can be useful. Figure 3.1, from the EOSC Future Grant Agreement, depicts **vertical** and **horizontal integrations** as two core types of service integration.

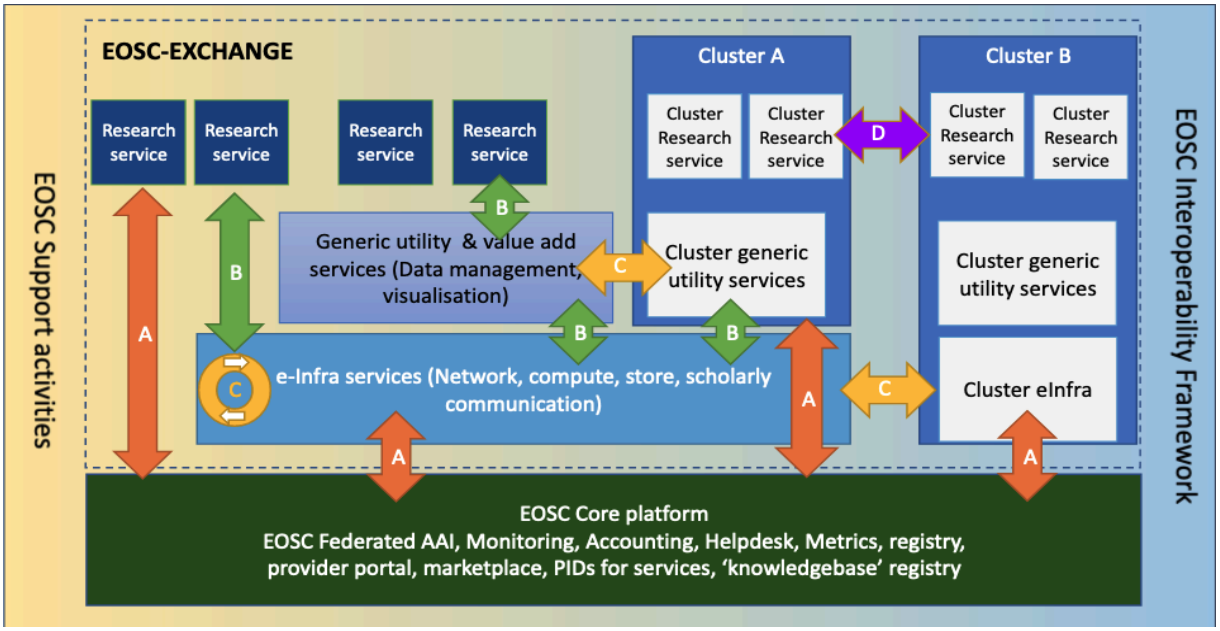


Figure 3.1: Forms of integration and composability

However, it may be useful to explain the two types of integrations in more detail.

Vertical integrations, as shown in Figure 3.1 (by Arrows "A" and "B") are:

- **A:** Make a Science Cluster service resource interoperable with the EOSC-Core in order to benefit from their composition (e.g. a discovery service for SSH resources integrates with EOSC AAI).
- **B:** Compose a Science Cluster service resource with horizontal added value services in the EOSC-Exchange to enrich the cluster service with additional transparent/elastic/on-demand features, an action which would be facilitated by the EOSC-Core Services (e.g. a materials science service from a Science Cluster is integrated with a horizontal cloud computing service from an e-Infrastructure).

Whereas **horizontal integrations,** shown in Figure 3.1 (by Arrows "C" and "D") are:

- **C:** Make horizontal service resources from e-Infrastructures and clusters interoperable, an action which would also bring added value to the EOSC Interoperability Framework as the framework to-be-used should surely be proposed to and "branded by" EOSC (e.g. a horizontal data management service from an e-Infrastructure is integrated with data management functions and data from a cluster, or integration between e-Infrastructure services from different organisations).
- **D:** Compose scientific service resources to create added value solutions to handle complex scientific problems (e.g. an epidemiological simulation service from one Science Cluster is composed with a rich data set on logistics and international trade from another Science Cluster to help track the spread of a global pandemic).

Within Task 6.2, the initial priority, especially during the first phase (M12-M18) of the "Service Integration Roadmap" (see: Section 3.4) is on "**Type A**" integrations. However, "**Type B**" integrations are also being considered and prioritised for integration support as part of EOSC Future activities as long as they meet cross-cluster needs. For example, several of the Science Clusters have already expressed interest in using JupyterLab and Binder services offered by EOSC as horizontal services. Others come with their own solutions (e.g. Tesseract, developed by LifeWatch ERIC.) Furthermore, Task 6.2 may also need to consider "Type C" and "Type D" horizon integrations, at a later stage in the project. The Task 6.2 team will monitor the horizontal service developments within the EOSC Future consortium and adapt the "Service Integration Roadmap" if needed.

Previous work on service integration has been undertaken within the former EOSC-hub project where an Integration handbook for service providers was developed [17]. As well as providing procedures for onboarding of new EOSC service providers and their related services, this handbook provided guidelines as to how these service providers could integrate their services with the EOSC-hub services. These EOSC-hub services were a set of services that help service providers enhance their services from an operational perspective. These "federation services" included: a) federated user authentication, b) availability and reliability monitoring, usage accounting and a helpdesk. The EOSC-hub "federation services" are the basis of the EOSC-Core Services, which are being further enhanced and extended within the EOSC Future project. These EOSC-Core Services are the initial building blocks for service integration in the context of EOSC Future.

Additionally, the EOSC Interoperability Framework [1] and related EOSC-Core Interoperability Guidelines [4] are crucial tools in the service integration process. A first version of the framework and related guidelines is available as part of the "EOSC Architecture and Interoperability Framework", which has been prepared in the framework of WP3. These Interoperability Framework and Guidelines will be validated by the T6.2 team in liaison with the Research Service Providers, as well as being up for broader consultation in Spring 2022. Furthermore, they are complemented with the EOSC-Core Service Factsheets, developed in the framework of EOSC Future Task 6.2, which provide high-level introductions to the EOSC-Services and potential integration options (see Section 3.2 for further details).

3.2 EOSC-Core Services

As outlined in the EOSC Architecture and Interoperability Framework[1], the EOSC-Core is the set of enabling services required to operate the EOSC. EOSC-Core Services provide core EOSC functionality or stimulate interoperability between services offered within the EOSC ecosystem. Within EOSC Future, the EOSC-Core

Services are being developed in the context of T7.4 Core delivery, where a list of the EOSC-Core Services is available and maintained[2]. This list provides an overview of the components, contacts and status of the services envisioned to fulfil the functions described in the "Inventory of Core Functions and Inclusion Criteria" deliverable 5.2 [3].

To better understand the EOSC-Core Services, a mapping exercise led by the Task 6.2 team, was undertaken to gather "key facts" about each of the EOSC-Core Services. As some of the EOSC-Core Services are still in development, this is an ongoing process. It is important to note that EOSC-Core Services are often made up of several service components. For example, the EOSC Authentication and Authorisation Infrastructure (AAI) is made up of service components such as the "EOSC-Core Infrastructure Proxy" and the "EOSC AAI Federation". Task 7.4 monitors the delivery of the Core Services.

Building further on the Integration handbook for service providers developed within the former EOSC-hub project [17], for each EOSC-Core Service a "Factsheet" is being developed to help research service providers understand:

1. the core service,
2. the potential benefits for the research community as well as
3. the prerequisites for integration and technical details regarding the integration and
4. details of where to get assistance during the integration process.

Step-by-step other EOSC-Core Services[2] will become available which will be of interest for research service providers. Almost all of them will represent an opportunity to ease providers' work, reduce duplication of effort and contribute to building the EOSC as a system of systems. For researchers and other EOSC users, these integrations will also simplify secure access to a range of EOSC services. An overview of the EOSC-Core Services currently available for integration is provided in Figure 3.2 below.

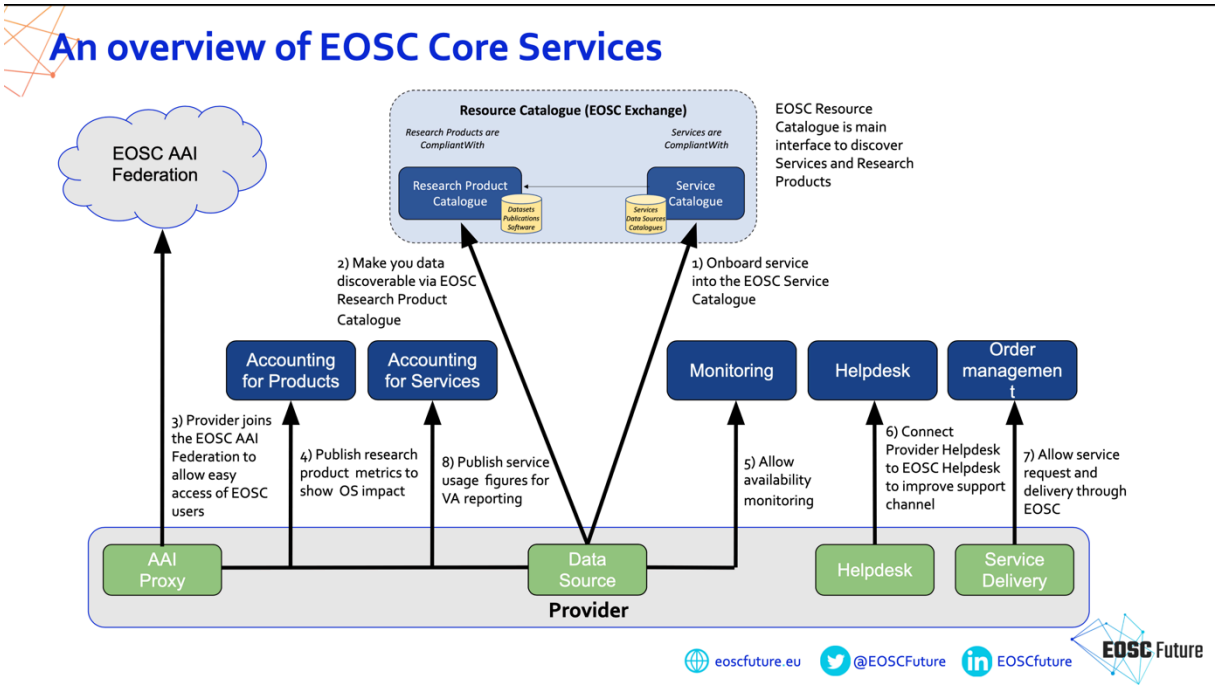


Figure 3.2: An overview of EOSC-Core *Services*

Table 3-1 below presents an overview of the current list of EOSC-Core Services that are being prepared for integration for research services, their status in terms of technical development, as well as a link to the related EOSC-Core Service Factsheet. Additionally, the Task 7.4 team have integrated the publication of the EOSC-Core Service Factsheets into their process as a prerequisite for moving into production for the EOSC-Core Service in question. On the EOSC Future public wiki, a "EOSC-Core Service Integration" page [18] has been published providing an overview of all the available EOSC-Core Service Factsheets.

Table 3.1: EOSC-Core *Services List*

Service name	Status	Core Service Factsheet
EOSC AAI	The EOSC AAI consists of a number of core components, such as the EOSC-Core Infrastructure Proxy (in production) and the EOSC AAI Federation (in pre-production). The EOSC AAI as a whole is in the process of moving from pre- to in production.	Two core documents for the EOSC AAI are: EOSC Authentication and Authorisation Infrastructure (AAI): report[3] and Authentication and Authorisation for Research and Collaboration (AARC) Blueprint Architecture (BPA)[4]
EOSC Order Management	back-office in production	Factsheet: https://wiki.eoscfuture.eu/display/PUBLIC/EOSC+Order+Management+-+integration+factsheet
EOSC Helpdesk	pre-production	Factsheet: https://wiki.eoscfuture.eu/display/PUBLIC/EOSC+Helpdesk+-+integration+factsheet
EOSC Monitoring	production	Factsheet: https://wiki.eoscfuture.eu/display/PUBLIC/EOSC+Monitoring+-+integration+factsheet
EOSC Accounting	Accounting for Services (in production) and Accounting for Research Products (in pre-production).	Research products accounting architecture and interoperability guidelines available: https://wiki.eoscfuture.eu/display/PUBLIC/Resource+Products+Accounting+Architecture+and+Interoperability+Guidelines

As outlined in the factsheets, EOSC-Core Services may offer a number of "Integration Options" or "Integration Use Cases". These integration options or use cases are very useful to give research service providers a general idea of the different levels of integration available. For example, one of the EOSC-Core Services, the EOSC Helpdesk [19], offers three integration paths:

- **Full integration**: this path corresponds to the integration of community helpdesks, which implies full synchronisation between EOSC Helpdesk and community helpdesk. This integration can be achieved by application of a set of helpdesk REST APIs. The exact integration guidelines are defined based on the specifications agreed with the community.
- **Ticket redirection**: in this integration the EOSC helpdesk is used only as a contact point to redirect the initial request to the provider's or community helpdesk or mailing list without further integration.
- **Direct usage**: in this integration the EOSC helpdesk can be used as the ticketing system for the community and their onboarded services.

Table 3.2 below presents an overview of the different integration options per EOSC-Core Service. The different options represent a level of gradual integration, from the easiest to the most sophisticated integration possible. Typically, the different options can answer to a question of granularity of the provider needs - does the research provider want to integrate a single service or a whole infrastructure for example - and are the different options are also set up to accommodate existing technical frameworks in use within research infrastructures. For example, if a research provider already uses its own Helpdesk or Monitoring solution, it is possible to exchange data between the different systems.

[3] https://op.europa.eu/en/publication-detail/-/publication/d1bc3702-61e5-11eb-aeb5-01aa75ed71a1/language-en
[4] https://doi.org/10.5281/zenodo.3672785

Table 3.2: Overview of the EOSC-Core integration options

	Integration option 1	Integration option 2	Integration option 3
EOSC AAI	National academic Federations (e.g. Belnet AAI federation)	Infrastructure Proxies operated by Research Infrastructures. (e.g. DARIAH AAI)	Infrastructure Proxies operated by e-Infrastructures.
EOSC Monitoring	Monitor an Onboarded Service (Centrally)	Monitor an Infrastructure (Community)	Integrate External Monitoring service (both directions possible, so Third-party services exploiting EOSC Monitoring data also possible)
EOSC Accounting	Accounting for services: aggregate, exchange and visualise Virtual Access (VA) metrics regarding the use and impact of services	Accounting for research products: is automatically provided for resources/products onboarded in the catalogue and helps measure their impact.	
EOSC Order Management	Service Order Management Backoffice (SOMBO)	Order Management process adapters for existing Order Management Systems / reference JIRA adapter	Marketplace API for Order Management Systems
EOSC Helpdesk	Direct usage (as-a-service)	Ticket redirection	Full integration

3.3 Research Services

Research services are offered by a research service provider, such as Research Infrastructures, Science Clusters or other external research service providers, to facilitate data-driven research in any scientific discipline. With EOSC Future, to identify the service integration requirements from the scientific communities, liaison with research service providers takes place at four levels:

1. via the **10 Science Projects** in Task 6.3;
2. via the **5 Science Clusters** (e.g. ENVRI-FAIR for the Environmental Sciences; EOSC-Life for the Life Sciences, ESCAPE for Astronomy and Particle Physics domain, PaNOSC for the materials, health, energy and physics domains and SSHOC for the Social Sciences and Humanities) and their constituent **ESFRI Research Infrastructures** involved in the EOSC Future project [5];
3. via the **research services** onboarded directly in the EOSC catalogue (supported by Task 6.1) and
4. via the **EOSC Early Adopter Programme** (to be launched in Spring 2022), which is, for example intended to increase the adoption of EOSC by providing expertise and resources to researchers; gain insight into user needs and possible EOSC use cases; foster a culture of co-operation between researchers and EOSC providers and integrate new services and resources in EOSC to enrich its functionality.

Research service integration includes identifying and contacting a range of different colleagues working at a number of levels within the research service providers ecosystem, for example, both Senior Managers of European research Infrastructures, technical experts and research coordinators responsible for liaison with the relevant research communities. It is essential that communication is streamlined to support an effective integration process.

As well as direct contact with the representatives of the Science Clusters and from the EOSC-Core Services team, the Task 6.2 team is liaising closely with core working groups and task forces that have been established within EOSC Future to facilitate these effective communications including:

1. Cross-Work Package Working Group: Technical Alignment with the Science Projects[6],
2. EOSC Onboarding Strategy Group and the
3. Technical Coordination Board [7].

Additionally, there are working groups related to specific core services, such as the EOSC Future AAI Implementation Cross-Work Package Working Group[8], to which the Task 6.2 team also contributes.

It is also important to note that integration needs expressed by the scientific communities engaged in EOSC cover not only services but also other types of research products (this term covers for example software, publications or datasets) and "training materials". At the time of writing, onboarding of services is a clear process and integration needs for the service catalogue are covered by the onboarding process. More clarity is needed for the research products and the training catalogues integration options offered to resource providers, although several use cases are already shared as part of the Interoperability Guidelines [20].

3.4 Service Integration Roadmap

The integration of research services with EOSC-Core Services requires a substantial amount of preparatory work to:

1. understand the complex landscape of research service providers and their needs regarding EOSC-Core Services integration and
2. understand the EOSC-Core Service offer and the integration requirements of each EOSC-Core Service from a policy/governance, legal, technical and research-centred perspective.

A first step in this process was to reach out to each of 10 EOSC Future Science Projects, in close liaison with Task 6.3. An overview of the Science Clusters and their related Science Projects is provided in Table 3.3 below:

Table 3.3: EOSC Future Science Projects

ESCAPE	Understanding of Dark Matter Understanding of Extreme Universe and Gravitational waves
SSHOC	Climate Neural and Smart Cities Access Management for distributed Research Infrastructures (ARIA)
EOSC-Life	COVID-19 metadata Findability and Interoperability in EOSC Imaging Data in EOSC - COVID-19 as Demonstrator
PaNOSC	Serial crystallography Time resolved imaging of biological specimen
ENVRI-FAIR	Impact of Climate change on Biodiversity and Ecosystems in Europe Dashboard on the State of the Environment

A series of Science Project Templates (MS19) were developed, which included a description of the research and the potential impact of the science project. Additionally, the infrastructure needs of the Science Projects in relation to EOSC have further been investigated within the EOSC Future Cross-Work Package Working Group: Technical Alignment with the Science Projects [6]. Correspondents from e-Infrastructures are suggested to support Science Projects in their implementation plans and this also entails liaison with tasks 6.1 and 6.2 regarding the onboarding and integration processes/workflows. This initial phase of service integration activity, as reported in the current document (D6.2a), has allowed the Task 6.2 team to undertake this preparatory work, as well as to demonstrate it through a particular use case (the integration of AAI with the SSH Open Marketplace).

Based on the Science Projects templates and on the current EOSC Architecture and Core services delivery, four main types of integration requirements (which are not fully with the integration types described above in Figure 3.1) can be distinguished: *1) EOSC-Core AAI, monitoring, accounting*, 2) *EOSC-Core catalogues and marketplace*, 3) *Horizontal service resources (computing & storage)* and 4) *Cluster scientific service resources*. Considering the service planning (T7.1) and the service delivery of the EOSC Portal & EOSC-Core components (T7.4) the initial phase of service integration conducted by T6.2 focuses on "*Type A: EOSC-Core AAI, monitoring, accounting".* An overview of service integration requirements, building further on "MS18 Science Project integration requirements and plans"[9], is provided in Table 3.4 below.

Table 3.4: Integration requirements of the ten EOSC Future Science Projects, organised by Cluster

Cluster	Science Project	Integration Requirements
ESCAPE	Understanding of Dark Matter & Understanding of Extreme Universe and Gravitational waves	1. EOSC-Core AAI, monitoring, accounting - AAI federation 2. EOSC-Core catalogues and marketplace - Onboarding resources - Software Catalogue 3. Horizontal service resources (computing & storage) - DataLake - Additional resources requirements: storage, Compute, Networking 4. Cluster scientific service resources - Publication of data sets into the DL - Analysis environment - JupyterLab environment with Binder support - VREs
SSHOC	Climate Neutral and Smart Cities	1. EOSC-Core AAI, monitoring, accounting -Access management 2. EOSC-Core catalogues and marketplace -Alignment of structured metadata standards -Multilevel data repository adaptation 3. Horizontal service resources (computing & storage) -Capacity requirements mostly to be determined but relatively low in scale and can be distributed (legal/privacy concerns?) 4. Cluster scientific service resources -Multilevel analysis tool to cater for various types of analysis - JupyterLab environment with Binder support -automatic data harvesting, transformation, merging and processing
SSHOC	Access Management for distributed Research Infrastructures (ARIA)	1. EOSC-Core AAI, monitoring, accounting -AAI 2. EOSC-Core catalogues and marketplace -Generic metadata extension 3. Horizontal service resources (computing & storage) -B2SAFE for form the basis of a generic solution that can be used as a compatible data storage solution for restricted data 4. Cluster scientific service resources -Dataverse platform extension -Domain or cluster specific solution will be extended to be applicable to all interested EOSC service providers.

EOSC-Life	COVID-19 metadata Findability and Interoperability in EOSC	1. EOSC-Core catalogues and marketplace -Framework for a metadata model, characterising the research approach and workflow across research infrastructures and domains. 2. Cluster scientific service resources -Data reuse within and among scientific clusters (Integration type D)
EOSC-Life	Imaging Data in EOSC - COVID-19 as Demonstrator	1. Horizontal service resources (computing & storage) -Need for open access large scale cloud-based storage platforms. -Use of existing resources for HPC and cloud storage
PaNOSC	Serial crystallography & Time resolved imaging of biological specimen	1. EOSC-Core AAI, monitoring, accounting -Umbrella AAI federated with EOSC AAIs -EOSC Helpdesk integration -Monitoring services for storage and compute 2. EOSC-Core catalogues and marketplace -Data search enabled over all connected data repositories based on metadata ontologies and digital identifiers 3. Horizontal service resources (computing & storage) -Access to storage and compute with clearly defined access mechanisms -Long-term data archival beyond the RI data policies 4. Cluster scientific service resources - JupyterLab environment with Binder support
ENVRI-FAIR	Impact of Climate change on Biodiversity and Ecosystems in Europe	1. EOSC-Core AAI, monitoring, accounting -Integrating with the appropriate EOSC-Core technical (layers security, monitoring, AAI) 2. EOSC-Core catalogues and marketplace -Onboarding resources 3. Horizontal service resources (computing & storage) -Computing resources
ENVRI-FAIR	Dashboard on the State of the Environment	1. EOSC-Core AAI, monitoring, accounting -Onboarding in the EOSC portal 2. EOSC-Core catalogues and marketplace -Virtual common platform for ENVRI-FAIR data and services 3. Horizontal service resources (computing & storage) -Computing resources 4. Cluster scientific service resources -Front-end of the ENVRI-Hub

Since M12, the T6.2 team uses a "**Service Integration Roadmap**", developed in close liaison with the Science Clusters and the Science Projects (T6.3) and based on their service integration requirements. These requirements have been further iterated in a series of meetings.

During these meetings, the service integration needs, and integration readiness of the EOSC-Core and Research Services have been reviewed to produce a prioritised list of potential integrations per Research Service. This prioritised list will then be iteratively mapped to each of the **three phases of the "Service Integration Roadmap":**

- **Phase 1 (M12-M18):** Review EOSC-Core Services Factsheets and collected Science Project Templates, organise meetings with Science Clusters, agree and undertake the first lot of 10 integrations
- **Phase 2 (M19-M24):** Review and update D6.2 based on Service Integration Roadmap Phase 1, agree and undertake the second lot of 10 integrations
- **Phase 3 (M25-M30)**: Review and update D6.2 based on Service Integration Roadmap Phase 2, agree and undertake the third lot of 10 integrations

This "Service Integration Roadmap" outlines service integration targets per phase, which is being closely monitored by the Task 6.2 team, in close liaison with both the research service and EOSC-Core Service providers. This supports the achievement of the Key Performance Indicators (KPIs) of 10 services integrations by M18 (September 2022), 20 by M24 (March 2023) and 30 by M30 (September 2023). From a technical perspective, this "Service Integration Roadmap" is also supported by a specific JIRA project [10] as part of the overall EOSC Future Technical Roadmap, which is used for tracking issues and resolving issues as part of the technical integration process.

By the end of Phase 1 of the Service Integration Roadmap (M18, September 2022), the Task 6.2 team had identified over **50 Research Services** (from the Science Clusters and their related Research Infrastructures and the Science Projects) with "Integration potential" with EOSC-Core Services. It is important to note that each of these research services *has the potential to be integrated with **5 EOSC-Core Services***. Additionally, many of these research services have already been "onboarded" to the EOSC Catalogue.
Based on the meetings with the Science Clusters and the Research Service providers, the WP6 team presented an initial prioritisation of the *first 15 Research Services with integration potential* to the Science Clusters and the Science Projects during the EOSC Future Consortium Meeting in Seville (28th-30th September 2022) for feedback and validation. To facilitate the Service Integration process, during the same meeting, each of the EOSC-Core Service providers presented their Core Service specifically for the Research Service providers from the Science Clusters and the Science Projects. This was followed by "**Service Integration Clinics**" where the Research Service providers could ask questions about each Core Service.

The details of the service integrations can be found in the **Service Integration Matrix**[5]. Table 3.5 below, provides an overview of the first fifteen service integrations that have already been kick-started in Phase 1 of the Service Integration Roadmap (M12-M18). All of these Service Integrations have also been added to JIRA.

Additionally, a list of a further 6 Research Services, including one "Service Integration request" which was received via the EOSC Helpdesk (the EOSC Nordic Service Desk), have been prioritised the second phase of the Service Integration Roadmap. These additional service integrations are more complex, e.g. the services have not yet been onboarded to the EOSC Catalogue. Table 3-6 below provides an overview of the second phase of the Service Integration Roadmap.

[5] https://docs.google.com/spreadsheets/d/1V1VVpPpTSsBwgYh2FNQ63ChlafeyAWTboGrIgVRr7fU/edit#gid=0

Table 3.5:Service Integration Matrix - Phase 1

Research Service	EOSC Science Cluster	Research Infrastructure	Resource Organisation	Research Services Onboarded	Core Service AAI Federation	Core Service Accounting for Research Products	Core Service Accounting for Services	Core service monitoring	Core service helpdesk	Core service order management
SSH Open Marketplace	SSHOC	DARIAH ERIC	DARIAH	Yes	Yes	No	Maybe	Yes	Maybe	Maybe
CESSDA Data Catalogue	SSHOC	CESSDA ERIC	CESSDA	Yes	Maybe	Maybe	Maybe	Yes	Yes	Maybe
Data Management Expert Guide (DMEG)	SSHOC	CESSDA ERIC	CESSDA	Yes	Maybe	Maybe	Maybe	Yes	Yes	Maybe
ELSST – European Language Social Science Thesaurus	SSHOC	CESSDA ERIC	CESSDA	Yes	Maybe	Maybe	Maybe	Yes	Yes	Maybe
Virtual Collection Registry	SSHOC	CLARIN ERIC	CLARIN	Yes	Maybe	Maybe	Maybe	Yes	Maybe	Maybe
The European Synchrotron Radiation Facility Data Portal	PaNOSC	ESRF	ESRF	Yes	Yes	Maybe	Maybe	Yes	Maybe	Maybe
PSI Public Data Repository	PaNOSC	EXPANDS	PSI	Yes	Maybe	Maybe	Maybe	Yes	Maybe	Maybe
SeaDataNet Common Data Index (CDI)	ENVRI-FAIR	SeaDataNet	SeaDataNet	Yes	Yes	Maybe	Maybe	Yes	Yes	Maybe
WebODV - Online extraction, analysis and visualization of SeaDataNet and Argo data	ENVRI-FAIR	SeaDataNet	SeaDataNet	Yes	Yes	Maybe	Maybe	Yes	Yes	No
Argo marine floats data discovery/download web	ENVRI-FAIR	EURO-ARGO ERIC	Ifremer	Yes	Maybe	Maybe	Maybe	Maybe	Maybe	Maybe
WorkflowHub: the FAIR computational workflow registry	EOSC-Life	ELIXIR	ELIXIR-UK	Yes	Yes	Maybe	Maybe	Yes	Maybe	Maybe
Identifiers.org	EOSC-Life	ELIXIR	EMBL-EBI	Yes	Maybe	Maybe	Maybe	Yes	Maybe	Maybe
Embassy Cloud	EOSC-Life	ELIXIR	EMBL-EBI	Yes	Maybe	Maybe	Maybe	Yes	Maybe	Maybe
3DBionotes-WS	EOSC-Life	ELIXIR	CNB-CSIC	Yes	Maybe	Maybe	Maybe	Yes	Maybe	Maybe
ARIA (Access to Research Infrastructure Management)	EOSC-Life	INSTRUCT ERIC	Instruct-ERIC	Yes	Maybe	Maybe	Maybe	Yes	Maybe	Maybe

Table 3.6: Service Integration Matrix - Phase 2

Research Service	EOSC Science Cluster	Research Infrastructure	Research Services Onboarded	Core Service AAI Federation	Core Service Accounting for Research Products	Core Service Accounting for Services	Core service monitoring	Core service helpdesk	Core service order management
ESCAPE Open-source Scientific Software and Service Repository	ESCAPE	ESCAPE	No	Maybe	Yes	Maybe	Maybe	Maybe	Maybe
ESCAPE Virtual Observatory	ESCAPE	ESCAPE	No	Maybe	Yes	Maybe	Maybe	Maybe	Maybe
High Energy Physics (HEP) Open Data Portal	ESCAPE	ESCAPE	No	Maybe	Yes	Maybe	Maybe	Maybe	Maybe
ENVRI-Hub catalogue of services	ENVRI-FAIR	ENVRI	No	Maybe	Maybe	Maybe	Maybe	Maybe	Maybe
EOSC Nordic Service Gateway	EOSC-Nordic	EOSC-Nordic	No	Yes	Maybe	Maybe	Yes	Yes	Maybe
LUMI ETAIS / Regular Access	EOSC-Nordic	EOSC-Nordic	No	Yes	Maybe	Maybe	Maybe	Maybe	Yes

During the EOSC Future Consortium meeting in Seville, a number of concrete next steps to support the Service Integration were agreed:

1. Each of the **Research Service Providers** in the Service Integration Matrix would review their service offer in the matrix and update it where necessary.
2. A "Service Integration Contact Point" from the WP6.2 team will be assigned to each Research Service providers to support the Service Integration process.
3. Individual **Service Integration meetings** with Research Service and Core Service providers would be organised to **address any challenges**
4. **Regular updates** on the progress with the Service Integration Matrix will be provided at the Cross-Working Group (XWG) on the Technical Alignment of Science Projects meetings.

These next steps kick-start Phase 2 of the Service Integration Roadmap (M19 – M24) at the beginning of October 2022. Additionally, during Phase 2, the possibility of streamlining the Onboarding (T6.1) and the Service Integration (T6.2) processes will be explored. As part of this T6.1/T6.2 coordination work, the possibility of providing **Service Integration metrics per Core Service** - in addition to the Service Integration Matrix which is a selection of 30 (cf. KPI 1) representative service integrations as a way to validate the different service integration workflows - will be explored.

4 Demonstrating the integration of a research service with EOSC AAI

A specific achievement of this first phase of activity is the demonstration of the integration of the EOSC Authentication and Authorisation Infrastructure (AAI) with the research service, the Social Sciences and Humanities Open Marketplace (SSH Open Marketplace) from the SSHOC Science Cluster. This has been outlined from: a) an operational perspective and b) demonstrated via a video (including presentation slides and script, see Appendix A). This demonstrator, which can be used to encourage research service providers to integrate their services with EOSC-Core Services, outlines the benefits of EOSC-Core Service Integration from both a user and a service provider perspective. The EOSC Authentication and Authorisation Infrastructure (AAI) was selected to demonstrate the potential for research service integration with EOSC-Core Services, due to both the anticipated frequency in which it will be implemented throughout EOSC ecosystem, as well it being the most complex Core Service in terms of the governance, operational and technical parameters of AAI service integration.

4.1 Background information

This section demonstrates how research service providers who are interested in integrating their offerings with EOSC-Core Services can proceed to implement the EOSC Authentication and Authorization Infrastructure (AAI) with their own services. For research service providers who would like to integrate their services with the EOSC AAI, a number of steps need to be followed, and an understanding of the key elements of the EOSC AAI Technical Architecture is required. Within the EOSC AAI Technical Architecture, which is based on the Authentication and Authorisation for Research and Collaboration (AARC) Blueprint Architecture (BPA) [12], there are two core components[13]:

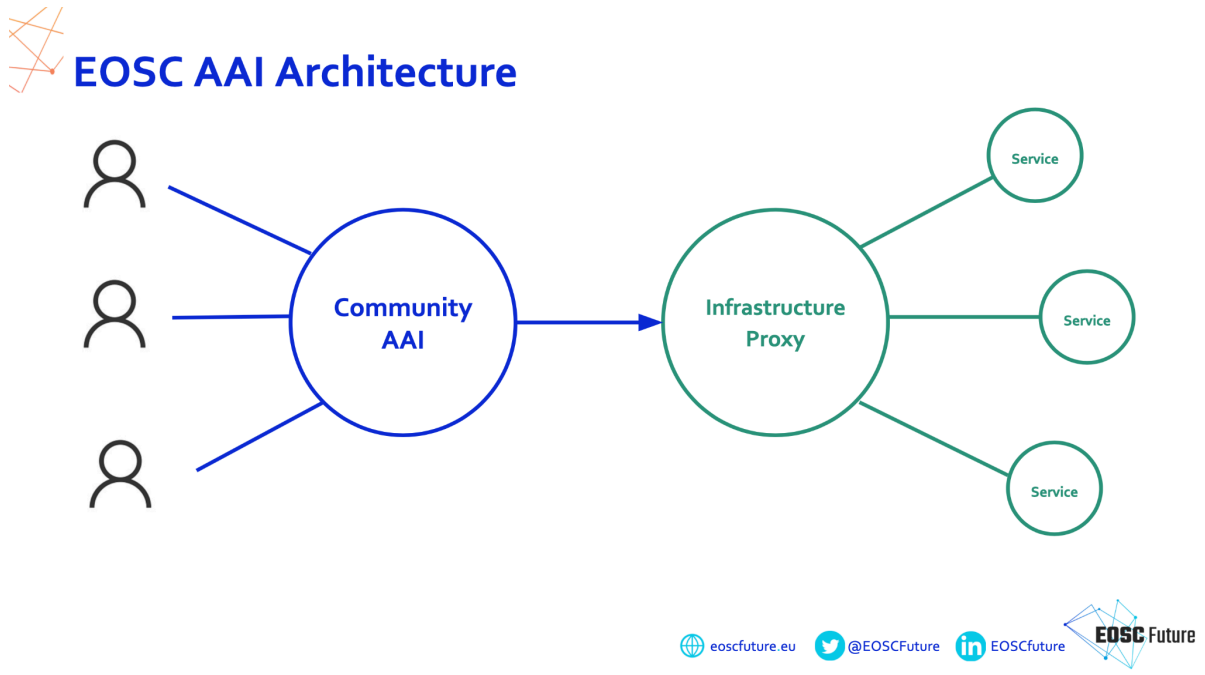


Figure 4.1: Core components of the EOSC AAI architecture

1. the **Community AAI** whose purpose is to streamline researcher's access to services. These can be services provided by their own infrastructure as well as the services provided by other communities. Examples of Community AAI services include: DARIAH AAI, EGI Check-in and the Open-Aire Single Sign On,
2. the **Infrastructure Proxy** that enables infrastructures with a large number of services to provide access to them via a single integration point. For example, the ESCAPE Science Cluster, provides access to a range of services in the astronomy and particle physics domain.

Additionally, the EOSC ecosystem will stimulate interdisciplinary research by enabling researchers from a specific scientific domain to access research services from other domains. For example, researchers affiliated to the ESCAPE Science Cluster will also be able to use services from the PaNOSC Science Cluster. Cross-disciplinary access is one of the founding principles of the EOSC AAI Federation which has been set-up to facilitate interdisciplinary research, for example between the Science Clusters. Further details about the EOSC AAI Core Infrastructure Proxy are available on the EOSC Future Wiki [14].

4.2 Social Sciences and Humanities use case

To illustrate the integration of the EOSC AAI with a research service, we will use a service from the Social Science and Humanities science cluster, SSHOC. The SSH Open Marketplace [15] functions as a discovery portal or a catalogue contextualising useful services and resources to support data driven research in social sciences and humanities. For example, Tools & Services, Training Materials or Datasets and Workflows. However, some functionalities in the SSHOC Marketplace are only accessible to authenticated users, for example, adding new or enriching existing information about the services. It was decided to integrate the SSHOC Marketplace with the EOSC AAI to minimise the entry barrier for the researchers by avoiding the need for separate registration. In practice, this means that when researchers want to sign in, they are redirected to the so-called "WAYF" or "where are you from" interface, where they can select their home organisation, or Community AAI to authenticate with, for example for researchers in the Humanities, this could be the DARIAH AAI. After successfully authenticating by entering their DARIAH username and password the researchers are then redirected back to the originating service (i.e. the Marketplace in this case), where they are granted access to the service and can immediately start creating new or amending existing records.

The EOSC AAI federation also allows users to authenticate via social identity providers like Google or ORCID. This opens new possibilities for involving members of the general public and citizen scientists, beyond the traditional community. The benefit for the user grows with the number of integrated services. If there are multiple services that have been integrated with the EOSC AAI and the researchers have permission to use them, then it is not necessary for the users to re-enter their credentials (username and password) multiple times. The Single-Sign On technology simplifies the login experience and allows users to sign into multiple applications by reusing the authentication session.

It is important to note that despite delegating the authentication, the service provider does not give up the control over who is allowed to do what, i.e. the authorisation. This is governed separately and directly within the service in question and the provider of the service decides who can do what. In the case of the SSH Open Marketplace, logged in users can suggest new contributions to the Marketplace, participate in curating existing content or contribute to workflows. However, prior to publication, their suggestions are to be reviewed by a dedicated group of moderators, i.e. users with more rights within the system. This review process enables users to actively contribute to the service, while ensuring quality of content.

4.3 Integration steps

Taking into account the proxy-based architecture, the first step in integrating a service with EOSC AAI[14], is to identify the "nearest" instance of the Infrastructure Proxy component. This is specific to each cluster. Several of the clusters run one instance of the Infrastructure Proxy component for the whole cluster. In the case of the Social Sciences and Humanities (SSH) Open Cluster, the individual participating research infrastructures rely on their existing AAI components. For the SSH Open Marketplace being developed under the auspices of DARIAH RI, the DARIAH AAI was a natural choice to serve as the Infrastructure Proxy. To register the services certain configuration information had to be exchanged between the providers of the DARIAH AAI and of the SSH Open Marketplace as described in [16].

In addition to establishing trust between the parties on a contractual and technical level, adjustments to the user management of the service are necessary. The service identified for integration still needs a representation of the user, however the authentication is not handled locally anymore, but delegated to the identity providers via the EOSC AAI federation and relayed via the Infrastructure Proxy. Therefore, most importantly, the user login page needs to be adjusted to accommodate a link to the Federated Identity login, the so-called "WAYF" or "where are you from" page. Following successful authentication, the users is

redirected back to the originating service (i.e. the Marketplace in this case), where they are granted access to the service.

Following the completion of the integration workflow, further maintenance and communication between both parties are handled, in our use case, via a dedicated helpdesk. However, in the future, it is intended that these steps and the related communication would be managed via the EOSC Helpdesk.

5 Conclusions

For researchers and other EOSC users, accessing a simple and secure environment facilitating interdisciplinary and cross-domain data-driven research is being made possible because behind the scenes, research service providers have worked to integrate their services offering with the EOSC-Core. Service integration is an opportunity for service providers to ease their work and contribute to building the EOSC as a system of systems.

This deliverable, details the process to establish a set of Service Integration Workflows for integrating EOSC-Core Services and Research Services, based on the requirements of the cross-disciplinary Science Projects. It demonstrates an understanding of research service integration with EOSC-Core Services as a socio-technological activity which needs to take into account the complex landscape of research service providers, as well as the needs of a diverse, heterogenous and multi-disciplinary research community. Furthermore, this initial phase has enabled the Task 6.2 team to focus on the EOSC-Core Service offer and the integration requirements of each EOSC-Core Service from a policy/governance, legal, technical and research-centred perspective.

A specific achievement of this phase of activity is the demonstration of the integration of the EOSC Authentication and Authorisation Infrastructure (AAI) with the research service, the Social Sciences and Humanities Open Marketplace (SSH Open Marketplace) from the SSHOC Science Cluster. This has been outlined from: a) an operational perspective (see: Section 4 of this report) and b) demonstrated via a video (including presentation slides and script, see Appendix A). This demonstrator, which can be used to encourage research service providers to integrate their services with EOSC-Core Services, outlines the benefits of EOSC-Core Service Integration from both a user and a service provider perspective.

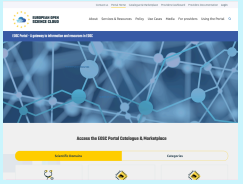
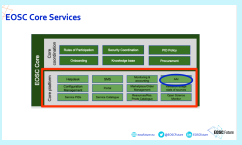
Finally, this deliverable outlines the next steps, including the development of a "Service Integration Roadmap" in close liaison with the Science Clusters and the related interdisciplinary Science Projects, for monitoring service integration targets based on a three-phased approach. This will help with the achievement of the Service Integration Key Performance Indicators (KPIs) of 10 research services by M18 (September 2022), 20 by M20 (March 2023) and 30 by M30 (September 2023). The technical implementation of service integration will additionally be supported by a specific JIRA instance[10]. By September 2022, the Task 6.2 team identified over **50 Research Services** (from the Science Clusters and their related Research Infrastructures and the Science Projects) with "Integration potential" with EOSC-Core Services. A first iteration of the **Service Integration Matrix**[6], providing the details of this service integrations has been provided.

Crucial to the upcoming phase of service integration will be the effective communication with the range of different colleagues working at a number of levels within the EOSC ecosystem, including senior managers of European research Infrastructures, technical experts and research coordinators responsible for liaising with the relevant research communities. This work will be undertaken in close liaison with the various cross-work package working groups that have been established within EOSC Future to facilitate these effective communications.

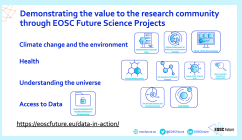
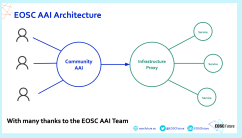
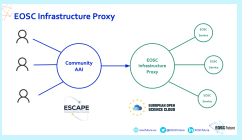
[6] https://docs.google.com/spreadsheets/d/1V1VVpPpTSsBwgYh2FNQ63ChlafeyAWTboGrIgVRr7fU/edit#gid=0

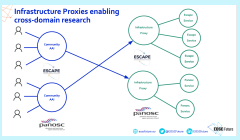
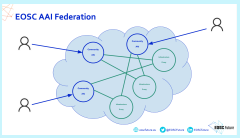
Appendix A – EOSC AAI integration with a research service

- Demonstrator video: Review version of the video: https://youtu.be/O1sVKBMpsvY
- Slides presented in the demonstrator video: EOSC Future Presentation for D6.2.pptx [7]
- Script of the demonstrator:

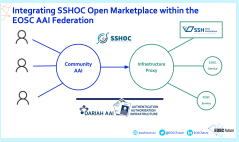
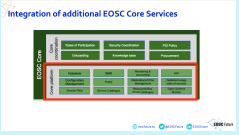
Slide #	Goal	On-screen text	Voice over script	Visual Materials
1	Welcome & Introduction	Integrating EOSC-Core Services into European Research Practice: An Introduction for Research Service Providers	Welcome. In this video, we will show you how to integrate research services with EOSC-Core Services This screencast has been developed in the European project EOSC Future.	EOSC Future logo EU grant agreement number or logo, EOSC logo
2	Setting the Context	EOSC, the European Open Science Cloud	EOSC, the European Open Science Cloud – aims to provide "a federated and open multi-disciplinary environment where European Researchers of all disciplines can publish, find and re-use data, tools and services for research, innovation and educational purposes". This video has been prepared for research service providers who are interested in integrating their offerings with EOSC-Core Services.	EOSC Portal 
3 4 5 6	Introducing Core Concepts	EOSC Science Clusters EOSC-Core Services AAI Science Projects	Service providers are usually Research Infrastructures represented in the EOSC science clusters like SSHOC for the Social Sciences and Humanities, ENVRI-Fair for the Environmental Sciences or EOSC-Life for the Life Sciences. [Click] EOSC-Core Services are generic infrastructural components that are designed to enhance existing services, guarantee their interoperability in the EOSC ecosystem and provide additional value to the users. [Click] For instance: the Authentication and Authorization Infrastructure - or AAI - is just one example of such an EOSC-Core Service. [Click] Enabling interdisciplinary data-driven research is one of the	Science clusters  EOSC-Core Services  The list of the EOSC-Core Services. 

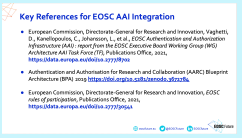
[7] https://docs.google.com/presentation/d/1UXp-LpuC4GQVsrun2SYEchYTNt7YrdRt/edit#slide=id.g115023628a4_0_0

			founding principles of EOSC. The integration of research services with EOSC-Core Services is one of the essential building blocks in this process. To validate this process, 10 interdisciplinary Science Projects addressing pressing societal issues and complex scientific questions such as the climate crisis and Covid-19, have been selected to ensure that this service integration facilitates researchers in their everyday work.	
7	Introducing AAI as a Core Service	EOSC AAI Architecture	For research service providers who would like to integrate their services with the EOSC AAI, a number of steps need to be followed. To do this, it may be useful to understand a little more about the EOSC AAI Technical Architecture. [Click] Within the EOSC AAI Technical Architecture, there are two core components: 1) the Community AAI and 2) the Infrastructure Proxy. Firstly, the purpose of the Community AAI is to streamline researcher's access to services. These can be services provided by EOSC as well as services provided by other communities. [Click]	
8		Community AAI	Examples of Community AAI include: EGI Check-in, DARIAH AAI and the Open-Aire Single Sign On. [Click]	
9		Infrastructure Proxy	Secondly, the infrastructure proxy enables infrastructures with a large number of services to provide access to them via a single integration point. For example, by connecting the Escape Community AAI to the EOSC Infrastructure Proxy, it is possible for researchers in the Escape Community to access a range of EOSC Services via this single integration point. [Click]	
10		Enabling cross-disciplinary research		

11			Additionally, the EOSC ecosystem will stimulate **interdisciplinary research** by enabling researchers from a specific scientific domain to access research services from other domains. For example, researchers affiliated to the Escape Science Cluster will also be able to use services from the **PaNOSC Science Cluster** or vice-versa. [Click]	
12		EOSC Future Wiki	**Cross-disciplinary access** is one of the founding principles of the EOSC AAI Federation which has been set-up to facilitate interdisciplinary research, for example between the Science Clusters. [Click] Further details about the EOSC AAI Core Infrastructure Proxy are available on the EOSC Future Wiki.	 
13	Integrating the EOSC AAI with the SSH Open Marketplace	SSH Open Marketplace	To **demonstrate the integration** of the EOSC AAI with a research service, we will use a service from the social science and humanities science cluster, **SSHOC.** [Click] The **SSH Open Marketplace** functions as a discovery portal or a catalogue contextualising useful services and resources to support data driven research in social sciences and humanities. [Click]	SSH Open Marketplace website 
14		Tools & Services	For example, **Tools & Services, Training Materials or Datasets and Workflows.** However, some functionalities in the SSHOC Marketplace are only accessible to authenticated users, for example, creating a new dataset. [Click]	
15		Sign-in	To do this a researcher needs to click on '**sign in**' (in the top right of	

			the screen). [Click]	
16		Sign-in with EOSC	from where they will be taken to to the login page. By clicking on 'sign-in with EOSC' …	
17		Select Community AAI	[Click] … they are then redirected to a page where they can select which Community AAI they would like to use to login, for example for researchers in the Social Sciences and Humanities, this could be the DARIAH AAI. [Click]	
18		DARIAH AAI	After successfully authenticating by entering their DARIAH username and password	
19		Access Granted	[Click] … the researcher is then redirected back to the originating service (i.e. the Marketplace in this case), where she is granted access to the service and can create a new dataset.	
20		Login with Institutional Account	[Click] Alternatively, a researcher may want to login within their institutional account such as Ghent University. From the 'sign-in with EOSC' page, a researcher can select her home organisation from the list	
21		Login page of home institution e.g. Ghent University	[Click] After which she is redirected to the login page of her home organization, where she logs in with her institutional username and password.	
22		Social Identity Providers	[Click] The EOSC AAI federation also allows users to authenticate via social identity providers like Google or ORCID. This opens up new possibilities for involving members of the general public and citizen scientists, beyond the traditional research community.	
		Authorisation remains with the		

		service provider	It is important to note that despite delegating the authentication, the service provider does not give up the control over who is allowed to do what, i.e. the authorisation. This is governed separately directly within the service in question and the owner of the service decides who is able to do what. [Click]	
23	Setting up the infrastructural components	Integrating SSHOC Open Marketplace within the EOSC AAI Federation	To integrate the SSHOC Open Marketplace within the EOSC AAI Federation it was necessary to set up a number of components. For example, the DARIAH AAI was selected as one of the **Community AAI** that could be used to login to the SSH Open Marketplace. The DARIAH AAI could also act as the **Infrastructure Proxy** for providing access to the SSHOC Open Marketplace as a Research Service within the EOSC ecosystem. It was decided to integrate the SSHOC Marketplace with the EOSC AAI to minimize the effort required for the **researchers** by avoiding the need for separate usernames and passwords. Additionally, this will help SSHOC as a **research service provider** to simplify their user management.	
24		DARIAH Infrastructure Proxy	[Click] Further details about how to register research services with the **DARIAH AAI** can be found on the **DARIAH Wiki**.	
25	AAI is just one example of a EOSC-Core Service - there are many more	Integration of additional EOSC-Core Services	[Click] It is important to note that AAI is just one of the EOSC-Core Services. Once a **research service** is registered (or **onboarded**) in the EOSC Portal it is possible to integrate this service with other EOSC-Core Services. [Click]	

26 27	Key Documents for AAI Integration Getting in touch with the T6.2 Team	Key References for EOSC AAI Integration EOSC-Core Services Integration - Contact Details	Thank you for watching this video. We have demonstrated one example of integration of an EOSC-Core Service - the EOSC AAI - with a research service, and how this has been beneficial for both users and the service provider. Here are a number of Key References for research service providers who would like to integrate their service in the EOSC AAI Federation. [Click] If you found this demonstration useful there are other EOSC-Core Services that you may be interested in. Service integration is an opportunity for service providers to ease their work and contribute to building the EOSC as a system of systems. If you would like to know more, please don't hesitate to get in touch. We look forward to hearing from you.	 

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