

D4.3C

EOOSC Back Office Software



Version 1.0
October 2023

D4.3c / EOSC Back Office Software

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Dissemination Level of the Document

Public

Abstract

This deliverable describes the software components that are required to deliver the Back-Office functionality software that contributes to the achievement of the relevant M30 milestones. It provides a description of each of the components and details of where the source code, artefacts, containers, or other relevant items can be found in each case.

Version History

Version	Date	Authors/Contributors	Description
Vo.1	1/09/2023	Paolo Manghi (OPENAIRE)	Established document structure and initial content.
Vo.1.1	10/09/2023	All authors	Authors' first version
Vo. 2.0	28/09/2023	All Authors	Refinement after internal review
Vo. 3.0	29/09/2023	Paolo Manghi (OpenAIRE)	Refinement after internal review from Mark Van De Sanden for circulation to GA
V1.0	03/10/2023	Paolo Manghi (OpenAIRE), All Authors, Dekker (TGB), Mike Chatzopoulos (ATHENA)	Final version submitted to EC

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List of Abbreviations

Acronym	Definition
API	Application Programming Interface
CRIS	Current Research Information Systems
CRUD	Create, Read, Update Delete paradigm
EPOT	EOSC Provider Onboarding Team
HTC	High-Throughput Computing
SLA	Service Level Agreement
TCB	EOSC Future Technical Coordination Board

1. Introduction

This document describes the final M30 release of the software components that are required to deliver the Back-Office functionality as identified by the Milestones at M30. As shown in Figure 1.1, Back-Office components aim at enabling a uniform Resource Portfolio of resources, including services, data sources, research products, and training material. When reaching the EOSC Portal, users perceive an otherwise fragmented and heterogeneous landscape of resources as a uniform and consistent realm. Providers, by implementing the EOSC Core IF guidelines, can use the services delivered in WP4 to ensure a uniform description of “local” resources, a uniform helpdesk access point, accounting, and monitoring services. Providers may manage individual services and onboard them (and their products, when the service is a data source) in the EOSC Exchange or manage local catalogues, monitoring, accounting, and helpdesk (e.g. clusters and RI hubs) and act as a proxy to the EOSC for local providers. The last release includes the EOSC IF registry that providers can use to onboard EOSC IF guidelines and/or associate their services with EOSC guidelines to facilitate interoperability.

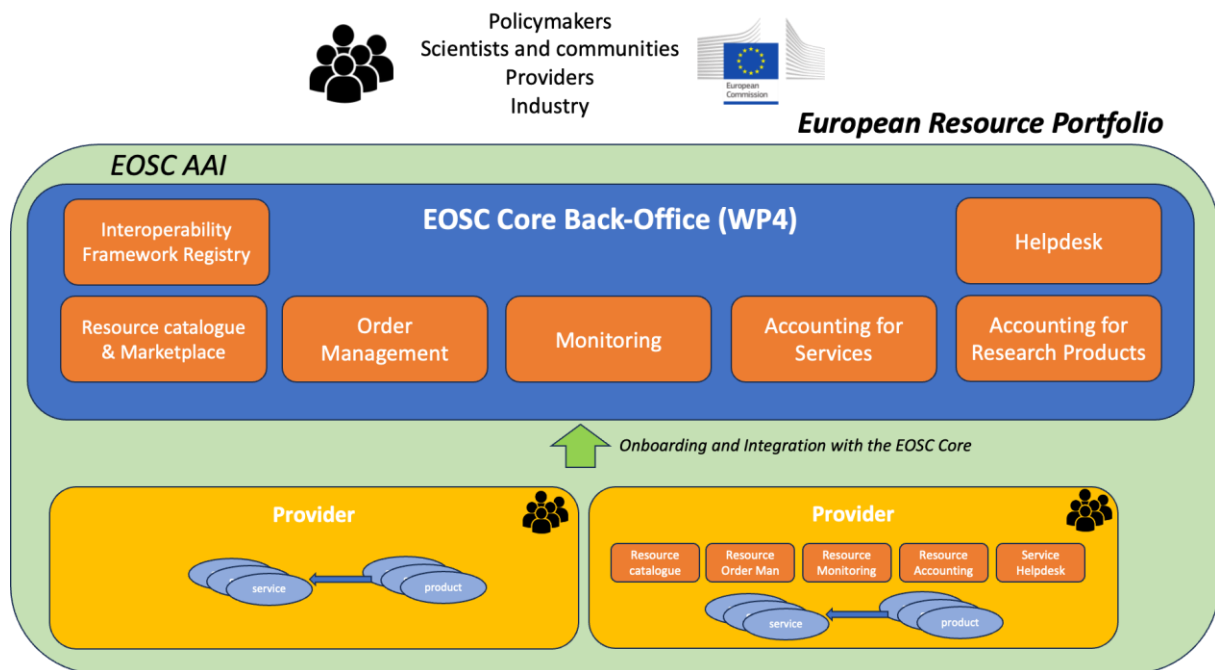


Figure 1.1: EOSC Back-Office components

The intended audience of this document is made up of EOSC technical architects and service providers of the EOSC Core services, other EOSC providers and the European Commission.

Section 2 provides the list of Milestones relevant to this deliverable, together with a short description and their relationship with WP4 Back-Office functional components as described in *D4.1b Back-Office design, functional and technical specifications*. Section 3 provides, for each back-office functional component, a short description and, for each software module, where the related source code, artefacts, containers, or other relevant items can be found.

2. Relevant M30 milestones

The following tables list the M30 Milestones tickets in Jira, specifying which sub-components they contribute to.

Table 2-1: Resource Catalogue & Marketplace

Resource Catalogue & Marketplace	
Reference	Description
TECHRDMP-538 PRODUCTION	EOSC Resource Catalogue APIs and dumps Related Back-Office functional components: 2.1 Resource Catalogue, Research Product Catalogue, Service Providers Dashboard, Research Product Provider Dashboard, Onboarding Workflow System
TECHRDMP-556 PRODUCTION	Enabling the providers deeper insight into their services. Related Back-Office functional components: 2.4 Recommender System

Table 2-2: Interoperability Framework Registry

Interoperability Framework Registry	
Reference	Description
TECHRDMP-594 PRODUCTION	Interoperability guidelines for key Horizontal services are available in the EOSC Portal. Related Back-Office functional components: 2.10 Interoperability Framework
TECHRDMP-596 PRODUCTION	Research communities can start to register horizontal or thematic Interoperability Guidelines in the EOSC IF. Related Back-Office functional components: 2.10 Interoperability Framework
TECHRDMP-597 PRODUCTION	EOSC IF registry: guidelines IDs and profiles. Related Back-Office functional components: 2.10 Interoperability Framework
TECHRDMP-599 ALPHA	EOSC IF registry: IF guideline configuration profiles. Related Back-Office functional components: 2.10 Interoperability Framework

Table 2-3: Resource order management

Resource order management	
Reference	Description
TECHRDMP-561 PRODUCTION	Enhanced order management process to support new emerging use cases. Related Back-Office functional components: 2.5 Order Management (OMS in Front Office, Order Workflow Systems, SOMBO)

Table 2-4: EOSC Core

EOSC Accounting	
Reference	Description
TECHRDMP-573 PRODUCTION	Supporting the integration of accounting for services in the EOSC Marketplace. Related Back-Office functional components: 2.7 Accounting
TECHRDMP-575 PRODUCTION	Integration of research products accounting in the EOSC Provider Portal Related Back-Office functional components: 2.7 Accounting

Table 2-5: EOSC Monitoring

EOSC Monitoring	
Reference	Description
TECHRDMP-570 PRODUCTION	Automated/self-service integration of monitoring probes and metrics offered to EOSC-Exchange providers Related Back-Office functional components: 2.6 Monitoring

Table 2-6: EOSC Helpdesk

EOSC Helpdesk	
Reference	Description
TECHRDMP-589 PRODUCTION	Enhanced integration of the EOSC Provider Portal & Marketplace with the Helpdesk Service Related Back-Office functional components: 2.9 Helpdesk
TECHRDMP-591 PRODUCTION	Multiple Community branded Knowledge bases Related Back-Office functional components: 2.9 Helpdesk

3. Relevant software components

This section lists the software components required to deliver each EOSC-Core component as described in deliverable *D4.1b Back-Office design, functional and technical specifications*. The deliverable reports the output of the work to define and implement the functional and technical specifications of the EOSC Core back-office.

3.1 EOSC Resource Catalogue & Marketplace

3.1.1 EOSC Service Catalogue

EOSC Service Catalogue provides functionality to register, maintain, administer, and access the profiles of services, data sources, and regional/thematic catalogues. Moreover, it provides the back end to register, access, and manage EOSC provider profiles and the metadata information required to enable EOSC monitoring, accounting, and helpdesk functionalities for onboarded resources. It offers the tools for the programmatic access, registration, manage (CRUD) of providers and services, onboarded either directly or from external catalogues (e.g., regional and/or thematic). The software includes the API functionality for the interoperability of those catalogues from individual providers or aggregators with the EOSC portal. It serves as a single source of truth for all services onboarded to the EOSC Resource catalogue, either directly or through third-party catalogues. Modifications to the service resources maintained in the Service Catalogue are synchronized with the EOSC Research Graph and the Marketplace.

For the M30 release, the software has been extended to support new Resource types such as Training Resources, the new Profiles 4.0+ definitions, a tight integration with the EOSC Interoperability Guideline Registry to support onboarding of Guidelines and linking with resources, minting PIDs for all resources onboarded either directly or indirectly through third party catalogues, and finally, ability to subclass Services to distinct sub-profile types such as Data Sources (already implemented) or Computing Resources and other types (to follow).

Table 3-1: EOSC-Enhance Service Registry software components

EOSC Service Registry	
Type	Location
License	<ul style="list-style-type: none"> Apache 2.0 License
Code repository	<ul style="list-style-type: none"> https://github.com/madgeek-arc/resource-catalogue
Release notes, docs, etc.	<ul style="list-style-type: none"> Service Registry frontend URL: https://marketplace.eosc-portal.eu/services Swagger API: https://providers.eosc-portal.eu/openapi Registry Resources profiles: https://eosc-portal.eu/providers-documentation/eosc-provider-portal-resource-profile EOSC Service Catalogue Interoperability Guidelines
New capabilities (from M18 to M30)	<ul style="list-style-type: none"> Training Resources EOSC Interoperability Framework Registry integration Support for Services sub-profile resources, mainly Data Sources Profiles v4.0+ support PID minting for all onboarded resources Monitoring/Helpdesk extension functionality for new resources

	<ul style="list-style-type: none"> • Extending support for new Resource types to third party Catalogues
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3.1.2 EOSC Service Provider Dashboard

The EOSC Service Provider dashboard offers a portal for users representing a Provider organization, who wish to onboard their organization (as an EOSC provider) and their services (thematic/horizontal services, data sources) and regional/thematic catalogues in the EOSC Resource Catalogue. This will enable the collection of resources (either standalone resources or catalogues or resources and providers) from a provider to be accessible through the EOSC Catalogue & Marketplace.

Since M18, the software has been extended to support new resources, such as Training Resources and Interoperability Guidelines. The addition of Interoperability Registry to the EOSC Core components allows providers to link their resources to guidelines so as to facilitate third-party providers to interoperate with the service. For the M30 release, the software has been extended to support Profiles 4.0+ enhancements for both Providers and EPOT curators, enhancing the onboarding experience for Providers by using recommendations for specific profile fields, and enables auditing of resources onboarded from third party catalogues. Finally, for the M30 release, the ability to add sub-profiles to a service has been implemented with a view to the future: Services can now have their own “facets” based on their actual purpose and offered functionality. Data Sources are now a sub-profile of Services, maintaining their generic service identity, but at the same time introducing the ability to provide a more specific definition and description of the actual nature of a Data Source.

Table 3-2: EOSC Service Provider Dashboard software components

EOSC Service Provider Dashboard	
Type	Location
Code repository	<ul style="list-style-type: none"> • https://github.com/madgeek-arc/resource-catalogue-ui-eosc
License	<ul style="list-style-type: none"> • Apache 2.0 License
Release notes, docs, etc.	<ul style="list-style-type: none"> • URL: https://providers.eosc-portal.eu/provider/my • Documentation: https://eosc-portal.eu/providers-documentation • Sandbox: https://sandbox.providers.eosc-portal.eu/becomeAProvider • Usage tutorials: https://eosc-portal.eu/using-the-portal • EOSC Portal glossary: https://eosc-portal.eu/glossary • EOSC Providers Hub: https://eosc-portal.eu/eosc-providers-hub
New capabilities (from M18 to M30)	<ul style="list-style-type: none"> • Training Resources onboarding • Onboarding and curating Interoperability Guidelines to EOSC Interoperability Framework Registry • EOSC Interoperability Framework Registry integration: Resources can be linked to Interoperability Guidelines • Support to data sources and related research product onboarding (TRL8): Onboarding capabilities are extended to support data sources and related research products in EOSC (similar to service onboarding already available) • Support for Services sub-profile resources onboarding (starting with Data Sources) • Profiles v4.0+ onboarding procedures support • Improvements for curation of all types of resources and for resources coming from third party Catalogues

3.1.3 EOSC Research Product Catalogue

The EOSC Research Product Catalogue operates a knowledge graph interlinking research products (publications, data, software) with the data sources providing access to them, and with organizations, funders, projects, and authors. The EOSC Research Product catalogue is generated once a month, to ensure its up to

date-ness with the EOSC data sources as well as with thousands of data sources globally. The Research Product Catalogue is powered by the OpenAIRE Research Graph (<https://graph.openaire.eu>).

3.1.4 EOSC Resource Catalogue

The EOSC Resource Catalogue is the heart of the EOSC Future platform, being a service that brings together and provides access to the content of the EOSC Service Catalogue and the EOSC Research Product Catalogue. Services and products are interconnected to provide a knowledge graph of EOSC resources. To this aim, the OpenAIRE Research Graph (<https://graph.openaire.eu>), powering the EOSC Research Product Catalogue, has been enriched with content from the EOSC Service Catalogue by regularly harvesting its service profiles. The Graph has been therefore extended to include services as a new data model entity and include semantic relationships between services and products, such as “the product is *hostedBy* a service” (e.g. dataset deposited in Zenodo), “the product was *collectedFrom* a service” (e.g. the metadata of a dataset is collected from the CEESDA research data catalogue, while the actual dataset is deposited in a repository harvested by such catalogue), and “the product is referring to a service” (e.g. an scientific article mentions the service in the text). The EOSC Research Product catalogue is generated once a month, to ensure its up to date with the EOSC data sources as well as with thousands of data sources globally.

At M15, the Research Product Catalogue software has been released as an extension of the OpenAIRE Research Graph Aggregation and Provision software. The extension integrates:

- *Data model update*: added a new entity “service” in the model, semantic relationships between services and products, and EOSC Interoperability Framework guidelines for all resources
- *Aggregation workflows*: the data aggregation workflows necessary to collect metadata profiles from the EOSC Service Catalogue as well as from OpenDOAR, FAIRSharing.org, and re3data.org;
- *Deduplication of content*: deduplication algorithms capable of identifying and merging duplicates across service catalogues/registries to disambiguate the Resource Catalogue and to support deduplication of service and data source profiles in the Service Catalogue;
- *APIs*: API software enhanced to enable discovery of services and of resources by EOSC IF guidelines;
- *Data dumps*: software to generate EOSC Resource Catalogue datasets referring to all and only EOSC onboarded resources; the dataset are used to deliver the index for the EOSC Search.

At M28 the mining modules for inferring links representing “mentions” between full-text of articles and EOSC Services has been released as part of the software.

Table 3-3: OpenAIRE Aggregation and Graph Provision system software components

OpenAIRE Aggregation and Graph Provision system	
Type	Location
Code repository	<ul style="list-style-type: none"> • https://code-repo.d4science.org/D-Net/dnet-hadoop • https://svn-public.driver.research-infrastructures.eu/driver/dnet45/webapps/dnet-container-openaireplus/branches/prod
License	<ul style="list-style-type: none"> • AGPL v3.0
Release notes, docs, etc.	<ul style="list-style-type: none"> • Graph data model: https://code-repo.d4science.org/D-Net/dhp-schemas • Graph general info: https://graph.openaire.eu
New capabilities (from M18 to M30)	<ul style="list-style-type: none"> • Integration of links between full-text of articles and EOSC Services generated by mining algorithms in IIS

Table 3-4: OpenAIRE APIs software components

OpenAIRE APIs	
Type	Location
Code repository	<ul style="list-style-type: none"> https://code-repo.d4science.org/D-Net/dnet-openaire-exporter
License	<ul style="list-style-type: none"> AGPL v3.0
Release notes, docs, etc.	<ul style="list-style-type: none"> Graph data model: https://code-repo.d4science.org/D-Net/dhp-schemas
New capabilities (from M18 to M30)	No new capabilities, only consolidation

Table 3-5: OpenAIRE Information Inference Service software components

OpenAIRE Information Inference Service	
Type	Location
Code repository	<ul style="list-style-type: none"> https://github.com/openaire/iis
License	<ul style="list-style-type: none"> AGPL v3.0
Release notes, docs, etc.	<ul style="list-style-type: none"> Docs: https://github.com/openaire/iis/tree/master/docs
New capabilities (from M18 to M30)	<ul style="list-style-type: none"> <i>Mining algorithms to infer links between scientific articles and EOSC services in the Marketplace (TRL8):</i> Finalization of mining algorithms to identify references to EOSC services from scientific publications to be used to define impact indicators

3.1.5 EOSC Research Product Provider Dashboard

The EOSC Research Product Provider Dashboard is a one-stop-shop web service where data source providers can find the functionalities to onboard their Research Products into the EOSC resource catalogue. The functionality includes registration of data sources, validation of the Research Product against the EOSC IF guidelines, EOSC Research Product Accounting Service (OpenAIRE UsageCounts), and the Broker Service (to receive notifications about metadata enrichments). The Data Source management functionality of the Research Product Provider Dashboard shows the status of harvesting of the data source and offers access to the history of harvesting/validations of Research Products. The service is powered by the OpenAIRE PROVIDE service (<https://provide.openaire.eu>), integrated into the onboarding workflow of Data Sources via the EOSC Service Provider Dashboard.

Since M15, work on the EOSC Research Product Provider Dashboard consisted in the extensions of the OpenAIRE PROVIDE and APIs software necessary to include the new service/data source profile introduced by the EOSC Future. The extension enables full integration with the EOSC Service Provider Dashboard to exchange data source information via such APIs. FAIR validation of data sources is available through aBeta version of the EOSC Research Product Providers Dashboard.

Table 3-6: EOSC Research Product Provider Dashboard

EOSC Marketplace	
Type	Location
Code repository	<ul style="list-style-type: none"> https://svn-public.driver.research-infrastructures.eu/driver/dnet45/modules/ua-repository-dashboard-gui/trunk https://svn-public.driver.research-infrastructures.eu/driver/dnet45/modules/ua-repository-manager-service/trunk

License	<ul style="list-style-type: none"> • AGPL v3.0
Release notes, docs, etc.	<ul style="list-style-type: none"> • Swagger API: https://provide.openaire.eu/api/swagger-ui.html • Info: http://catalogue.openaire.eu/service/openaire.data_provider_dashboard
New capabilities (from M18 to M30)	<i>No new capabilities added, only consolidation</i>

3.1.6 EOSC Interoperability Framework Registry

The Interoperability Framework Registry is a database containing Interoperability Guideline profiles, tightly integrated with EOSC Service Catalogue. By associating services and products to guidelines, providers can indicate compatibility and composability features with other EOSC resources and/or EOSC Core Components. For the M30 release, guidelines can be onboarded into the registry and assigned to service resources via the EOSC Service Providers Dashboard. Also, an API allows for CRUD operations on IF Registry records and manage relations between IF Guideline entries and EOSC Service Catalogue entries. The UI functionality supports different kinds of users:

For providers

- Onboarding of Interoperability Guidelines that can be used by others to interoperate with the Provider's resources
- Management of already onboarded Interoperability Guidelines
- Link a Resource with an onboarded Interoperability Guideline using a UI integration in the Service Providers' Dashboard
- REST API supporting all operations above
- Prototype as planned by T4.2.5: support the ability to onboard Configuration Templates for Interoperability Guidelines for Resources

For EPOT team members

- Onboarding approval/rejection of Interoperability Guidelines
- Auditing and curation of Interoperability Guidelines entries

For other EOSC Core Components:

- Vise: Provide listings of Interoperability Guidelines that are adhered by a Resource
- Versa: Provide listings of Resources that have stated that are compatible to a specific Interoperability Guideline

Table 3-7: EOSC Interoperability Framework

EOSC Marketplace	
Type	Location
Code repository	<ul style="list-style-type: none"> • https://github.com/madgeek-arc/resource-catalogue.git
License	<ul style="list-style-type: none"> • Apache 2.0 License
Release notes, docs, etc.	<ul style="list-style-type: none"> • EOSC Interoperability Guidelines Registry frontend URL: https://providers.eosc-portal.eu/home • Swagger API: https://providers.eosc-portal.eu/openapi • EOSC Service Catalogue Interoperability Guidelines
New capabilities (from M18 to M30)	<ul style="list-style-type: none"> • User interface for the management of Interoperability Guidelines, including the underlying database of the EOSC IF registry in the same way it's done for all other resources (TRL8) • Link a Resource with an onboarded Interoperability Guideline using a UI integration in the Providers' Dashboard • Auditing and curation of Interoperability Guidelines

	<ul style="list-style-type: none"> Resources complying to a Guideline and Guidelines adhered to a Resource are shown to users to facilitate composability and compatibility
--	--

3.2 EOSC Order Management

The Order Management system of the EOSC Platform facilitates the interaction between consumers and providers in the scope of getting access to services and their offers, published in the EOSC Catalogue & Marketplace components. It consists of:

- User facing part exposing the offerings and allowing the user to ask for the access (place the order) using the parameters defined by the provider and providing information on the scientific purpose for it.
- User facing part supporting the management of research products of choice with direct access to their source, which is a first step for the resource composability via the EOSC Marketplace Projects
- User facing part supporting the management of the issued orders or access requests, keeping the user updated on their status and offering the communication channel with the provider in the scope of the order.
- Provider facing UI allowing to create and manage their offers for a given service or a service bundle along with the list of parameters to be filled in by the user when placing an order.
- Provider facing UI gathering orders issued by the users, allowing to manage them.

The EOSC Marketplace UIs exploit the following APIs:

- API Exposing functions that are necessary to manage offerings (services and bundles) from provider's order management system, including their technical parameters and ordering configuration.
- Ordering API which enables integration with the ordering process. External Order Management Systems (OMSes) can use it to keep order processing on their side, but still providing users with a consistent order workflow and support.

Since M18, the work was concentrated on the user experience aspect of offer options for providers to define bundles. After this update, a new functionality allowing to add research products (with their sources and other relevant data) to Marketplace projects was developed, as a first step towards representing resource composability via Marketplace Projects.

Table 3-8: EOSC Order Management

EOSC Marketplace	
Type	Location
Code repository	<ul style="list-style-type: none"> https://github.com/cyfronet-fid/marketplace
License	GPL-3.0
Release notes, docs, etc.	<ul style="list-style-type: none"> Latest release: https://github.com/cyfronet-fid/marketplace/releases/tag/v3.49.2 Read Me: https://github.com/cyfronet-fid/marketplace/blob/master/README.md Change Log: https://github.com/cyfronet-fid/marketplace/blob/master/CHANGELOG.md <p>Other documents:</p> <ul style="list-style-type: none"> JIRA integration - https://github.com/cyfronet-fid/marketplace/blob/master/docs/jira_integration.md API - https://marketplace.eosc-portal.eu/api_docs

	<ul style="list-style-type: none"> Description of functionalities - https://wiki.eoscfuture.eu/display/EOSCF/Activity+5.2.1+-+Front+Office+EOSC+Portal+Catalogue+and+Marketplace+Functionalities
New capabilities (from M18 to M30)	<i>Solutions/Bundles can be ordered/accessed in one shot (TRL8):</i> Enhanced UI to bundle definition of the bundles for the Providers <i>Research products can be added to the MP Projects (TRL 7)</i> <i>Improved UI for Providers to define service offers.</i>

3.3 EOSC Accounting

3.3.1 EOSC Accounting for Research Products

The OpenAIRE Accounting for Research Products Service gathers usage activity for research items like publications, research data and software, as well as consolidated usage statistics reports, from a distributed network of content providers (repositories, e-journals, CRIS) by utilizing open standards and protocols and exploiting reliable, consolidated, and comparable usage metrics like counts of item downloads and metadata views conformant to COUNTER Code of Practice. Registration of an EOSC Data Source to the service can be performed during EOSC onboarding of research products. The software is in production since M6.

Table 3-9: OpenAIRE Usage Counts software components

EOSC Marketplace	
Type	Location
Code repository	<ul style="list-style-type: none"> https://github.com/openaire/Generic-Matomo-Tracker https://github.com/openaire/OpenAIRE-Piwik-DSpace https://github.com/openaire/EPrints-OAPiwik
License	<ul style="list-style-type: none"> Apache v2.0
Release notes, docs, etc.	<ul style="list-style-type: none"> UsageCounts informative website: http://usagecounts.openaire.eu UsageCounts Guidelines: https://openaire.github.io/usage-statistics-guidelines/ UsageCounts SushiLite APIs: https://usagecounts.openaire.eu/resources#apis
New capabilities (from M18 to M30)	No new capabilities, only software consolidation.

3.3.2 EOSC Accounting for Services

The EOSC Accounting for Services collects, stores, aggregates, and displays usage information related to EOSC Exchange services. Service providers can customize the indicators, to report their Virtual Access or usage statistics transparently to EOSC Users. Service Providers of the EOSC Platform can publish accounting data to the central accounting repository via an http API so that they can aggregated, exchanged or made available through an external Accounting Portal.

At M25, the first TRL8 release of the EOSC Accounting for Services software has been released, including the APIs and User Interfaces. EOSC Accounting for Services is integrated with the Service Catalogue, to access the list of EOSC Data Sources, and with the EOSC Explore service to link usage data to active EC projects.

Table 3-10: EOSC Accounting for Services software components

EOSC Accounting	
Type	Location
Code repository	<ul style="list-style-type: none"> https://github.com/ARGOeu/ARGO-accounting.git https://github.com/apel/apel.git

License	<ul style="list-style-type: none"> • Apache License 2.0
Release notes, docs, etc.	<ul style="list-style-type: none"> • Accounting api: api.accounting.eosc-portal.eu / api.accounting.argo.grnet.g • Accounting UI: accounting.eosc-portal.eu / ui.accounting.argo.grnet.gr • Documentation: https://argoeu.github.io/argo-accounting/ • Release notes: https://github.com/ARGOeu/argo-accounting/releases
New capabilities (from M18 to M30)	<p><i>New accounting system for EOSC services (TRL8):</i> The new Accounting for Services system allows to gather and retrieve information about custom metrics defined by service providers.</p>

3.4 EOSC Monitoring service

EOSC Monitoring is the key service needed to bring at the level of EOSC Platform insights about availability of service at local infrastructures. It needs to be continuous and on-demand to quickly detect, correlate, and analyse data to have a fast reaction to anomalous behaviour. The challenge of this type of monitoring is to quickly identify and correlate problems before they affect end-users and ultimately the productivity of the organisation. Management teams can monitor the availability and reliability of the services from a high-level view down to individual system metrics and monitor the conformance of multiple SLAs.

At M1, the EOSC Monitoring service software has been released as an extension and customization of the ARGO technology to support two operational monitoring services: the EOSC-CORE and the EOSC-Exchange Monitoring Services, respectively monitoring the EOSC Platform services (EOSC Core Monitoring) and the services onboarded to the EOSC Catalogue and Marketplace (EOSC-Exchange Monitoring). The software supports an API to enable the EOSC Service Provider Dashboard to offer Providers to configure the monitoring of a given EOSC service.

Between M18 and M30, the EOSC Monitoring was integrated with the EOSC Providers Dashboard and EOSC Marketplace for monitoring data to become available via their corresponding dashboards. In M29, the EOSC Monitoring offered to providers the self-service integration of custom monitoring probes and metrics functionality via a workflow that allows to submit request for new metrics / probes to be evaluated and deployed semi-automatically.

Table 3-11: EOSC-Hub Monitoring software components

EOSC Monitoring	
Type	Location
Code repository	<ul style="list-style-type: none"> • https://github.com/ARGOeu
License	<ul style="list-style-type: none"> • APACHE 2.0
Release notes, docs, etc.	<ul style="list-style-type: none"> • EOSC Exchange Monitoring: https://monitoring.eosc-portal.eu/ • EOSC Core Monitoring: https://monitoring-core.eosc-portal.eu/ • EOSC Core Status: https://status.eosc-portal.eu • API: https://api.argo.grnet.gr • UI Documentation: https://argo.eosc-portal.eu/eosc/documentation • http://argoeu.github.io/overview/ • Web-API: https://argoeu.github.io/argo-web-api/ • POEM: https://argoeu.github.io/poem/v1/ • Web API: https://argoeu.github.io/api/v2/
New capabilities (from M18 to M30)	<p><i>Integration of the EOSC Service Provider Dashboard with the Monitoring Service (TRL8):</i> Add a new report on EOSC Exchange monitoring dashboard about Horizontal Services</p> <p><i>Monitoring dashboard about Horizontal Services report (TRL7):</i> Add a new report on EOSC Exchange monitoring dashboard about Horizontal Services</p> <p><i>Integration of the EOSC Marketplace with the Monitoring Service (TRL7):</i> The Marketplace will include Monitoring Data (status, A/R) in the resource entries</p>

	<i>Status Pages about Core Services (TRL7)</i> : A service to display the latest status about the EOSC Core services
	Self-service integration of custom monitoring probes and metrics offered to providers

3.5 EOSC Helpdesk

EOSC helpdesk is a single point of contact for all EOSC customers for requesting help for enquiries and for reporting or fixing issues. The helpdesk consolidates support for EOSC services and enable communication between service providers and external EOSC users. The established support units with expert teams, management procedures and workflows allow efficiently routing any incoming request or issue to appropriate expert.

At M18-M30, the EOSC helpdesk software has been significantly customized to meet the requirements of the EOSC communities and agent groups, the EOSC Service Management System according to the procedures developed in the scope of Incident and Service Request Management process. The full support structure including multiple support units to provide support for EOSC Core services has been significantly extended and includes multiple support areas of different EOSC communities integrated in EOSC Helpdesk.

A new service to streamline the integration between multiple helpdesks and EOSC helpdesk has been developed at KIT and set in production. The integration in terms of full synchronization has been accomplished with the OpenAIRE helpdesk (in production) and several other helpdesks (beta).

In addition, the option of Helpdesk-as-Service has been significantly extended and new customization options have been added to meet the requirements of some EOSC communities including addition of community portal, customization of logo and themes, implementation of community mini-admin role to manage community support agents independently.

Table 3-12: EOSC Helpdesk software package software components

EOSC Helpdesk	
Type	Location
Code repository	<ul style="list-style-type: none"> https://github.com/zammad
License	AGPL 3.0
Release notes, docs, etc.	<ul style="list-style-type: none"> Service URL https://helpdesk.eosc-portal.eu/ Release note https://eosc-helpdesk.eosc-portal.eu/help/en-us/12-news-updates-and-releases/12-eosc-helpdesk-changelog Technical documentation: https://eosc-helpdesk.eosc-portal.eu/help/en-us/1-eosc-helpdesk-documentation API https://docs.zammad.org/en/latest/api/intro.html
New capabilities (from M18 to M30)	<i>Helpdesk as-a-service is enhanced with community multi-portals (TRL9)</i> Any community or service provider could get a dedicated management area, including multiple support groups, connected with separate email/webform to support users and request a dedicated community portal with unique URL.
	Multi-portals domain themes (TRL9): Implementation of additional customization options including domain themes for community portals in EOSC Helpdesk.
	<i>Integration of multiple communities in EOSC Helpdesk and delivery Helpdesk-as-service to communities (TRL9): software in support of the integration of multiple communities with the EOSC Helpdesk; each community can get a customizable portal with community logo, color theme additional links, mini-admin option (WP6 has integrated OpenAIRE helpdesk, Sikt Helpdesk, and many others).</i>

	<p>Enhanced Slack/other messengers integration (TRL9): Enhancement of the helpdesk integration with multiple Slack channels. Integration with Slack channel of onboarding support group.</p>
	<p>Group subscription (TRL9): The group subscription functionality for a ticket is developed and enabled in production. It allows to involve not only single persons, but also multiple groups to follow the ticket.</p>
	<p><i>Mini-Admin for Helpdesk-as-Service (TRL9)</i>: Implementation of mini-admin role for Helpdesk-as-a-service option to allow community admins to manage the dedicated management area, e.g. add or remove new support members.</p>

4. Conclusions

Overall, this deliverable signifies the completion of the development process for the Back-Office functionality. The deliverable encompasses the culmination of three releases: M6, M18, and M30. These releases pertain to the development and implementation of software components essential for the delivery of the Back-Office functionality, as identified by the Milestones at M30.

In the final release, noteworthy additions include the introduction of the EOSC IF registry. Providers now have the capability to employ this registry to onboard EOSC IF guidelines, as well as associate their services with EOSC guidelines.