



Deliverable D3.2

Intermediate report on the integration of CDI Operation and Collaboration Tools in EOSC

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Abstract:	This is the intermediate report on the integration of services. The main focus is on the integration activities of the Collaborative Data Infrastructure (CDI) Operation and Collaboration tools with the EOSC-Core services.
Keyword List:	integration, CDI operation and collaboration tools, EOSC, EOSC-Core, APIs, messaging, EUDAT
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Terms and abbreviations

AAI	Authentication and Authorisation Infrastructure
AGORA	Service Portfolio Management Tool (SPMT)
AMS	Argo Messaging Service
API	Application Programming Interface
CDI	Collaborative Data Infrastructure
DoA	Description of Action
DPMT	Data Project Management Tool
EC	European Commission
EIF	EOSC Interoperability Framework
EOSC	European Open Science Cloud
EU	European Union
IdP	Identity Provider
GA	Grant Agreement to the project
GRNET	National Infrastructures for research and technology
KIT	Karlsruher Institut für Technologie
MPG	Max-Planck-Gesellschaft zur Förderung der Wissenschaften
MVE	Minimum Viable EOSC
RI	Research Infrastructure
RoP	Rules of Participation
RT	Request Tracker
SPMT	Service Portfolio Management Tool
TF	Task Force
VA	Virtual Access
WG	Working Group
WP	Work Package
EPOT	EOSC Portal Onboarding Team.
SPMT	Service Portfolio Management Tool



Executive Summary

DICE relies on the independently operated Collaborative Data Infrastructure (CDI) that was developed in the course of the EUDAT and EOSC-hub projects. To enable efficient service and resource provisioning through DICE, the integration activities described in this document focus on the further integration of the CDI Operation and Collaboration tools with the EOSC-Core services.

The first aim of this activity is to adapt to the EOSC-Core services evolution/updates the relevant support services (e.g helpdesk, accounting, monitoring) and to support the resource provisioning through the EOSC Platform (e.g. service onboarding, resource accounting, monitoring). The second aim is to connect the user-facing data services with EOSC-Core services making them available via the EOSC Platform. In summary, the objectives are 1) to strengthen the CDI Operation and Collaboration Tools to remain interoperable with the relevant components of the EOSC ecosystem and 2) to facilitate a consistent service onboarding and efficient resource provisioning process through EOSC.

The Integration of the services we are referring to, have to do with the end-user while navigating in the Portal and searching for services. EUDAT CDI Helpdesk will be integrated to support the users requests, and DPMT (Data Project Management Tool) to support the ordering process of the users. At the same time AGORA (SPMT) will play an important role in the onboarding process for the DICE services by integrating with the EOSC Platform. The EUDAT Monitoring, and EUDAT Accounting service integration will support the resource provisioning of the services to the EOSC ecosystem based on the requirements set. The integration and operation of the services follow the FitSM¹ standard, with standard procedures and responsibilities clearly defined to guarantee the quality of the service.

The integrations are being implemented according to the agreed roadmap and integration plan already presented in the previous Deliverable D3.1 “Initial architecture plan on the integration of CDI Operation and Collaboration Tools in EOSC”.

The CDI Operation and Collaboration tools are in operation from the first day of the DICE project and during this period a number of improvements have been developed to improve either the integration with other EUDAT services or the user's experience. The improvements, and the status integration is depicted in this deliverable.

One blocking parameter to finalise the integration is the lack of the final version of the interoperability guidelines from the EOSC Future project. Members of the WP actively monitor the developments in EOSC related projects, EOSC Working Groups and particularly the integration guidelines for the Core Services.

¹ <https://apmg-international.com/product/fitsm>



1 Introduction

Following the planning deliverable D3.1, this document provides the first report on the integration of the CDI Operation and Collaboration Tools with EOSC components. It presents the current status of the EOSC ecosystem, the CDI Operation and Collaboration Tools, the status of the integration, and the next steps needed to achieve the integration.

1.1 About this deliverable

CDI Operation and Collaboration Tools cover the whole life-cycle of services, from planning to delivery and include a subset of services that are common with EOSC-Core services and that need to be fully compatible with the EOSC. At the same time, the user-facing data services - such as those provided through the DICE project - should be as much as possible integrated with EOSC-Core services and made available through the EOSC Platform, to be then provided through WP6 and used by service providers part of the WP7 Virtual Access work package. Work Package 3 (WP3) activities described in this document have the objective to evolve the CDI Operation and Collaboration Tools to play an important role in the EOSC ecosystem.

1.2 Document structure

Chapter 2 presents the current EOSC-Core landscape, the work achieved until time of writing (March 2022) about Interoperability / integration in the EOSC environment whilst at the same time the CDI Operation and Collaboration Tools are presented.

Chapter 3 presents the status of the integration of CDI Operation and Collaboration Tools with EOSC. The role of each tool is identified together with the work needed to support the internal integration (between CDI services) and of course the integration with EOSC-Core services.

Chapter 4 introduces the internal integration needed and achieved via the Collaboration Tools.

Finally Chapter 5 concludes with the current status of the integrations, the obstacles that we expect to face and the next steps.



2 Interoperability / integration introduced by EOSC environment

2.1 EOSC Environment

The European Open Science Cloud (EOSC) is the European Commission initiative aiming at developing a federated infrastructure providing its users with services promoting Open Science practices. This infrastructure is built by aggregating services provided by several providers following a system of systems approach.

EOSC aims at underpinning Open Science, turning FAIR principles into reality across Europe, building a web of FAIR data, enabling the core functions and service layers of an operational EOSC ecosystem. EOSC aims to give the EU a global lead in research data management and ensure that European scientists enjoy the full benefits of data-driven science.

EOSC governance coordinates the development of EOSC, and in order to ensure full implementation of its structure, it has created during 2020 five working groups (WGs). Among those, the Architecture WG, worked on the technical framework required to enable and sustain an evolving EOSC federation of systems. The Architecture WG defined the grouping for the EOSC services as the a) **EOSC-Core**: the set of enabling services required to operate the EOSC, b) **EOSC-Exchange**: the set of federated services registered in EOSC by Research Infrastructures (RIs) and clusters and, c) **EOSC Federation**: the set of scientific services provided by RIs and Clusters to the respective communities. It has also defined **The Minimum Viable EOSC (MVE)** as a dynamic set of EOSC resources like i) The subset of EOSC resources necessary for forming the added-value and opportunities considered essential to be provided by the EOSC and ii) The subset of EOSC-Core components/services required to operate and deliver such resources. The EOSC Architecture WG initiated a task to identify the MVE at functional level. This WG developed an architectural diagram² describing a functional overview of the EOSC and has identified concrete frameworks of the EOSC Interoperability Framework (EIF) and functions to be included in the MVE, with a focus on the essential functions of the EOSC-Core.

From the beginning of the EOSC Future project³ the goal of a specific work package has been to define a federated EOSC architecture (building on the output of the previous Architecture WG) and interoperability framework and its application to the EOSC-Core and EOSC capabilities, including interoperation with the RIs and e-Infrastructures. This technical framework has evolved and the list of services that comprise EOSC-Core is enriched with a number of services that support the main functions of EOSC. EOSC Future has defined a first draft of new guidelines⁴ for some of the core Services at the beginning of March 2022 .

At the same time a Collaboration Agreement of all INFRAEOSC-07-2020 projects (C-SCALE, DICE, EGI-ACE, openAIRE Nexus, Reliance) with the INFRAEOSC-03-2020 project (EOSC Future) has been put in place. The goal of this collaboration is to capitalise on synergies and alignment on common challenges. The topics include technical interoperability and integration, joint outreach and dissemination activities, and administrative issues. The technical interoperability and integration is the topic we focus on in this WP.

² EOSC architecture working group view on the minimum viable EOSC Report from the EOSC Executive Board, <https://op.europa.eu/en/publication-detail/-/publication/91fc0324-6b50-11eb-aeb5-01aa75ed71a1/language-en>

³ <https://eoscfuture.eu/>

⁴ EOSC Interoperability guidelines

<https://wiki.eoscfuture.eu/display/PUBLIC/EOSC+Interoperability+Guidelines>



During 2021, the EOSC Association has introduced the EOSC Task Forces⁵. There are five Advisory Groups focusing on overarching themes that are important for the realisation of EOSC. The Advisory Groups “Implementation of EOSC” and “Technical Challenges on EOSC” are the ones that members of this WP are participating in and will play a role in the the services and their integration with EOSC will evolve.

Based on all these challenges, all the functions which are in the FAIR lady⁶ document, in the draft of EOSC Future Interoperability Guidelines, the EOSC-Hub interoperability guidelines⁷, and OpenAIRE guidelines⁸ are being considered when working on WP3 integration activities and in this deliverable. These functions focus mainly on EOSC-Core services and they are trying to create the functional overview of EOSC. This list of functions is a priority for DICE and the members of this WP have taken that into consideration to support the integration with EOSC in the DICE environment.

The list of the EOSC-Core services is updated in the EOSC Future to include a list of services that support the EOSC different user types and their workflows. As it was defined in the first architectural group the EOSC-Core services that we are going to integrate are the following:

- **EOSC portal:** The EOSC Portal is the universal access channel to EOSC services and resources.
- **EOSC Service Catalogue and orders:** advertise, order services and resources, compliant with the needs of the European research community.
- **Federated AAI:** A distributed federated AAI infrastructure which allows for sharing of login and access to services and data across EOSC.
- **Helpdesk:** Basic helpdesk to cover incidents for the Portal and for the core services.
- **Monitoring** of service use, to report on their availability in various ways.
- **Accounting:** Delivery of accounting data by services.

2.2 DICE in EOSC Environment

The DICE consortium brings together a network of computing and data centres, and research infrastructures for the purpose to enable a European storage and data management infrastructure for EOSC, providing generic services and building blocks to store, find, and access data in a consistent and persistent way. All services provided via DICE are being offered through the EOSC Portal and interoperable with EOSC-Core via a lean interoperability layer to allow efficient resource provisioning from the very beginning of the project. In order to support that, DICE has included this dedicated work package to integrate the services offered through DICE with the EOSC-Core and Exchange.

DICE, relying on EUDAT tools, offers a set of services - common with many of the EOSC-Core services - that helps providers enhance their own services from the operational perspective. The services can, for example, simplify how users access the service federated authentication

⁵ <https://www.eosc.eu/advisory-groups>

⁶ A FAIR Lady (olim Iron Lady) report from the EOSC Sustainability Working Group, <https://op.europa.eu/en/publication-detail/-/publication/581d82a4-2ed6-11eb-b27b-01aa75ed71a1/language-en/format-PDF/source-175468053>

⁷ Interoperability Guidelines <https://www.eosc-hub.eu/technical-documentation>

⁸ OpenAIRE Guidelines - <https://guidelines.openaire.eu/en/latest/>



(AAI), improve service reliability (monitoring), provide details on capacity consumption by users (accounting), or simplify user interaction (helpdesk).

Considering this, the EOSC-Core and DICE have a set of common functions (like the ones mentioned in Architecture WG and MVE) to enable the federation of distributed resource providers and, in particular, to enable on-boarding of resources, access to resources, composability of resources, ordering, monitoring, accounting of the resources. This set of functions are part of the DICE CDI Operation and Collaboration tools and are the following:

- B2ACCESS authentication and authorization infrastructure (AAI), which is responsible for a seamless access to all resources.
- AGORA Service Catalogue (SPMT): the service portfolio management tool which includes standardised information based on the EOSC profiles (now version 3.0) about the providers and the resources available from this project.
- DPMT: The EUDAT Data Project Management Tool, the registry for providers, services, pledged and allocated resources, for customers and their projects (service orders), and for the management of scheduled downtimes.
- Monitoring: EUDAT service for monitoring status and performance data, the availability and reliability of the services.
- Accounting (ACCT): The EUDAT accounting service for collecting information about the usage of resources and services (this can be the number of data objects, the used volume of a storage or the number of users that are registered on a service).
- EUDAT Helpdesk: which consists of tools for providing support to end users and resource providers.

EOSC Future until the time of writing supports integration for AAI, Helpdek and Catalogue. EUDAT services B2ACCESS, HELPDESK and AGORA have followed the necessary guidelines and have managed to integrate with the Core Services. The status of the integration is described in the next chapter. Finally, we have to mention here that most of the tools are mature and follow in general the main guidelines to be compatible with the EOSC.

In the following sections, a brief summary of the description of the CDI operation and Collaboration tools is reported for completeness, but more details can be found in the previous D3.1 deliverable (D3.1⁹).

2.2.1 EOSC Federated AAI

B2ACCESS¹⁰ is EUDAT's Authentication and Authorization Infrastructure (AAI). B2ACCESS was partially developed as part of the EOSC-Hub project and it was included in the creation of technical specifications and interoperability guidelines for the AAI service¹¹. In these guidelines it was agreed to follow the AARC blueprint architecture for research infrastructure AAI. In this architecture, the AAI is a proxy Identity Provider (IdP) which allows user authentication with a set of upstream IdPs. This lowers the barriers for users to use services from a research infrastructure already known by another one. Beside the architecture, the interoperability guidelines contain a set of AARC guidelines which was agreed to and shall harmonise the attribute exchange between the services, and creates a reliable set of attributes which are available to the services. The contained policy guidelines lowers the barriers for users because

⁹ Deliverable D3.1 <https://b2share.eudat.eu/records/1d31d6fc7a924f70b3cbe177c1a20d77>

¹⁰ B2ACCESS: <https://sp.eudat.eu/catalog/resources/d04af0f5-2253-4ee4-8181-3a5a961ccd49>

¹¹ <https://wiki.eosc-hub.eu/display/EOSCDOC/AAI>



they need only to accept the policies at the first AAI where they enter the EOSC AAI federation and do not repeat this on every further AAI they pass on the way to access a service. The team is also monitoring the final report on the EOSC Authentication and Authorization Infrastructure (AAI)¹², produced by the EOSC AAI Task Force (TF) released by the EOSC Architecture Working Group. Three members of the DICE team are part of the AAI Architecture Task Force.

2.2.2 Helpdesk

The **EUDAT CDI Helpdesk**¹³ is a service based on the Request Tracker (RT) ticketing system software.

The EOSC Helpdesk interoperability guidelines are published in: “Technical specifications Federation Services Helpdesk”¹⁴. The document describes three possible integration methods for a generic Helpdesk with the EOSC Helpdesk service:

1. Direct usage, for services which have no helpdesk system and want to adopt the EOSC one;
2. Ticket redirection, for services with a fully independent Helpdesk tool, which need EOSC helpdesk to forward the tickets to their system; and
3. Full Integration, for services with a fully interoperable Helpdesk service, able to synchronise the information of the EOSC ticketing system with its own.

During the EOSC Future project, the EOSC Helpdesk interoperability guidelines are being updated. The first draft of the new guidelines are now published¹⁵.

The three possible integration methods for a generic Helpdesk with the EOSC Helpdesk service remain valid. A service provider can decide the Helpdesk integration method with EOSC during the on-boarding phase. The EUDAT Helpdesk has been one of the EOSC-hub demonstrators for the fully integrated method. A full Integration guarantees a fully interoperable Helpdesk service, able to synchronise the information of the EOSC ticketing system with its own. For this purpose, an interface was developed to provide the connection between the Core service and the EUDAT Helpdesk.

The synchronisation of the EUDAT RT system with the new EOSC Helpdesk tool (being deployed by EOSC Future team) will be kept, the API connecting the services will be upgraded in order to maintain the full functionality for the users, and keep the fulfilment of the interoperability requirements for the EOSC services.

2.2.3 Marketplace - Catalogue

Marketplace

EOSC marketplace is where users are searching, finding and requesting services. The searching and finding rely on the onboarding of the services in the EOSC catalogue as described below, while the request of the service is managed by the ordering process. How the orders are being managed by EOSC and the service providers is set by the providers in the onboarding phase:

¹² EOSC Authentication and Authorization Infrastructure (AAI) Report from the EOSC Executive Board Working Group (WG) Architecture AAI Task Force (TF)
<https://op.europa.eu/en/publication-detail/-/publication/d1bc3702-61e5-11eb-aeb5-01aa75ed71a1/language-en/format-PDF/source-188566729>

¹³ Helpdesk <https://helpdesk.eudat.eu/>

¹⁴ <https://wiki.eosc-hub.eu/display/EOSCDOC/Helpdesk>

¹⁵ <https://wiki.eoscfuture.eu/display/PUBLIC/Helpdesk+Architecture+and+Interoperability+Guidelines>



- open access: the user is redirected to the service web page where the service can be used without authorisation from the provider;
- provider managed: the provider is directly taking care of the requests which are forwarded to the indicated address;
- EOSC managed: the requests are checked by the EOSC order management team which clarifies questions or asks for missing information and then forwards the requests to the provider(s).

In DICE all three types of services have been onboarded and the requests are being managed accordingly. For the second and third category of services the order requests are registered and managed via the **Data Project Management Tool (DPMT)**.

DPMT¹⁶ is EUDAT's data project coordination tool. Information about providers and customers as well as the projects that they are engaged in are recorded there in order to support the order management process in WP6 and the VA monitoring in WP7.

EOSC Catalogue

The EOSC Platform aims to become a key component of the European Open Science Cloud (EOSC) by providing an access point for resources for Europe's research sector. It is composed of two main components: the Marketplace (Demand - End User Portal) and the Providers Portal. The EOSC Platform is built upon specifications that define common data models for EOSC entities (Providers, Resources, etc), referred as the EOSC Profiles¹⁷. During the last year a new version of EOSC Profiles (version 4.0) has been released and needs to be taken up in the DICE catalogue.

DICE operates its own Service Portfolio Management Tool (AGORA)¹⁸ which is based upon the EOSC Profiles as well. At the time of writing, EOSC Future is responsible for the operation of the EOSC Platform, and a dedicated team is working to produce a process in order to integrate regional or thematic portals such as AGORA with the central EOSC Platform. This process assumes that each associated portal adheres to the Rules of Participation¹⁹ and has in place similar processes for the validation of Providers and Resource Profiles. AGORA is the **service portfolio management tool (SPMT)** of the DICE project which includes standardised information based on the EOSC profiles 3.0 about the providers and the resources available from this project.

2.2.4 Monitoring and Accounting

Monitoring

As already mentioned, to support the seamless operation of services in the future European Open Science Cloud, EOSC-hub has proposed a number of technical specifications and interoperability guidelines covering both common and federation services. Among these guidelines, a guideline related to monitoring was created²⁰. The monitoring specification details the main features, the high-level architecture and the deployment models of the service in EOSC and defines interoperability guidelines that enable various integration paths to allow any EOSC service provider to use the service.

¹⁶ <https://dp.eudat.eu>

¹⁷ <https://eosc-portal.eu/providers-documentation>

¹⁸ <https://sp.eudat.eu>

¹⁹ <https://op.europa.eu/s/pemm>

²⁰ <https://wiki.eosc-hub.eu/display/EOSCDOC/Monitoring>



The interoperability document describes the high-level service architecture for an EOSC Monitoring service and presents the main integration and usage use cases for monitoring in EOSC. It proposes interfaces as guidelines to be followed to achieve the interoperability between monitoring systems in EOSC for three envisaged use cases: (1) combine Results of one or more infrastructures in EOSC in a unified UI, (2) add a Service Provider/Infrastructure to EOSC Monitoring and (3) Third-party services exploiting EOSC Monitoring data. The interoperability guidelines are being updated by the EOSC Future project and other related projects in the EOSC ecosystem.

The updated draft guidelines²¹ by EOSC Future for the EOSC Monitoring Service, released at the beginning of March 2022, will be taken into consideration in the future integration work.

The **EUDAT CDI Monitoring service** is based on ARGO Monitoring and is an infrastructure availability/reliability monitoring service designed for Service Level Monitoring, for medium and large electronic infrastructures.

Accounting

The **EUDAT accounting (ACCT)** is the service for collecting information about the usage of resources and services (this can be the number of data objects, the used volume of a storage or the number of users that are registered on a service).

The interoperability document²² describes the high-level service architecture for an EOSC Accounting service and presents the main integration and usage use cases. It proposes interfaces as guidelines to be followed to achieve interoperability. These guidelines are updated by the first draft of the interoperability guidelines and are being updated by the EOSC Future project and other related projects in the EOSC ecosystem. The EOSC Future first draft of new guidelines²³ have been recently released and will be taken into consideration in the future integration work.

2.2.5 Other services of the federated core

This Work package also deals with all supportive operational and collaborative tools that help onboard services based on technology trends and technologies with integration patterns that are based on events and asynchronous messaging and with technologies that support the continuous delivery of the service. The list of services are as follows:

Messaging: The ARGO Messaging Service (AMS) is a Publish/Subscribe Service, which implements the Google PubSub protocol.

Gitlab: GitLab is a web-based platform, operated under the open-source licence which provides an integrated environment for software development including Git-repository, issue tracking system, wiki, continuous integration module etc. GitLab via federated access (B2ACCESS) is used as an integrated solution for a full software development cycle and provides rich APIs for integration with other services.

Docker Registry: The combination of Gitlab and Docker Registry allows users to set up their own Continuous Integration and Continuous Delivery routines which run entirely on European servers.

²¹ EOSC Interoperability guidelines

<https://wiki.eoscfuture.eu/display/PUBLIC/EOSC+Interoperability+Guidelines>

²² EOSC Technical specification document <https://wiki.eosc-hub.eu/display/EOSCDOC/Accounting>

²³ EOSC Interoperability guidelines

<https://wiki.eoscfuture.eu/display/PUBLIC/EOSC+Interoperability+Guidelines>



Mattermost: Mattermost is an open source self-hosted communication service, which enables team communication, messaging, data sharing. It's fully integrated with GitLab and facilitates the software development cycle.

SVMON: The software version monitoring framework SVMON collects the information on software versions of EUDAT services and their components.



3 Status on the integration of the CDI Operation and Collaboration Tools in EOSC

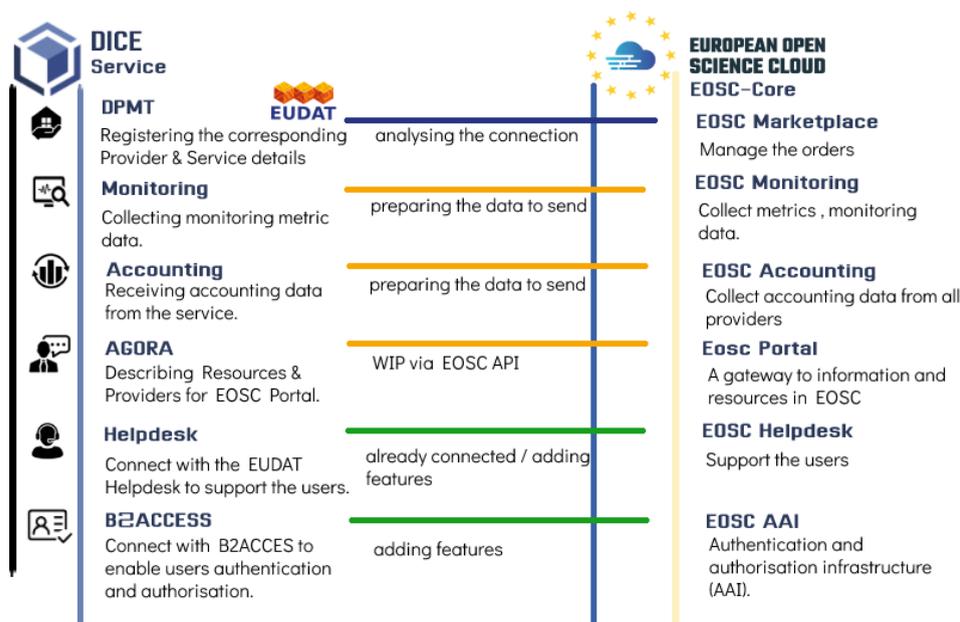
3.1 Introduction

This WP focuses on the interconnection and data exchange between the CDI Operation and Collaboration Tools and the EOSC-Core services. The External dependencies to other projects such as EOSC Future and the delay of publishing the 1st draft of the EOSC Interoperability guidelines and the finalisation of the corresponding processes caused a significant delay in the DICE integration plan.

The first draft of the integration Guidelines from EOSC Future²⁴ were released in March 2022 therefore this WP will soon be able to proceed with the next integration steps.

3.2 Status of the integration with EOSC

In the following sections, you may find information about the work done until the time of writing and the status of integration with respect to the work planned for each of the Operation and Collaboration tools. The status of the work in progress in DICE is also depicted in the following figure while associating the corresponding EOSC-Core services.



As it is mentioned in each tool, although the integration work has already started we are reporting on some blocking parameters mentioned in the following paragraphs.

3.2.1 B2ACCESS - Authentication and authorisation service

During this period in B2ACCESS we have worked on the maintenance of the connection to EOSC Platform and other research infrastructures, participating in EOSC.

At the same time a work has been done on the connection to further research infrastructures and communities. In cooperation with IT4Innovation, B2ACCESS was added as an Identity

²⁴ <https://wiki.eoscfuture.eu/display/PUBLIC/EOSC-Core+services>



provider to their central identity management system. This offers users the ability to log into the IT4Innovation services with their B2ACCESS account.

Beside the integration with IT4Innovation the collaboration with Fenix RI²⁵ is under investigation (in conjunction with Task 4.1 activities). The central Fenix AAI is planned to be integrated with B2ACCESS as a service provider to offer the EUDAT service suite to users of Fenix RI with their existing accounts.

Improvements

The basic improvements of B2ACCESS during this period are:

- The service was first updated to release 3.5.1 of unity which contained improvements in group management enhancing the usability for group administrators, and the possibility to handover to the community/requester to manage their members. This offers the possibility to request group specific quotas and permissions on connected services, like dedicated group storage on B2DROP. The release also supports external signatures of SLO messages which improves the logout functionality for all users.
- Then the service was updated to unity 3.6.1 which focused on improving the user invitation into groups. The email address, provided by the identity provider, may differ from the email address used in the invitation. Additionally, the check which kind of invitation (invitation for existing users or new users) was moved from creating the invitation to the login of the invited user. This solves problems where users create an account on B2ACCESS after receiving an invitation but before accepting it. Additionally, group administrators are now able to invite multiple users at the same time.
- Due to the log4j vulnerabilities, several fixes were applied to the service.

General Status: While B2ACCESS is already integrated with the EOSC Core, the EOSC AAI federation is still in preparation and has not yet started. AARC guidelines are in preparation, but not yet finished. Based on these blocking factors, we are working on improvements like the support of different signing methods in the SAML exchange messages.

3.2.2 AGORA - Service Portfolio Management Tool

GRNET started the integration of the AGORA catalogue with the EOSC Platform from the beginning of the project. During this period from the beginning of the project, we followed the development changes of EOSC Platform.

AGORA catalogue is currently connected with the sandbox version of EOSC Platform and verified that it is functioning properly. We have initiated the policy process to connect with the EOSC production platform which will be in place once we get the confirmation from the EOSC Future team.

The current implementation allows only to onboard Providers and Resources that are not onboarded already from a different source. The DICE team signed an agreement between DICE and the EOSC Platform Operator which describes who has the authority on which Resource and Providers profiles so that the appropriate access rights are given to AGORA to manage them.

Technical Information

GRNET implemented the integration of the AGORA catalogue with the EOSC Platform. Our Main goal in this process was to Onboard to EOSC Platform multiple providers and

²⁵ Fenix RI <https://fenix-ri.eu/>



resources/services registered in AGORA and to synchronise controlled vocabularies between the portals. In this process the following basic assumptions apply:

- The EOSC Platform provides a unique ID (EOSC_ID) for Providers Profiles which is used as a reference for all actions.
- The EOSC Platform provides a unique ID (EOSC_ID) for Resource Profiles which is used as a reference for all actions.
- The EOSC Platform is the authoritative source for all the controlled vocabularies.
- The EOSC Platform and AGORA use the same model which is EOSC Profiles 3.0.

In order to integrate with the EOSC Platform AGORA uses the API offered by the EOSC Platform and implements the workflows below.

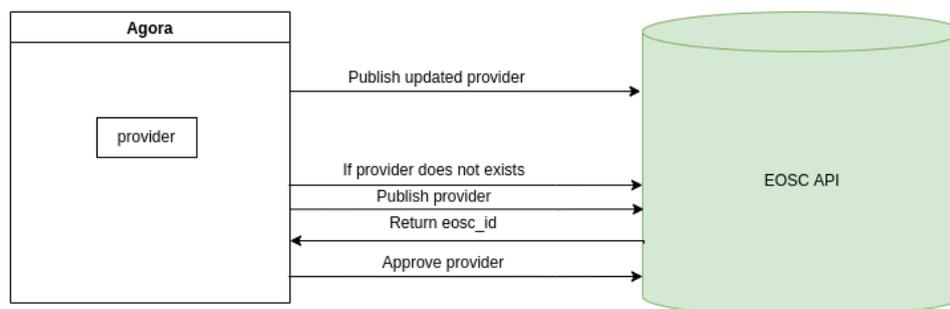
Users in AGORA to support the integration

In order to support the integration process of onboarding the Resources and the Providers we introduced the Portfolio Manager role in AGORA. This role is an administrative role to manage the whole catalogue and its integration with EOSC. A Portfolio Manager is able to validate Resource and Provider Profiles and then publish them either to DICE catalogue or EOSC Platform. Another user used in the integration is the Provider Admin whose scope is restricted to a single provider and its resources to publish to EOSC and administer them in the catalogue.

Onboard Provider Profiles Workflow

The image below demonstrates the workflow to onboard a new Provider in the EOSC Platform via the EOSC API.

Publish providers to eosoc api



1. In order to onboard a **Provider Profile** to EOSC, the provider admin needs to *Check* if the provider is onboarded on the EOSC Portal from a different source. If it exists, due to the lack of a reverse synchronisation agreement between AGORA and the EOSC Platform, the Provider Admin needs to create a new provider in AGORA and manually update its contents to make sure to have the same information. If it does not exist, the Provider Admin creates a Provider profile in AGORA and fills in the necessary information;
2. Once the provider profile is ready, the Provider Admin *Publishes* it to EOSC Platform; The status of the provider now is *Pending* verification.

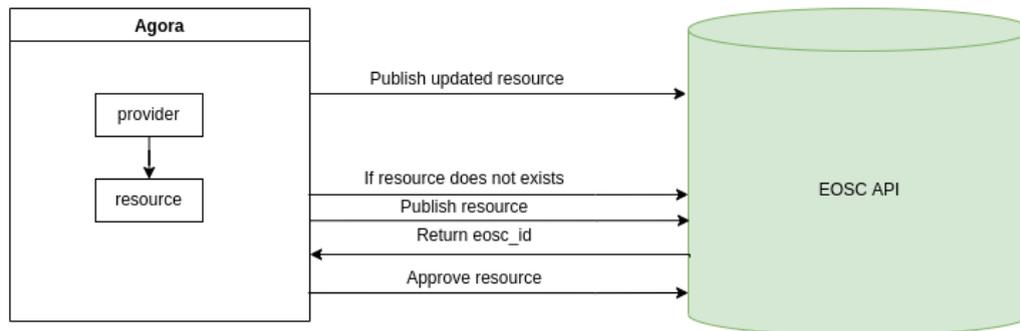
3. The Portfolio Manager *Validates* the new provider and *Approves* or *Rejects* it, this action is sent to the EOSC Platform. The publication date and EOSC_ID is recorded in the Provider profile in AGORA.

Status: **DONE**

Onboard Resource Profiles Workflow

The image below demonstrates the workflow to onboard a resource in the EOSC Platform via the EOSC API.

Publish resources to eosc api

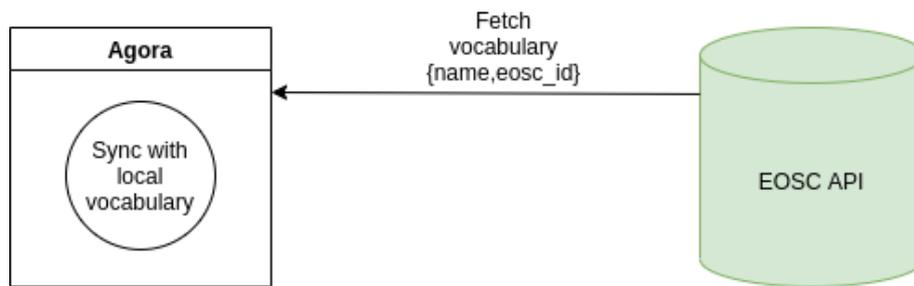


1. In order to onboard a **Resource Profile** to EOSC, the Provider admin needs to check if the resource is onboarded on the EOSC Portal from a different source. If it exists, due to the lack of a reverse synchronisation agreement between AGORA and the EOSC Platform, the Provider Admin or Resource admin needs to create a new resource in AGORA and manually update its contents. If it does not exist, ...
2. Once the Resource profile is ready, the Portfolio Provider Admin publishes it to EOSC Platform.
3. The Portfolio Manager *Validates* the new Resource and *Approves* or *Rejects* it, this action is sent to the EOSC Platform. The publication date and EOSC_ID is recorded in the Provider profile in AGORA.

Status: **DONE**.

Synchronisation of controlled Vocabularies

The main issue we faced at the beginning of the integration was the vocabularies. Both AGORA and EOSC API started using the vocabularies defined in the Profile 3.0. During the evolution and development of the EOSC API there were some changes (additions, removals) of the entries. That was an obstacle to integrating the AGORA instance with the EOSC Platform as we had to align the vocabulary



The steps followed are described:

1. Check if an entry in AGORA vocabulary matches a specific word from the EOSC vocabulary. For example a standard MERIL category.
2. Once we find the matching entry from AGORA we get its eosc_id from the vocabulary and append it to the entry model. As a result we saved the eosc_id in the object of the vocabulary entry as follows {name: <Vocabulary entry>, eosc_id: <entry_id>}
3. After the synchronisation we sanitised the data by removing duplicates and entries without an eosc_id.

Status: DONE

We developed a mechanism to check the new entries in the vocabulary. Every month we run a script manually to synchronise the vocabularies.

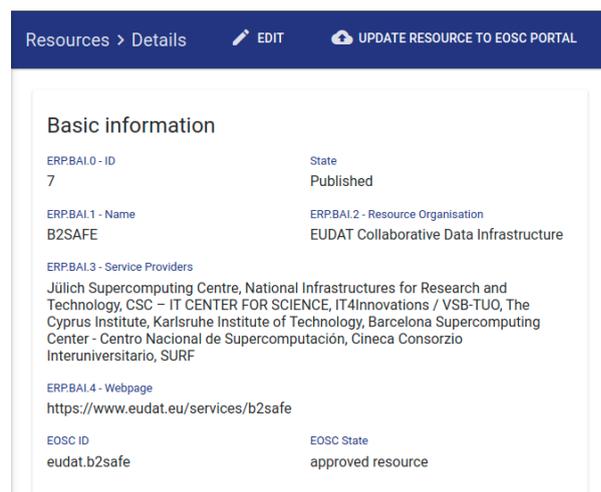
Testing in Sandbox

Tests have been done between sp.eudat.eu and the sandbox version of EOSC portal. To set up the integration we added at the catalogue settings the required variables bellow

```
EOSC_API_URL = 'https://sandbox.providers.eosc-portal.eu/api/'
OIDC_REFRESH_TOKEN = '<oidc-refresh-token>'
```

The API endpoint is used to push resources to the EOSC sandbox and the refresh token is used to be authorised by the API. The resources and providers that we had in the catalogue were already in the eosc-sandbox instance. Consequently, we had to synchronise the data between the 2 systems by getting the EOSC_ID from the sandbox resources or providers and update the info in the sp.eudat.eu catalogue.

For instance, in the B2SAFE resource we updated the EOSC_ID and state in the catalogue and then updated the info to the sandbox by clicking the top right button you see in the screenshot below. (ref: https://sp.eudat.eu)



Next we verified that the same data appeared on the side of the sandbox environment.



Approved**B2SAFE**ACTIVE

B2SAFE
ID: eudat.b2safe
Resource Status: **Approved**
Resource Organisation: EUDAT
Creation Date: May 15, 2018
Last Update: Jan 28, 2022
Last Audit: *Never audited*

Resource Providers: Jülich Supercomputing Centre, National Infrastructures for Research and Technology, CSC – IT CENTER FOR SCIENCE, IT4Innovations / VSB-TUO, The Cyprus Institute, Karlsruhe Institute of Technology, Barcelona Supercomputing Center - Centro Nacional de Supercomputación, Cineca Consorzio Interuniversitario, SURF

ref: <https://sandbox.providers.eosc-portal.eu/home>

Authoritative Source Selection & Reverse Synchronisation process

At the time of writing there are ongoing discussions between DICE and the EOSC Platform Operator on the process/workflow that is needed to designate AGORA as authoritative source for existing Providers and Resource Profiles. When this process is defined it will allow AGORA to be able to implement reverse synchronisation i.e It will be able to fetch existing Profiles from the EOSC Platform so that they can be updated within AGORA.

Policy

We have communicated our intention to integrate sp.eudat.eu with the EOSC production platform. The EOSC Portal Onboarding Team (EPOT) is actively working on an Interoperability framework between EOSC and regional or thematic catalogues. The use cases that they provided are

1. Import of records between catalogues
2. Update of a single record from the primary catalogue to another catalogue

The DICE catalogue is offered for both use cases as part of the Collaboration Agreement activities with EOSC Future.

3.2.3 Helpdesk, user support

The EUDAT CDI Helpdesk is a service based on the Request Tracker (RT) ticketing system software. EUDAT Helpdesk (RT) is a mature service and the integration is maintained along EOSC integration guidelines as the EOSC Platform evolves.

EUDAT CDI Helpdesk is following the integration guidelines from the beginning of the project. The first version of the guidelines is published in: “Technical specifications Federation Services Helpdesk” (<https://wiki.eosc-hub.eu/display/EOSCDOC/Helpdesk>) by EOSC-hub.

EUDAT / DICE Support Units

Most of the services provided through DICE are already supported via the EUDAT Helpdesk where appropriate support units are defined. The effectiveness of the solution is essential to guarantee the quality and the accessibility of the EOSC services and the growth of the EOSC users’ community.

Status: Open (till the end of the project)

Dependencies: None



Integration with EOSC Helpdesk / maintenance

At the moment EUDAT Helpdesk is fully integrated with the xGUS ticketing system developed in the context of the EOSC-hub project and taken up at the start by EOSC Future. The helpdesk system integration will be maintained until a new system by the EOSC Future project will be released.

Status: Done

Dependencies: None

Integration with EOSC Helpdesk / update

The connection between the EUDAT helpdesk and the EOSC helpdesk will be updated and then maintained according to the changes made by EOSC Future.

Status: EOSC Future contact established. Update of the system: under discussion.

Dependencies: EOSC Future Helpdesk update.

Integration with EOSC Helpdesk / enhancement

The Helpdesk service will follow the evolution of the requirements established by EOSC Rules of Participation.

Status: Enhancement of the system: continuous activity.

Dependencies: EOSC Rules of Participation update.

EUDAT Helpdesk service / update

We have an increase in the number of tickets from the DICE and EOSC users. EUDAT Helpdesk is updated to respond to the needs of the project and the user's requests. The support units definition, with the corresponding queues, as well as the technical functionalities, are maintained and constantly updated.

Status: Update of the service: stand-by.

Dependencies: DICE and EOSC users feedback.

Next steps with new EOSC Helpdesk Tool

The mapping of the current EUDAT RT and the new EOSC Helpdesk tool is ongoing, and it will be described in the final integration report. An intermediate phase consists of the preparation for RT to communicate with Zammad (official documentation: <https://docs.zammad.org/en>, development environment: <https://zammad-helpdesk-dev.scc.kit.edu>), while the former EOSC Helpdesk will be still in production.

The synchronisation of the two systems will be fully tested before the new EOSC Helpdesk tool will be released. The aim is that the change of EOSC system will be completely transparent for the DICE users.



3.2.4 DPMT and Marketplace

As already defined in the Integration plan (see D3.1 “Initial architecture plan on the integration of CDI Operation and Collaboration Tools in EOSC”²⁶) there are no other requirements for further integrations needed. Order requests coming via the Marketplace are forwarded to the EUDAT helpdesk and then, when checked by the order management team, they are recorded into DPMT.

The evolution of the order processing in EOSC Future will be monitored to identify any new opportunity.

3.2.5 Monitoring and Accounting

3.2.5.1 Accounting

The **EUDAT accounting (ACCT)** is the service for collecting information about the usage of resources and services (this can be the number of data objects, the used volume of a storage or the number of users that are registered on a service).

Integration with the DICE Services

The EUDAT accounting (ACCT) in cooperation with WP6 - Operations, has set up a number of guidelines for the Service owners to understand how to connect to the service. These guidelines are in Gitlab.

Integration with EOSC Accounting

Status: Work in progress.

Dependencies: The new EOSC Future guidelines were just released. The ACCT team is working on them to understand the integration steps needed and to decide on the best way to integrate.

Finally, DICE (via the EUDAT Accounting Service) is also participating as a use case in EOSC Future Task 4.3 - EOSC Back-Office Monitoring Framework for Resources. This task has a goal to collect metrics including VA metrics from the INFRAEOSC-07 Projects. Members of the EOSC Future Task 4.3 are currently developing a Metrics Aggregator and DICE is invited to participate, design and send examples of VA Metrics and their definition in order to use them in the validation of Metrics Aggregator service.

3.2.5.2 ARGO Monitoring

The EUDAT CDI Monitoring service is available at <https://avail.eudat.eu>. The EUDAT monitoring Service is not yet integrated with the EOSC Monitoring. As already described in the previous D3.1 deliverable, it supports and describes the monitoring data in the predefined format in line with the interoperability guidelines. The main tasks that we are currently working on are the following.

Monitor the different services in DICE

In cooperation with WP6 - Operations, we set up a number of guidelines to help the service owners to understand how they can prepare their services to be monitored by the Monitoring Service. In service monitoring, we start by checking the health status of the service. Based on the type of the service a few core checks (ex. http, tcp, certificate) are used. Apart from this traditional status monitoring, the monitoring service focuses on monitoring a service from the

²⁶ <https://b2share.eudat.eu/records/1d31d6fc7a924f70b3cbe177c1a20d77>



end users perspective. That means that the services have to be monitored in the same way regardless of who the service providers are and where they are located.

The current status of the service includes:

- Monitoring service instance is up and running (both for production and development)
- Probes/Metrics have been gathered to be deployed for the services to be monitored under DICE and the B2SAFE service
- Monitoring guidelines are available on how to enable, develop a new probe, and on how an existing service should be prepared to start monitoring it by a probe
- Implementation work has been carried out to:
 - Extend the topology to include projects and scopes,
 - Add filtering mechanism in the topology to exclude decommissioned items/services and to create correct group of services,
 - Add new analytic jobs that generate trends for top flapping items in four categories (metrics, endpoints, services, groups) and for specific group of services grouped by tags.
- Discussion is ongoing on how to integrate the monitoring with the DPMT service (for example to gather from DPMT the topology of services).

We have to report here that most of the services are already monitored and other new metrics are added and will be added during the project.

Service Name	Status
ESACCESS-INTERIOR	OK
ESACCESS-EPOR	OK
ESDROP-CDI	OK
ESFIND-CDI	OK
ESFIND-ONES	OK
ESFIND-IST	OK
ESFIND-Availability	OK
ESFIND-Blue-Cloud	OK
ESFIND-ESISA	OK
ESFIND-DATICE	OK
ESFIND-DRUS	OK
ESFIND-DatawarefR	OK
ESFIND-DatawarefND	OK
ESFIND-ES-INFO-AM	OK
ESFIND-EnvId	OK
ESFIND-Hostedup	OK
ESFIND-INFO	OK
ESFIND-INFO	OK
ESFIND-MISAD	OK
ESFIND-MetadataCloud	OK
ESFIND-NRD	OK
ESFIND-PI	OK
ESFIND-RDARS	OK
ESFIND-Source	OK
ESFIND-Tutorial	OK
ESFIND-UPH	OK
ESFIND-UCSIS	OK
ESHANDLE-CDI	OK
ESHANDLE-EDA	OK
ESHANDLE-ComptBioMed	OK

Status: Done. It is updated with the addition of new services.

Dependencies: None

Integration with EOSC Monitoring

Status: Work in progress.

Dependencies: The new EOSC Future guidelines were just released and we are working on them to find ways to expose the data that the monitoring service already collects.



4 Status of the integration for other supporting tools

4.1 Introduction

Apart from the integration of the CDI Operation and Collaboration tools with EOSC-Core, EUDAT has a number of other supporting tools used in project DICE that could enable the internal integration.

This list contains all the supportive operational and collaborative tools that help onboard services based on technology trends and technologies that are most used for the service development, operations and support. They actually advance the automation, integration and interoperability of the tools supporting the service operations, service development lifecycle and project management. The list of services are the following:

- **Messaging** service for exchanging messages
- **GitLab** as the software development platform
- **SVMON** as a software version monitoring
- **Docker Registry** combination of Gitlab and Docker Registry allows users to set up their own Continuous Integration and Continuous Delivery routines
- Finally, **Mattermost** as a collaboration platform

4.2 Messaging

The ARGO Messaging Service (AMS) can play a key role in this new integration ecosystem by filling the gap to the end to end interconnection between services, enforcing the adoption of common standards and becoming the main transport layer between CDI services and their integration with EOSC Core Services.

AMS allows the senders of messages to be decoupled from the receivers of messages. It can be used for both push and pull message delivery. In push delivery, the Messaging Service initiates requests to your subscriber application to deliver messages. In pull delivery, your subscription application initiates requests to the server to retrieve messages.

The Messaging service is investigated to play the following roles:

- as a library of common used data (ex. minimal set of values of providers)
- as the main transport layer of data in between the operational tools (ex. send alerts from the monitoring service to mattermost to inform everyone)
- as the main transport layer of data between the CDI Operation and Collaboration tools and the EOSC.

In the context of DICE we have already started using the service as follows:

Use of for the exchange of data in its components or to others

- **Monitoring:** It is already used by the Monitoring Service to exchange information in its components
- **Monitoring status data:** There is a work in progress for sending the Monitoring status data to AMS. The service status data define the status of each service and/or service components if they are responding or not. This information can be used by other EUDAT services that want to know the monitoring status of the service. These data will follow a predefined format/schema.



Integration of Other Elements of the federated core like SVMON, Mattermost and Monitoring to exchange information.

- A new activity has been started to connect the SVMON with the Messaging Service. SVMON is investigating the AMS on how to use the service.

4.3 Gitlab

GitLab is the web-based platform which provides an integrated environment for a full software development cycle. The GitLab service hosted at KIT is currently running as a production service and delivers the central software repositories for EUDAT software developers as well as it offers repositories for all EOSC related scientific communities and researchers. Gitlab is also used in DICE to host the services development.

During the reported period regular maintenance activities including daily backups and updates according to the GitLab release schedule have been performed.

The usage of the GitLab during the project time has significantly increased. At the beginning of the project, we started with around 300 active users and 100 software projects. Currently the number of users has increased up to 450 and the number of projects approaching 200. We have increased the allocated storage accordingly.

Following the initial plan, presented in D3.1, the GitLab runners have been migrated to KIT infrastructure based on BW-Cloud <https://portal.bw-cloud.org/>. We have set up three runners for the B2SAFE development group and will extend this number of runners based on the further requirements.

The new storage resources with additional 150GB have been mounted to the GitLab runners and the storage space has been extended to enable the preservation of the Docker images.

4.4 Mattermost

Mattermost is a production service operated by KIT, an open source platform for communication, collaboration, and workflow orchestration across tools and teams. The initial plan to use the service as a notification engine has been implemented. Four broadcasting channels have been created:

- B2SHARE BROADCAST
- B2SAFE BROADCAST
- B2HANDLE BROADCAST
- B2ACCESS BROADCAST

Integrations

SVMON integration (done)

The Mattermost service has been integrated with SVMON to collect all update information related to the EUDAT installations of B2Services. The image below shows an example of the SVMON report upon the version change of the B2ACCESS service.



February 09

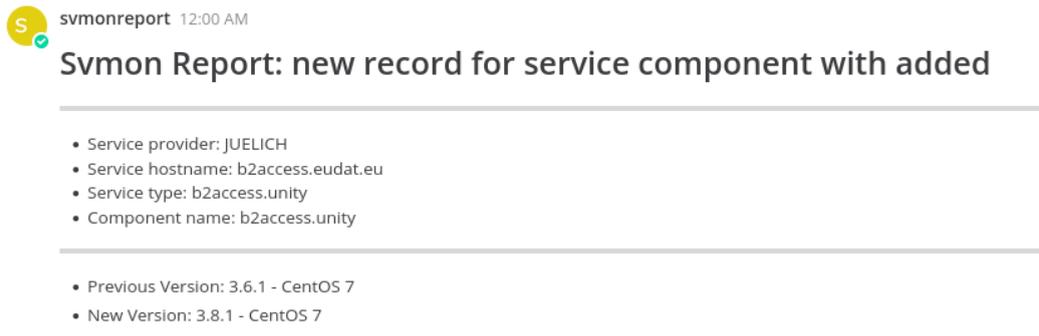


Image : Example of SVMON Report in Mattermost about version update from 3.61 to 3.8.1 for B2ACCESS.

Monitoring data integration (wip)

The integration with the Monitoring Service is in progress. Until now the Service Providers are receiving notifications from the monitoring service through email. The idea is to use mattermost channels to send real time notifications to service owners. Via this integration the dedicated channels in the next version will include monitoring data.

4.5 Containers.eudat.eu

Currently the Docker registry is running in a test environment. The delivery of the containers service has been delayed due to change of the initial technology after assessment. The new technology based on open source registry Harbor²⁷ is being tested and will be available for production in Q2 of 2022.

4.6 SVMON

The SVMON had undergone significant development and enhancement. The following general tasks which were included in the initial plan now has been finalised:

- Migration of the frontend from Angular to React.JS
- Migration the backend from Java to Node.JS
- UI Improvements including minor new features.
- Backend updated following the architectural requirements.

Integrations

- New providers have been integrated with SVMON.
- Integration with most of B2-Service used in DICE is ready or upgraded (ex. B2SAFE/B2FIND/B2ACCESS)
- Integration with B2HANDLE is a work in progress
- Integration with DPMT has been improved
- Integration with AMS service is planned
- Integration with SPMT/AGORA is a work in progress

²⁷ <https://goharbor.io/>



The following items describe the enhancement of **SVMON UI** which has been accomplished in more detail:

- Responsive Design: now the UI can be used also on mobile now only on big screens.
- Refactor of the UI: the ui was re-designed for better accessibility, material design was introduced.
- Support for Adding/removing service components added.
- Edit services metadata feature added.
- Add/modify/delete relationships among components, services and providers added.
- Implementation of interactive diagrams to depict service components and relationships between them.
- Several UI bugs were fixed.
- Now it is possible to select what information should be displayed on the providers/services tables instead of always displaying all the information.
- An admin panel has been added for those who have admin access, allowing them to configure the svmon python client remotely for debugging proposals.

The **SVMON Backend** improvements can be summarised as follows:

- The database structure has been completely modified to fulfil the new architecture defined on the svmon roadmap.
- Integration with GOCDDB has been deprecated.
- Integration with DPMT has been improved following the new database architecture, now the information from DPMT is stored with relationships.
- The entire backend endpoints and logic were refactored.
- Several security issues have been fixed.
- Now the backend also fetches automatically reports using client's endpoints, a script within the backend runs once per day and requests the information, allowing the services to avoid installing the svmon-python-client.
- Documentation of the endpoints has been added, there are plans for adding swagger and making the endpoints public.
- Integration with AMS service is planned, svmon will send periodic information to this service.



5 Conclusions

The Data Infrastructure Capacities for EOSC (DICE) consortium brings together a network of computing and data centres, and research infrastructures for the purpose to enable a European storage and data management infrastructure for EOSC, providing generic - horizontal services and building blocks to store, find, access and process data in a consistent and persistent way.

CDI Operation and Collaboration Tools are a set of services that cover the whole life-cycle of services, from planning to delivery and include a set of services that implement common functions with EOSC-Core services and that need to be fully compatible with the EOSC. All the CDI Operation and Collaboration Tools have been designed to be compatible with the EOSC-Core of the Minimum Viable EOSC.

By the time of writing the CDI Operation and Collaboration Tools are fully deployed, updated with new features and the integration for some of the Services with EOSC is set (B2ACCESS, Helpdesk, SPMT). However, the integrations are delayed due to the fact that the first draft of the integration guidelines from EOSC Future²⁸ were released in March 2022 and a number of Policies - Agreements need to be aligned so as to finalise the Integrations.

²⁸ <https://wiki.eoscfuture.eu/display/PUBLIC/EOSC-Core+services>

