Deliverable D3.3

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

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Abstract:	This is the final 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 interface
API	Application Programming Interface
ASTRON	Astron
BSC	Barcelona Supercomputing Center - Centro Nacional de Supercomputacion
CESNET	CESNET, z. s. p. o.
CINECA	Cineca
CSC	CSC – Tieteen Tietotekniikan Keskus Oy
CyI	The Cyprus Institute
Datacite	DataCite
DKRZ	Deutsches Klimarechenzentrum GmbH
DPMT	Data Project Management Tool
DoA	Description of Action
EC	European Commission
EOSC	European Open Science Cloud
EPOT	EOSC Portal Onboarding Team
ETHZ	Eidgenössische Technische Hochschule Zürich
EU	European Union
EUDAT ltd	EUDAT ltd
FZJ	Forschungszentrum Juelich Gmbh
GA	Grant Agreement to the project
GRNET	National Infrastructures for research and technology
GWDG	Gesellschaft für Wissenschaftliche Datenverarbeitung mbh Göttingen
INFN	Istituto Nazionale di Fisica Nucleare
IT4I	Vysoka Skola Banska - Technicka Univerzita Ostrava
KIT	Karlsruhe Institut für Technologie
KNAW-DANS	Koninklijke Nederlandse Akademie van Wetenschappen
KPI	Key Performance Indicator
MPG	Max Planck Gesellschaft zur Foerderung der Wissenschaften e.V.
PID	Persistent Identifier
SIGMA	SIGMA2
SNIC	Uppsala Universitet
SPMT	Agora, Service Portfolio Management Tool
SURF	SURFsara BV
TRUST	Trust-IT services
UCL	University College London
ULUND	University of Lund
VA	Virtual Access
WP	Work Package

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Executive Summary

DICE relies on the independently operated Collaborative Data Infrastructure (CDI) that was developed in the course of the EUDAT and EOSC-hub EC funded projects. To enable efficient service and resource provisioning through DICE, the integration activities described in this document focus on the further integration of the EUDAT 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 EOSC Portal and searching for services. EUDAT CDI Helpdesk is 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) plays 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 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 FitSM[1] standard, with standard procedures and responsibilities clearly defined to guarantee the quality of the service.

The integrations have been 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 the project lifetime 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.

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[1] https://apmg-international.com/product/fitsm

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1 Introduction

This is the final report of the Integration of CDI Operation and Collaboration Tools in EOSC.

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.

In the previous reports, we have provided an initial architecture plan with a first approach on the integration of the CDI Operation and Collaboration Tools in EOSC with D3.1[2]. This plan was based on assumptions due to external dependencies and the evolution of the EOSC landscape. With the D3.2[3], and with the first EOSC interoperability guidelines in place we provided the first report on the integration of the CDI Operation and Collaboration Tools with EOSC components.

In this final report, based on the evolution of the EOSC interoperability framework we managed to achieve the integrations with the EOSC where possible. Based on this, we describe in detail the technical and administration part of the integration. At the same time the work achieved about Interoperability / integration in the EUDAT and EOSC environment is also described in detail.

1.2 Document structure

In Chapter 2 we present the advantages of the integration with EOSC-Core services for all the different parties EUDAT Providers and B2* Services, EOSC, and the CDI Operation and Collaboration Tools.

Chapter 3 positions EUDAT in EOSC and 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 achieved via the supporting tools used in the DICE project.

Finally, Chapter 5 concludes with the current status of the integrations, the success of the integrations achieved and the obstacles that we expect to face after the end of the project.

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[2] https://doi.org/10.23728/B2SHARE.1D31D6FC7A924F70B3CBE177C1A20D77
[3] https://doi.org/10.23728/B2SHARE.78FFAB065CF44DD090A7732450A48B23

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2   EUDAT in EOSC

As it will be described in the next section, most of the collaboration and operational tools have been integrated with the EOSC-Core services. These integration steps align the user journey and daily work needs for searching, reading, learning, interacting, ordering services that suit their needs.

B2ACCESS has established a connection with the EOSC-Core Infrastructure Proxy service. This integration enables users to access EOSC-Core services using their community identity managed through B2ACCESS.
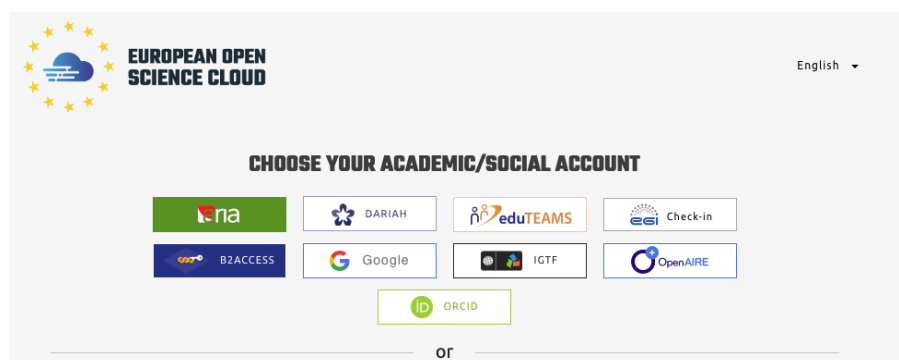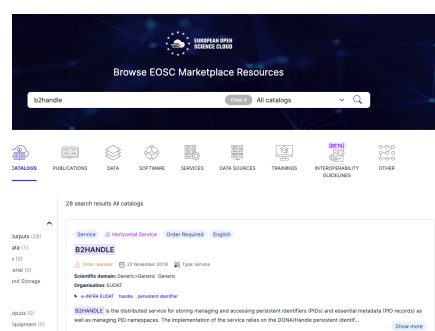

Additionally, B2ACCESS has been registered both as a Community AAI and an Infrastructure Proxy in the EOSC AAI Federation Metadata Registry. This registry is used to manage the EOSC AAI Federation entities and their metadata. By registering as a Community AAI in the EOSC AAI Federation, B2ACCESS will enable researchers to employ their B2ACCESS identity to access services and resources provided by various infrastructures participating in EOSC. At the same time, the integration of B2ACCESS as an Infrastructure Proxy will streamline the accessibility of EUDAT services connected to B2ACCESS for users from different Research Communities.
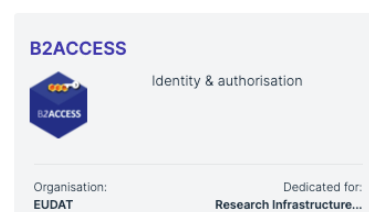
The integration of EUDAT CDI Helpdesk with the EOSC Helpdesk creates a transparent channel from EOSC to EUDAT. New channels of support are created and EUDAT support can interact with users and provide support to them, when requested. This integration also supports the ordering of the services where EUDAT can manage service requests: users can request services, select one of the Service offerings and agree on the most suitable service levels. Order management integration also offers new features like statistics about access requests and customer feedback.

At the same time the integration of AGORA with the EOSC Catalogue and Marketplace added significant value to the EUDAT B2* Services, the EUDAT Service Owners and to the AGORA Service. AGORA followed the interoperability guidelines and adapted the EOSC Profiles metadata schemas for consistently describing the Services. By using this scheme the Services contains the required information a service needs, and this information can be exchanged with EOSC and other services that follow this approach. EUDAT Services Owners can now transparently publish information

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about their services to both the EUDAT Catalogue and the EOSC Catalogue and Marketplace. Finally, EUDAT can now promote the Services and enable adoption from outside the traditional user groups, reaching a wider user base. It also increases the utility of the services by adding a feature of linking with compatible services or products through the EOSC Interoperability Framework.

Finally, the integration of the EUDAT CDI Monitoring with EOSC Monitoring, offers information about the EUDAT Services to all users. This is a transparent integration to the EUDAT Service Providers that offers high value to them like increasing customer satisfaction. The availability, the reliability and the status of each service which is already computed in the EUDAT CDI Monitoring Service, is integrated with the EOSC Monitoring. The real time information and reports about Availability and Reliability is advertised to the EOSC users thus building trust with them and with the potential new customers.

UPTIME MONITORING

Availability	99.18%
Reliability	99.18%
Status	● OK

Show more details >

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3 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. In order to support the integration process we have established a team within the WP3 with wide-ranging expertise and experience to cover all aspects. Moreover, DICE partners were and are actively engaged with the other EOSC initiatives and projects running in parallel to find complementarities, and to capitalise on synergies, to avoid duplication of effort, and increasing seamless integration of the services and resources.

At the same time, the team is and was closely following the developments of the EOSC Portal and the EOSC Interoperability Framework as they were and are developed, maintained, and operated by EC Projects like EOSC-Future. Collaboration with EOSC-Future was close as part of connecting the federating operational tools with the EOSC-Core and in aligning with the requirements of integrated, composable and reliable services.

In order to support the integration (technical interoperability) with the EOSC-Core services, a number of common integration concepts, styles or patterns were identified like the well-defined API style for services that support it and the messaging integration style where structured data needs to be exchanged. Apart from the integration concept which totally depends on the methods supported by the EOSC-Core service the data-format was also checked (semantic interoperability). The services follow the agreement on the format of the data they exchange, and we have developed where necessary an intermediate translator to unify applications that insist on different data formats.

The main points that have been identified to be aligned[4] in the DICE project were a) the comprehensive and coherent set of rules of participation (RoP[5]) to onboard services and make them discoverable and accessible through the EOSC Platform and b) the interoperability and Integration guidelines[6], defining the high-level architecture for basic EOSC technical functions, c) the interoperability guidelines - technical specifications with EOSC-Core like for AAI, Monitoring , Helpdesk that were created in EOSC-Future at the duration of DICE.

The interoperability guidelines have evolved and been used as baseline during the project duration for the interoperability specifications so as to guide the CDI Operation and Collaboration Tools when designing and implementing the architectural plan.

During the project DICE , the EUDAT Service Owners of the CDI Operation and Collaboration Tools were actively participating in the development of the EOSC-Core interoperability guidelines. The tools were sometimes used as demo services to test and validate the steps of the integration.

- **AGORA**: was one of the first Demo External Catalogue, integrated to EOSC Marketplace and Catalogue via the EOSC Providers Portal;

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[4] EOSC Interoperability Framework - https://www.eoscsecretariat.eu/sites/default/files/eosc-interoperability-framework-v1.0.pdf

[5] https://repository.eoscsecretariat.eu/index.php/s/QWd7tZ7xSWJsesn#pdfviewer

[6] Interoperability guidelines https://confluence.egi.eu/pages/viewpage.action?pageId=52598376

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- **Helpdesk**: EUDAT CDI Helpdesk was one of the first helpdesk services that validated the integration with the EOSC-Helpdesk;

- **DICE VA Data**: DICE was one of the demo projects that had validated the workflow and the VA data description (metadata) that was used in the EOSC-Accounting of Services.

Today we can say that during the DICE project we have managed to integrate CDI Operation and Collaboration Tools with the EOSC-Core Services as presented in Figure 1..
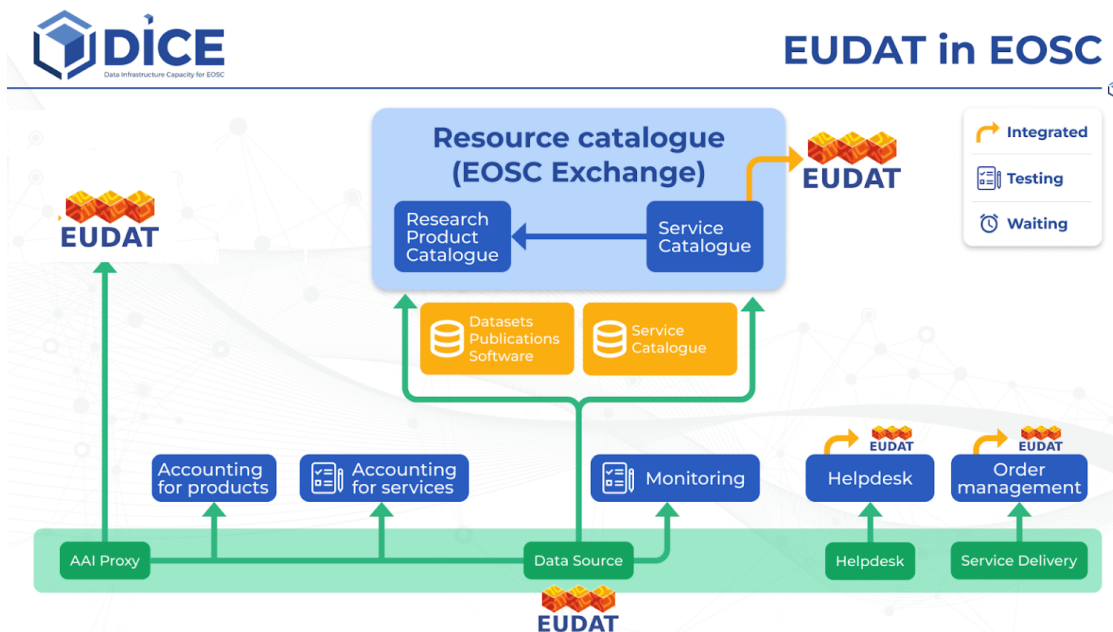

Figure 1 - Status of the integration of CDI Operation and Collaboration Tools and EOSC-Core services

The status of the integrations in DICE is also depicted in the previous figure while associating the corresponding EOSC-Core services. The CDI Operation and Collaboration Tools that were integrated with EOSC-Core services are:

- **B2ACCESS**: EUDAT's Authentication and Authorization Infrastructure (AAI) service is integrated with the EOSC AAI and the EOSC community can login to the EOSC services via B2ACCESS.

- **EUDAT CDI Helpdesk**: The EUDAT CDI Helpdesk is also integrated with the EOSC Helpdesk and questions, help and support can be offered via the EUDAT Helpsked transparently.

- **EUDAT Monitoring**: The EUDAT Monitoring is integrated with the EOSC Monitoring Service and EOSC Community can view the status, availability and reliability results through the EOSC Monitoring UI.

- **AGORA / SPMT**: AGORA is integrated and EUDAT services are advertised whilst at the same time EOSC Community can learn more about them.

In the following sections, you may find information about the work done until the time of writing and the status of integration for each of the Operation and Collaboration tools where applicable.

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3.2   B2ACCESS - Authentication and authorisation service

B2ACCESS is EUDAT's Authentication and Authorization Infrastructure (AAI) service. It is based on Unity Identity Management[7] (IdM) and follows the AARC blueprint[8] architecture for research infrastructure AAIs. This offers the users a wide variety of authentication mechanisms and protocols. B2ACCESS participates in the SAML-based interfederation service EduGAIN[9], which allows users from all over the world to authenticate with the accounts of their home organisation. Beside of this, B2ACCESS is connected to social identity providers (IdPs) like Google or Facebook and other IdPs like ORCID[10] using OAuth2/OIDC. Additionally, it offers authentication with X.509 certificates. For users, who have none of these accounts or do not want to use them for authentication at EUDAT services, B2ACCESS offers local accounts as well. For the interoperation with other research communities, like CLARIN[11] or ELIXIR, B2ACCESS offers users from those communities to log in with their community ID. The external Identity provider and some of the EUDAT services are connected to B2ACCESS using SAML and OAuth2/OIDC protocols. B2ACCESS can translate the authentication between those protocols, so users are not limited in the usage of services by the type of authentication they use.

As preparation for the EOSC federation, B2ACCESS was already connected to EGI CheckIn[12], GEANT eduTEAMS[13] and Indigo IAM[14] in the past. So users from those research infrastructures can use the EUDAT services and vice versa.

Beside the account management of single users, B2ACCESS offers the management of research groups/communities who do not have the possibilities on other infrastructures. For this management, a dedicated view is available to create and maintain the group structure including subgroups and inviting or deleting group members. The membership information, which might be used for authorisation, is released in the common attribute set of each user.

3.2.1   Integration option

B2ACCESS is already integrated with the EOSC-Core components at the moment. The current infrastructure connections, built in EOSC-Hub by EGI Checkin, GEANT eduTEAMS, Indigo IAM and EUDAT B2ACCESS has some limitations and does not scale up to the whole European research landscape. For this reason, the EOSC AAI federation, similar to the eduGAIN inter-federation service, was designed in the last years and is still under development. The EOSC AAI federation is designed and discussed in the EOSC-Future project and the EOSC AAI taskforce.

3.2.2   Technical integration

To be prepared for the start of this federation, B2ACCESS implemented several AARC guidelines[15] about information exchange between research infrastructures in the last years. The implemented guidelines are handling:

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[7] https://unity-idm.eu/
[8] https://aarc-project.eu/architecture/
[9] https://edugain.org/
[10] https://orcid.org/
[11] https://www.clarin.eu/
[12] https://aai.egi.eu/registry/
[13] https://eduteams.org/
[14] https://indigo-iam.github.io/v/current/
[15] https://aarc-project.eu/guidelines/

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- The exchange of group membership and role information (AARC-G002 & AARC-G069)

- The expression of assurance information (AARC-G021)

- The exchange of resource capability information (AARC-G027)

Some further guidelines are still under development and only partly implemented. B2ACCESS already expresses the user identity according to the AARC-G026 guideline but does not yet put the additional claim in the token.

To express the affiliation information within B2ACCESS some additional rules need to be defined, but the affiliation information from the user origin is already expressed according to AARC-G025 guideline. A rule set to determine the affiliation of the user, if the remote identity provider did not provide this information, according to AARC-G057 is under development.

The implementation of the hinting mechanisms to enhance the user experience is under discussion with the company who is developing the underlying software, since there was already another hinting mechanism in place before the guidelines were created. The target is to create a new hinting mechanism which supports the existing parameters and the parameters from AARC-G061 and AARC-G062 guidelines. Since this feature is rarely used by the connected services, the focus was on an overall enhancement of the user experience.

3.3 AGORA - Service Portfolio Management Tool

The EUDAT Service Portfolio Management Tool (SPMT/Agora) is one of the main tools of the CDI Operation and Collaboration Tools. It is used to document and to track the status of service feature requests, maintenance and further developments. AGORA includes standardised information based on the EOSC Profiles (now version 4.0)[16] about the providers and the resources available in EUDAT. DICE also uses the Service Portfolio Management Tool (AGORA)[17] to promote the EUDAT Services.

GRNET started the integration of the AGORA catalogue with the EOSC Platform from the beginning of the project. During this period, we followed the development changes of EOSC Platform. EOSC-Future was and is responsible for the operation of the EOSC Platform, and a dedicated team produced a process in order to integrate providers, regional or thematic catalogues. The EUDAT provider via the AGORA tool was one of the providers that successfully published the Services to EOSC by following the integration steps.

3.3.1 Integration option

EUDAT is an organisation with a number of services (resources) that want to advertise them to the EOSC ecosystem. The solution for that was the integration with the EOSC Providers Portal. We have communicated our intention to integrate sp.eudat.eu with the EOSC Providers Portal from the beginning of the project. The team was in close collaboration with EOSC-Future and was following the evolution of the guidelines.

The EOSC Portal Onboarding Team (EPOT) created an Interoperability framework between EOSC and single organisations, regional or thematic catalogues. The framework was based on the EOSC Profiles which are metadata schemas for consistently describing EOSC Resources, so that they are accurately described and easily found in the EOSC Catalogue and Marketplace. The EOSC Profiles started with version 3.0 and during the last two years had small changes and

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[16] EOSC Profiles v 4.0 https://zenodo.org/record/5726890

[17] https://sp.eudat.eu

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finally, have evolved to version 4.0. These lead to changes to AGORA software on the EUDAT side and to the interoperability guidelines on the EOSC side.

During the project duration we tried the different options supported to integrate with the EOSC Providers portal as a catalogue and as a single provider. The option selected was the **"Basic Onboarding Process: Onboarding resources by a single provider"**[18].

The process was initiated via the EUDAT representative through the EOSC Providers Portal. The main steps that we followed for the onboarding of resources, i.e., the registration of the EUDAT provider and the registration of Resources, are described below:

1. **Onboarding the EUDAT Provider.** The EUDAT provider was registered in the Service Providers Dashboard, and EPOT reviewed this registration before approving it. This step ensures that EUDAT follows the rules or Participation and is organised to provide the type of quality resources expected by EOSC.

2. **Onboarding EUDAT's first resource to the EOSC Catalogue and Marketplace.** The EUDAT provider registered its first resource (B2HANDLE) via the Portal Open API, and EPOT reviewed this registration. This step established the quality and interoperability of the first resource onboarded. EPOT examined the metadata quality, in accordance with the resource profile guidelines and recommendations, as well as spelling, accuracy, composition and the format of URLs. The goal of this review was and always is to comply with the minimum requirements. In case the resource doesn't comply EUDAT's Representative may be asked to take action (e.g. amend the description and resubmit, etc.) or join an information/training session to address issues that are preventing approval of the resource.

3. **Onboarding additional resources.** Once the first resource has been onboarded, EUDAT started adding additional resources to the EOSC Catalogue and Marketplace via the Portal Open API. The EPOT team may optionally audit the input resources.

4. **Ongoing Audits of EUDAT Provider and Resources.** EPOT conducts regular audits of the collection of resources available through the EOSC Catalogue and Marketplace. This ensures that EOSC continues to offer the quality and interoperability of resources required by researchers.

In order to follow the Rules of Participation and to follow the best practices provided by EPOT, we keep EUDAT profile and the EUDAT services profiles up to date, reviewing, updating them at least once a year.

3.3.2 Technical implementation

GRNET implemented the integration of the AGORA catalogue with the EOSC Providers portal. Our main goal in this process was to Onboard to EOSC Providers Portal EUDAT provider and resources/services registered in AGORA and to synchronise controlled vocabularies between the two different sides. In this process the following basic assumptions apply:

● The EOSC Providers Portal provides a unique ID (EOSC_ID) for Provider Profile which is used as a reference for all actions.

● The EOSC Providers Portal provides a unique ID (EOSC_ID) for Resource (Services) Profiles which is used as a reference for all actions.

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[18]https://eosc-portal.eu/eosc-providers-hub/how-become-eosc-provider/instructions-onboard-providers-and-resources-eosc

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- The EOSC Providers Portal is the authoritative source for all the controlled vocabularies.

- The EOSC Providers Portal and AGORA use the same model which is EOSC Profiles 4.0 .

In order to integrate with the EOSC Providers Portal AGORA uses the Portal Open API offered by the EOSC Platform and implements the workflows below. At the same time we connected with the sandbox version of EOSC Platform so as to work and verify that everything was functioning properly.

As a prerequisite for the metadata quality, in accordance with the providers and resource profile guidelines and recommendations we put in place a number of processes. The processes assumes that AGORA, EUDAT and the resources adheres to the Rules of Participation[19] and has in place similar processes for the validation of Provider and Resource Profiles.

We must mention here that some of the developments of this chapter are described in detail in D3.1[20] and D3.2[21] .
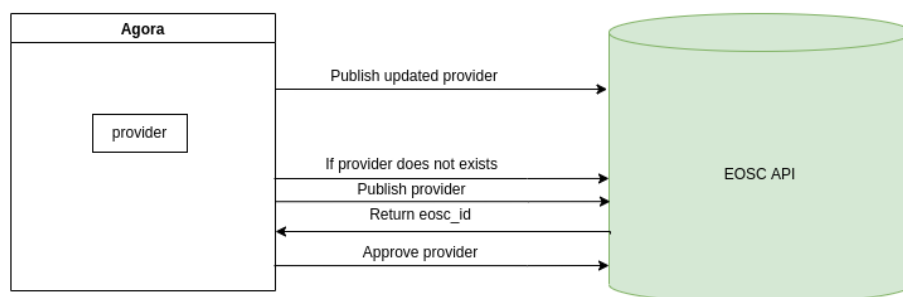
Users in AGORA to support the integration

In order to support the integration process of onboarding the Resources and the Provider we introduced the Portfolio Manager role in AGORA. This role is an administrative role to manage the list of resources / services 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 Profile Workflow

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

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Note that since DICE/EUDAT selected the option "**Basic Onboarding Process: Onboarding resources by a single provider**"[22]. This functionality is currently restricted to updating only the profile of EUDAT as a provider.

The onboarding of a new provider step can be done only via the Providers Portal. Then we can use the unique ID generated by EOSC in AGORA to refer to the EUDAT Provider Profile. We record the publication date and EOSC_ID is in the Provider profile in AGORA. Any changes needed from this point forward can be done via the API. Once the changes on the EUDAT provider profile is ready, the Provider Admin *Publishes* it to the EOSC Provider Portal.

Onboard Resource Profiles Workflow

The image below demonstrates the workflow to onboard a resource in the EOSC Platform via the EOSC API.
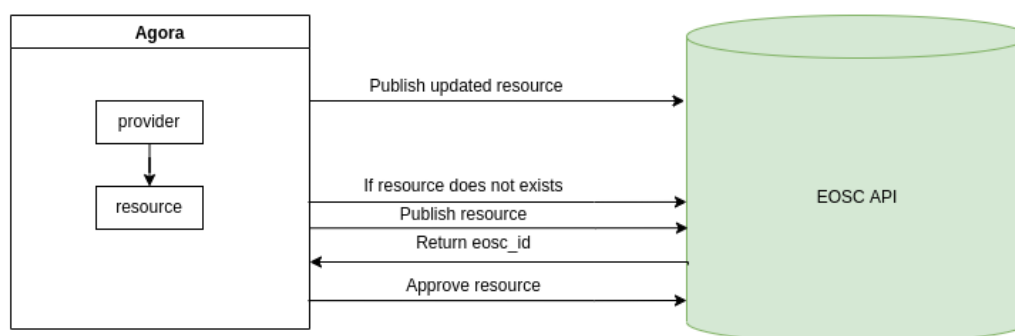
1. In order to onboard a **Resource Profile** to EOSC, the Provider admin should fill in a form with all the required information.

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.

Synchronisation of controlled Vocabularies

The main issue we faced from the beginning of the integration was the vocabularies. Both AGORA and EOSC API started using the vocabularies defined in the EOSC Profiles. 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 vocabularies. We developed a mechanism to check the new entries in the vocabulary. Every month we run a script manually to synchronise the vocabularies. The steps followed are described below:

1. Check if an entry in AGORA vocabulary matches a specific word from the EOSC vocabulary. For example a standard MERIL category.

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[22]https://eosc-portal.eu/eosc-providers-hub/how-become-eosc-provider/instructions-onboard-providers-and-resources-eosc

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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.

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.

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

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3.4 Helpdesk, user support

The EUDAT CDI Helpdesk[23] is a service based on the Request Tracker (RT) ticketing system software. In DICE Task 3.3, led by BSC, was responsible for maintaining the correct functionality of the EUDAT CDI Helpdesk tool and support system and for integrating it with the EOSC Helpdesk.

3.4.1 Integration Options

The EOSC Helpdesk https://eosc-helpdesk.eosc-portal.eu is the entry point and ticketing system/request tracker for issues concerning the available EOSC services.

The interoperability guidelines of EOSC Helpdesk were updated and released at the EOSC-Future project. This EOSC-Core Interoperability Guideline "EOSC Helpdesk: Architecture and Interoperability Guidelines"[24] is intended for the technical experts of service and resource providers that would like their services and/or resources to be interoperable or integrate with EOSC Helpdesk.

The document describes three possible integration methods for a generic Helpdesk with the EOSC Helpdesk service:

- Direct usage, for services which have no helpdesk system and want to adopt the EOSC one;

- Ticket redirection, for services with a fully independent Helpdesk tool, which need EOSC helpdesk to forward the tickets to their system; and

- Full Integration, for services with a fully interoperable Helpdesk service, able to synchronise the information of the EOSC ticketing system with its own.

The EUDAT CDI Helpdeskwas already integrated with the previous EOSC Portal helpdesk system deployed by the EOSC-hub project, but the new ticketing system selected by EOSC-Future required a new integration planning and testing. Given the possibility of further changes, we selected to adopt a flexible and light-weight strategy (ticket redirection), to permit an easy adaptation of the EUDAT RT system to any other system the EOSC Portal might use.

3.4.2 Integration with EOSC helpdesk description

Whenever a user creates a ticket in the EOSC Portal regarding EUDAT services, the ticket is forwarded to the EUDAT Helpdesk, whose support teams provide assistance to the user. The EOSC support team can close the ticket from their side.
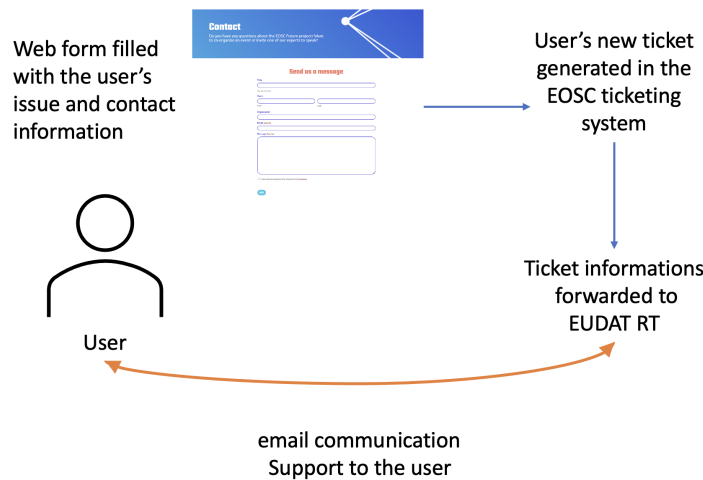
The detailed procedure for the ticket transfer from the two ticketing systems is the following:

1. The user creates a ticket regarding an EUDAT service in the EOSC Portal by using his email user@request.com requested in the web forms that allow the communication of issues, like the one shown in the figure below.

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[23] Helpdesk https://helpdesk.eudat.eu/
[24] https://zenodo.org/record/7308617

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2. The ticket created in the EOSC ticketing system, recognized as an issue for EUDAT, is triggering the generation of an email to helpdesk@eudat.eu. The sender is help@eosc-portal.eu, the email of the requestor is included at the beginning of the forwarded message, and the subject is keeping the original identifier number of the EOSC ticketing, for traceability.

3. When an email is sent to helpdesk@eudat.eu, a ticket is automatically created in the EUDAT RT. If the sender is help@eosc-portal.eu the parameters of the ticket such as user's email and issue, are collected from the message.

4. The EUDAT CDI Helpdesk Team communicates with the user to provide support, informing with an automatic message that the issue owner is passing from EOSC to EUDAT.

We performed several tests to prove the stable integration between the two ticketing systems.

In EOSC, a user can create tickets using different channels (web forms, mail, …) of EOSC Portal. Tickets from different users and from different forms were successfully triggering the creation of messages and forwarded to EUDAT RT Helpdesk. The main scenarios we tested were the following:

● A new ticket is created in the EUDAT RT Helpdesk whenever an email is sent to EUDAT from the EOSC Portal.

● The email of the user requestor appears in the ticket generated in the EUDAT RT Helpdesk.

● The content of the EUDAT RT Helpdesk corresponds to the message in the original ticket.

● The ticket is correctly created in the RT system to permit the communication with the original user requestor from the RT Helpdesk.

The RT system used by EUDAT is a common tool, broadly used by different stakeholders. Although not fully automated, the procedure can be adapted independently from the EOSC Helpdesk tool. The main advantages are that it is extremely easy to maintain and totally transparent for the users.

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3.5 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"[25] and D3.2. Intermediate report on the integration of CDI Operation and Collaboration Tools in EOSC) 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.

3.6 Monitoring and Accounting

3.6.1 Monitoring

The EUDAT CDI Monitoring service is available at https://avail.eudat.eu. The EUDAT monitoring Service is 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.

3.6.1.1 EOSC Integration Option selected

The EOSC Monitoring Team released the final Monitoring Integration Guidelines by the end of 2022. This document describes the EOSC monitoring specification details, the main features, the high-level architecture and the deployment models of the service in EOSC. At the same time it defines interoperability guidelines that enable various integration paths to allow any EOSC service provider to use the service.

The guidelines support 5 different integration options and the one selected was "Use Case 4: Combine Results of existing ARGO Tenants"[26]. This option has as a prerequisite, in order to combine results from tenants, e.g. A and B, those tenants should be already monitored by a relevant Monitoring service and offer at least the following
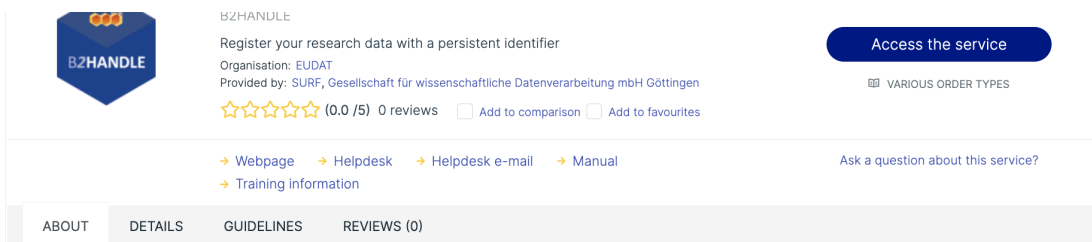
- Latest Data available: Each tenant should be checked that has an active stream of incoming monitoring data

- Topology: Each tenant should already have a well defined source of topology that includes lists of groups, endpoints and services.

- Metric Profile: In simple terms, a list of all services to be checked along with all relevant metrics per service

EUDAT Monitoring Service uses the same technological solution as the EOSC-Core Monitoring Service. All the prerequisite different sources of truth (topology, profiles) are ready and validated by the latest version of the interoperability guidelines of EOSC Monitoring. One of the main advantages of the EUDAT CDI Monitoring service is the way it exposes the data it uses. It uses well defined messages and technologies that can easily and quickly support the integration needed. This led us to integrate the EUDAT Monitoring Service with the EOSC Monitoring Service.
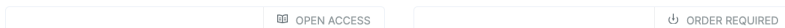
---

[25] https://b2share.eudat.eu/records/1d31d6fc7a924f70b3cbe177c1a20d77
[26] https://zenodo.org/record/7118591

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3.6.1.2. Technical Solution

In this chapter we are going to describe the technical solution which is an extension that maintains compatibility with the developments of the EOSC Monitoring Interoperability Framework and the evolution-development of the EOSC Ecosystem in general.

In order to integrate EUDAT Monitoring with the EOSC Monitoring Service, EUDAT, as mentioned before, decided to make use of the Integration option 4[27] and to export its monitoring data in a dedicated endpoint where it would be accessible by the EOSC Monitoring Service.

The next step was to make the requested data available to EOSC Monitoring. Each different type of data is described below:

Latest Data available:

List of monitoring data results (continuously generated) for EUDAT services. Each item in this dataset contains information about the result of a monitoring check done on a specific service at a specific timestamp. The dataset is encoded in a specific format based on the integration guidelines with EOSC Monitoring. An example of such a data item (decoded) is given below:

Example of a monitoring result data item:

```
{
  "timestamp": "2023-05-04T10:47:29Z",
  "service": "myservice.eudat",
  "hostname": "myhost.example.foo",
```

---

[27] https://argoeu.github.io/argo-monitoring/docs/guides/case4

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```
    "metric": "generic.http",
    "status": "OK",
    "monitoring_host": "monbox.example.foo",
    "actual_data": "time=0.153s",
    "summary": "HTTP Check OK",
    "message": "More Details",
    "tags": {}
}
```

Topology

One of the main sources of truth used in the Monitoring Service is the topology. It helps to discover and map relationships between services / resources. Via the topology the owner may have in-depth visibility into the infrastructure, by enabling the Monitoring Service to categorise, classify, and finally monitor the services in it. Topology includes all the necessary information about how an infrastructure is structured and organised.

EOSC Monitoring service requires the following topology information in order to monitor services

- the services and service endpoints they are running

- the way they are organised (e.g. groups of sites, groups of services),

- the service actors (owners, admins, contact points).

The topology can be further extended with attributes needed for individual probes (e.g. service port or URL, path to be used in case of storage services, e.g.). EUDAT collects this information in DPMT and therefore topology was made available to EOSC Monitoring via it.

An example is

```
{
    "date": "2023-06-04",
    "group": "mygroup",
    "type": "SERVICEGROUPS",
    "service": "myservice.eudat",
    "hostname": "myhost.example.foo",
    "notifications": {},
    "tags": {}
}
```

Required Profiles

There are also specific profiles used in EUDAT Monitoring computations that define what services and checks per service are relevant for the computations and how the services are combined hierarchically These are the metric & aggregation profiles.

**Metric Profile:** A Metric Profile is used to associate a Service with the corresponding metrics.In simple terms, a list of all services to be checked along with all relevant metrics per service

**Aggregation Profile:** An Aggregation Profile defines how to aggregate service statuses into higher hierarchical grouping (i.e. a service_group) status results. They are actually used to define logical rules on how to aggregate individual service status computations into groups.

End Result - EOSC Monitoring

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Once all the information has been prepared, the EOSC Monitoring Team starts testing and validating the different types of data provided. The profiles have been also transferred and configured in the EOSC Monitoring Service. The EOSC Monitoring team configures the service appropriately and the monitoring starts. The EOSC Monitoring Computation and Analytics component calculates availability and reliability of the services, and creates a report. The calculations are done in big data management and processing infrastructures which provide results both in real time and their correction at regular intervalsin combination with EOSC services. The service publishes the results of its calculations in real time, thus allowing the creation of a control panel of the status of the services (through a special interface that has been created). The user can have a look at the Availability, Reliability and status results from the combined reports from the UI.

3.6.1.3. Other Actions

Apart from the integration with EOSC Monitoring a number of other actions took part during the duration of this project .

Guidelines for Service Providers - Ownersin 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.

Monitor the different services in DICE

In cooperation with WP6 - Operations we organised the services in coherent groups and created a number of reports.

3.6.2 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).

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 INFRAESOC-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 ofMetrics Aggregator service.

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4 Integration of the supporting tools

4.1 Introduction

EUDAT has a number of other supporting tools used in project DICE that enables 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

During the DICE project we managed to successfully integrate some of these tools, to reuse the same information, to avoid deduplication and to use it for the users benefit . The internal integrations that are described in detail in the following chapter are the following:

- **(AMS) Messaging as library of data - Monitoring status data:** The Monitoring service status data define the status of each service and/or service components if they are responding or not. These data are stored in the AMS for other services to use it.
- **(Monitoring - AMS - Mattermost) Monitoring status data in Mattermost to inform the Service Providers:** Real time alerts via a new component implementing the mattermost integration are sent to a dedicated channel(s) to inform the owners , users about potential problems.
- **(SVMON - AMS) Messaging as library of data - SVMON service versions:** The Service Version Monitoring tool is sending to a dedicated topic the latest update of the service versions.

4.2 Messaging

The ARGO Messaging Service (AMS) played a role in this new integration ecosystem by starting to fill 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. The Messaging service 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 used the service as follows:

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

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- **Monitoring**: It is already used by the Monitoring Service to exchange information in its components

- **Monitoring status data:** 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 follow a predefined format/schema. This library[28] data helps the user process events/alerts directly from the source.

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

- **(SVMON - AMS) - Messaging as library of data - SVMON service versions:** The Service Version Monitoring tool is sending to a dedicated topic the latest update of the service versions.

- **SVMON - Mattermos**t - The SVMON is sending information about the changes of the Software version

- **(Monitoring - AMS - Mattermost)** - **Monitoring status data in Mattermost to inform the Service Providers:** Real time alerts via a new component implementing the mattermost integration are sent to a dedicated channel(s) to inform the owners , users about potential problems. They are actually push enabled subscriptions that provide the functionality to forward messages to mattermost channels via mattermost webhooks[29].

4.3 Gitlab

GitLab as the central software repository delivered by KIT to EUDAT offers its service for any European research community or infrastructure. In the DICE project GitLab undergone several significant enhancements reported in the previous deliverable D3.3 including:

- Migration of GitLab runners to KIT infrastructure

- Increase of number of runners available for GitLab projects

- Significant extension of the storage resources for GitLab instance.

During the last reporting period Gitlab has been enhanced by enabling the **GitLab Pages** feature. The **GitLab Pages** allows users to easily create and host static websites directly from their GitLab repositories. The primary function of GitLab Pages is to enable developers to showcase their projects or documentation by publishing static HTML, CSS, and JavaScript files directly from their GitLab repositories. It eliminates the need for setting up separate web servers or hosting platforms for deploying static websites. The deployed website can be accessed and viewed by anyone with the URL. This feature will be used by developers for publishing and sharing their projects or documentation online without the need for additional hosting infrastructure.

By the end of the project the number of active users of GitLab has increased up to 550 and the number of projects to 280.

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[28] https://argoeu.github.io/argo-monitoring/docs/guides/AMS-consume-publish-events
[29] https://argoeu.github.io/argo-messaging/docs/guides/mattermost-integration_guide

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4.4 Mattermost

- Mattermost has been updated to the latest version

- Mattermost has been integrated with svmon in order to be used as a notification service for new services and updates created on svmon, each provider has its own mattermost channel that is used to periodically report new versions of its services and components.

The initial plan to use the service as a notification engine for major B2Services has been reported in previous deliverable D3.2. The major enhancements performed in the DICE project include:

- Establishment of broadcasting channels for B2Services

- The Mattermost has been integrated with SVMON, the system for monitoring of the DevOps cycle of B2Services. This integration enables Mattermost to function as a notification service, delivering important updates and alerts for B2Services. Each EUDAT provider now has its dedicated Mattermost channel, dedicated to reporting periodic updates regarding versions of its services and components.

- Integration with the monitoring system is now complete and enables sending the real time notifications to service owners.

4.5 Containers.eudat.eu

The Docker registry service has been deployed and integrated with GItLab in the production environment after a long testing period. The service is based on GoHarbor open-source container registry, which provides a scalable solution for storing and sharing container images. It supports the GitLab Continuous Integration/Continuous Deployment engine and facilitates the build and deployment process.

In the last period of the DICE project the service containers.eudat.eu was enabled in the production environment and integrated with GitLab service. The registry provides a dedicated user dashboard where users can also manage their images interactively. The service is available at https://containers.eudat.eu/

4.6 SVMON

The SVMON service has been dynamically developed and enhanced during the project time. The major achievements can be summarised as follows:

- Frontend Migration: The frontend of the system has been successfully migrated from Angular to React.js, bringing improvements in user interface and interactivity.

- Backend Migration: The backend infrastructure has been migrated from Java to Nest.js, enhancing the system's performance, scalability, and maintainability.

- Integration of SVMON with Argo Messaging: The integration of SVMON with the Argo messaging system enables the system to push notifications on version updates.

- Mobile Devices Support: The system now supports mobile devices, allowing users to access and interact with the platform using their smartphones or tablets.

- Performance Improvements: Various optimizations have been implemented to improve the overall performance of the system, resulting in faster response times.

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- New Backend Architecture: A new architecture has been implemented on the backend, enabling the establishment of relationships among different services within the system.

- Integration with Mattermost: The integration of Mattermost, a communication platform, has been achieved, allowing for efficient notifications and updates within the system.

All integrations of SVMON service have been performed based on the REST API. The description of SVMON V2 API is available at https://svmon.eudat.eu/api/docs/

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, and access 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.

During this project we have successfully integrated most of the Tools (where applicable) with the EOSC-Core services. One other success factor is that we finally managed to put in place some internal integrations to the supporting tools that advance the automation, integration and interoperability of the tools.

Finally, we must mention here that most of the integrations that were developed during this project will be maintained after the end of the project for most of the Services. The support will be maintained as part of the activities offered by each Organisation participating in EUDAT and as described in the D1.5 Deliverable.