



Integration handbook for service providers

Abstract:

The EOSC-hub project operates many of the core elements of the European Open Science Cloud, and acts as the main facilitator of onboarding new providers in EOSC. This handbook provides assistance for service providers who want to share services via EOSC with the use of EOSC-hub services. The document describes the various options for onboarding and service integrations, and points to specific manuals for further details. The handbook is meant to be used as a document to understand the 'big picture' of EOSC onboarding and to choose the best approach for integrating into it.

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TERMINOLOGY

<https://wiki.eosc-hub.eu/display/EOSC/EOSC-hub+Glossary>

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1. Introduction

Over the past years, numerous policy makers from around the world have articulated a clear and consistent vision of global Open Science as a driver for enabling a new paradigm of transparent, data-driven science as well as accelerating innovation. In Europe, this vision is being realised through an ambitious programme under the heading of the European Open Science Cloud (EOSC). The EOSC initiative has been proposed in 2016 by the European Commission as part of the European Cloud Initiative to build a competitive data and knowledge economy in Europe.

The EOSC will offer 1.7 million European researchers and 70 million professionals in science, technology, the humanities and social sciences a virtual environment with open and seamless services for storage, management, analysis and re-use of research data, across borders and scientific disciplines by federating existing scientific data infrastructures, currently dispersed across disciplines and the EU Member States.

The European Commission is providing financial support to implement the EOSC by means of projects under the EU Framework Programme for Research and Innovation (Horizon 2020). The number of Horizon 2020 projects contributing to EOSC reached over 40 by 2020¹.

EOSC-hub is one of the EOSC contributing Horizon 2020 projects. EOSC-hub plays a central role in the EOSC landscape: It established and runs the central services of EOSC, such as the EOSC Portal, a user Authentication and Authorization system, or a 'service onboarding' team - just to name a few. EOSC-hub produced 9 Key Exploitable Results².

EOSC-hub started in 2018 for 3 years to bring together multiple service providers to create "the Hub", a single contact point for European researchers and innovators to discover, access, use and reuse a broad spectrum of resources for advanced data-driven research. This Hub grew into the initial version of EOSC in 2018, with the official opening of the EOSC Portal³ in November 2018.

EOSC-hub contributes to EOSC in 4 main areas:

1. Delivering services that form the core elements of EOSC and act as 'the glue' that enable the sharing and access of services in EOSC. (e.g. Portal, Authentication-authorisation)
2. Delivering generic services (such as compute, storage, data management) and scientific discipline specific thematic services via the EOSC portal.
3. Providing a service management system for EOSC, i.e. processes and procedures that define how to plan, deliver, operate and control services in the Hub.
4. Simplification of the EOSC landscape for the users by, for example, working with providers on harmonised user policies and licenses.

This document is focussing on topic 1, but gives a perspective of the other areas too from the perspective of institutes who wish to offer services in EOSC.

¹ EOSC Projects: <https://eosc-portal.eu/about/eosc-projects>

² EOSC-hub Key Exploitable Results: <https://www.eosc-hub.eu/eosc-hub-key-exploitable-results/>

³ EOSC Portal: <https://eosc-portal.eu/>

- In section 2 the document details the minimum criteria of becoming a provider in EOSC, i.e. onboarding a service in the EOSC Portal.
- In section 3 we provide an overview of other elements of the Hub that you may want to integrate with to improve the feature set your service can offer to EOSC users.
- In section 4 we provide an overview of generic services that EOSC-hub offers for the management, handling and processing of (big) research data. Your service can be enhanced with these.
- In section 5 we provide an overview of the EOSC service management system and how it can help you to become a more professional service provider, better meeting your customers' and users' needs.
- Section 6 provides an outlook beyond EOSC-hub, with an overview of the initiatives and activities that will sustain and further develop the EOSC-hub services for the long term in EOSC.

2. Registering in the EOSC Portal

EOSC services can be accessed by users via the EOSC Portal⁴. Any service that wish to be present in the EOSC Service Portfolio need to apply for inclusion in the Portal via a dedicated form⁵. This application form gathers initial information about the service, reasons for wanting to become an EOSC provider, access conditions and provider contacts.

The information is initially reviewed before a Service Description Template (SDT) is created for the requester to fill it in. The SDT covers more detailed information which enables the service onboarding team to determine that the service fulfils all requirements of the 'Rules of Participation' in addition to information needed to populate the EOSC Service Portfolio entry corresponding to the new service. The SDT is a longer form, covering areas such as detailed description of the service, licenses, helpdesk contact, accessibility⁶, etc. The onboarding team also provides customisable templates for some of the items, e.g. for 'acceptable use policy'. These templates can help providers fill any gaps they are currently missing from a complete service description.

At the time of writing, there are the following fundamental requirements⁷ for a service to be onboarded in EOSC:

1. The service falls within the remit of the EOSC activities, i.e. it brings value to users and facilitates them to implement Open Science.
2. It is either an online service (e.g. a web application portal, a web service) or a 'human' service, such as training and consultancy. (plain datasets and software artefacts should not be directly onboarded to EOSC. There are other ways⁸ to do that.)
3. The service is mature, reaching 'Technology Readiness Level 7 (TRL7)'⁹. TRL7 services are 'System prototype demonstration in operational environment', practically meaning that they have been already used by early adopter scientists.
4. The compulsory fields of the service description template are filled during onboarding.

The submitted information is reviewed for suitability by the onboarding team, then a draft, hidden page is setup about the service within the EOSC Portal. This draft is sent back to the submitter for

⁴ <https://eosc-portal.eu/>

⁵ Application form for new service providers: <https://eosc-portal.eu/for-providers>

⁶ Some services are available through the EOSC Portal publicly, without any login. Other services require the user to login (for traceability purposes). Yet other services require access requests from the users which are then evaluated against service-specific eligibility criteria.

⁷ A few additional considerations are listed at <https://wiki.eosc-hub.eu/display/EOSC/Criteria+for+possible+inclusion+in+the+EOSC+Service+Portfolio>

⁸ Plain datasets should be deposited in data repositories that are already registered in EOSC. Data repositories can be found in the 'Sharing and Discovery' and in the 'Data management' sections of the EOSC Portal. Software should be deposited in software repositories that are already registered in EOSC. Software repositories can be found in the 'Sharing and Discovery' sections of the EOSC Portal.

⁹ Technology readiness levels defined by the European Commission:

https://ec.europa.eu/research/participants/data/ref/h2020/wp/2014_2015/annexes/h2020-wp1415-annex-g-trl_en.pdf

final validation. After successful validation the service entry is made public and accessible in the EOSC Portal and Marketplace¹⁰.

Reaching the published status with the service entry in the EOSC Portal and Marketplace is the minimum level of EOSC integration. This level ensures that the service meets minimum requirements, it is visible, properly described and accessible for new users. If the service requires users to apply for access, then such requests will be submitted via the EOSC Marketplace, then forwarded to the service provider who can evaluate and respond to the requests.

Additional integration options also exist besides the portal registration that was discussed so far. Those additional integrations are optional, but they can bring further added value to providers and the users. These additional integration options are described in Section 3, 4, and 5.

3. Integrating with federation services

EOSC-hub offers a set of services that help service providers enhance their services from the operational perspective. The services can, for example, simplify how users access the service federated authentication, improve service reliability, provide details on capacity consumption by users, or simplify user interaction via a helpdesk. This section provides an overview of these services, using the same structure for each.

3.1 Federated user authentication

What is it

The EOSC-hub Authentication and Authorisation Infrastructure (AAI) enables seamless, authenticated access to services and research data in EOSC. The EOSC-hub AAI enables service providers to control access to their services from users holding identities (usernames and passwords) from a very broad set of academic, community or social Identity Providers¹¹ (IdPs). The EOSC-hub AAI brings together these IdPs, the EOSC-hub service providers (SPs) and intermediary identity management proxies into a single, interoperable infrastructure. The EOSC-hub AAI builds on open technologies including SAML 2.0, OpenID Connect, OAuth 2.0 and X.509v3 to offer a flexible framework for access management. The EOSC-hub AAI comprises different, compatible endpoint services, namely B2ACCESS, Check-in, eduTEAMS and INDIGO-IAM that service providers are free to choose from depending on their preference of technology or provider. The infrastructure also includes Perun, a component that can be used for managing users' access rights to the services, and a set of Token Translation Services to translate between different protocols or technologies when passing identities and user roles to services.

¹⁰ The EOSC Portal is the landing page for users (<https://eosc-portal.eu/>). The Marketplace is accessible via the 'Services & Resources' subsection of the portal and provides interfaces to inspect, access service entries, or to submit access requests to services.

¹¹ Supported IdPs include those that are part of the eduGAIN federation, ORCID, Google, Facebook, LinkedIn and others.

Why to use it

If Your service or dataset requires authenticated access, or if you want to track usage at the level of individual users, then the EOSC-hub AAI offers a simple way for user authentication and authorisation. The AAI enables users to get from the EOSC Portal into your service with a single identity, which they already hold from their university, institute or preferred social network. The EOSC-hub AAI can recognise this identity and pass you a trusted token to enable access for the service you offer.

How to integrate with it

As a resource provider you have several endpoints in the EOSC-hub AAI to integrate with:

- B2ACCESS
- Check-in
- eduTEAMS
- INDIGO-IAM
- Perun
- WaTTS
- MasterPortal
- RCauth.eu

Full documentation is available at

<https://confluence.egi.eu/display/EOSC/Authentication+and+Authorization+Infrastructure+-+AAI>

Where to ask assistance

Open a ticket in the EOSC-hub Helpdesk (<https://helpdesk.eosc-hub.eu/>).

3.2 Availability and reliability monitoring

What is it

Monitoring is the key service needed to gain insights into an infrastructure. It needs to be continuous and on-demand to quickly detect, correlate, and analyze data for a fast reaction to anomalous behavior. The challenge of this type of monitoring is how to quickly identify and correlate problems before they affect end-users and ultimately the productivity of their organizations. The features of a monitoring system are monitoring of services, reporting availability and reliability, visualization of the services status, providing dashboard interfaces and sending real-time alerts. Management teams, administrators, service owners 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.

EOSC-hub provides a service monitoring service based on the ARGO system. This ARGO Service collects status results from one or more monitoring engine(es) and delivers status results and/or monthly availability (A) and reliability (R) results of distributed services. Both status results and A/R metrics are presented through a Web UI, with the ability for a user to drill-down

from the availability of a site to individual services, to individual test results that contributed to the computed figure. Argo is capable also to send notifications to the service admins in case of a failure/warning on one of the services monitored.

Why to use it

ARGO Service Monitoring keeps an eye on the performance of IT services and quickly detects issues and helps the providers resolve them. The service is provided by EGI, based on ten years' experience of monitoring distributed e-infrastructures. With Service Monitoring you get:

- Activate monitoring of your services with minimal effort
- Ready-to-use user interface
- Automated reporting tools

How to integrate with it

Please follow these steps to request the monitoring of one/more services in EOSC:

1. Open a ticket at the EOSC Helpdesk (<https://helpdesk.eosc-hub.eu/>), assigning it to the 'EOSC Availability / Reliability Monitoring', and with the following content:
 - a. Short description of the integration use case
 - b. A name for the new service(s)/infrastructure to monitor. In order to help you with the monitoring of the Service(s)/infrastructure it would be helpful to add the service endpoint(s) with a small description (optional).
 - c. The list of probes that should be used for the monitoring. Known service types and ready-to-use probes are listed at https://poem.egi.eu/ui/public_probes
2. If the request refers to a new service type and/or new probe, then the probes should be developed. This is possible by following the guidelines at http://argoeu.github.io/monitoring-probes/v1/guidelines_for_monitoring_probes/
3. The Monitoring team will deploy the probes and activate the tests in the ARGO staging instance. If the tests are successful, then the configuration is replicated into the production instance.

Where to ask assistance

Open a ticket at the EOSC Helpdesk (<https://helpdesk.eosc-hub.eu/>).

3.3 Usage accounting

What is it

EGI provides an accounting service for EOSC. This Accounting service can collect, store, aggregate, and display usage information about the following types of services:

- High Throughput Compute
- Infrastructure-as-a-Service cloud virtual machines
- Storage space providers

- Data set providers

This usage data is collected from those Resource Centres that provide the above types of services, and that connect their service endpoints to the centrally managed Accounting Service. Accounting information is gathered from the service by probes and sensors according to certain data formats¹².

Probes and sensors are deployed locally at the service providers. Data is forwarded from the sensors into a central Accounting Repository where those data are processed to generate various summaries and views for display in the Accounting Portal¹³. Depending on the complexity of the provider the accounting data may go via intermediate repositories that collate accounting data for particular regions, sub-infrastructures or communities. EOSC service providers can either directly publish accounting information into the EOSC Accounting Repository or can do so via an intermediate repository that serves for example a specific region or group of providers. It is up to the provider (group) to use the central repository directly, or to apply an intermediary accounting infrastructure and connect it to EOSC.

Why to use it

The EOSC-hub Accounting service stores user accounting records from various services. It works thanks to a network of message brokers that transfer usage data from the host to a central repository of information. The data is handled securely and can be consulted online through the Accounting Portal. Accounting gives:

- Increased control over resource consumption
- Reduced overhead of defining data models, architecture and setup of an accounting system
- Reduced cost of maintaining an accounting infrastructure
- Access to a reliable, high available, high performance service
- User friendly web interface

How to integrate with it

The integration of a service with the Accounting Service requires three steps:

1. Registration of the service in a 'topology', associating it with geographical or community entity (e.g. a country, a community-specific infrastructure). Topology information is stored in the GOCDB system.
2. Installation of parsers at the service provider to produce accounting data in the format expected by the Accounting Repository¹⁴. The parser must be specific to the resource that should be observed from the usage perspective. Ready-to-use parsers are available for
 - a. Grid jobs: <https://github.com/apel/apel/tree/dev/apel/parsers>

¹² Message formats for Job records: <https://wiki.egi.eu/wiki/APEL/MessageFormat>; for VM usage records: <https://egi-federated-cloud.readthedocs.io/en/latest/federation.html#cloud-usage-record>; For Storage usage records: <https://www.ogf.org/documents/GFD.201.pdf>; Data usage: In prototype version.

¹³ EGI Accounting Portal: <https://accounting.egi.eu/>

¹⁴ Job records format: https://wiki.egi.eu/wiki/APEL/MessageFormat#Job_Records and https://wiki.egi.eu/wiki/APEL/MessageFormat#Summary_Job_Records;

VM usage record format:

<https://egi-federated-cloud.readthedocs.io/en/latest/federation.html#cloud-usage-record>;

Storage usage record format: <https://www.ogf.org/documents/GFD.201.pdf>

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- b. VMs: <https://github.com/apel/caso>
 - c. DPM and dCache storage systems: Part of the relevant storage software release
 3. Accounting records should be sent to the Accounting Repository (directly or via intermediate repositories).

Where to ask assistance

Open a ticket at the EOSC Helpdesk (<https://helpdesk.eosc-hub.eu/>).

3.4 Helpdesk

What is it

The EOSC-hub Helpdesk (<https://helpdesk.eosc-hub.eu/>) is the entry point and ticketing system/request tracker for issues concerning EOSC services. New service providers of EOSC can integrate into the Helpdesk and this results in:

- a corresponding support topic listed on the Helpdesk user interface (for users to ask questions or raise issues directly to the provider)
- the provider support team to receive notifications about tickets that are assigned to this topic by the users, or by the ticket handler team of EOSC-hub.

The Helpdesk therefore serves two groups, offering the following features to them:

- Main features offered to users:
 - Creation of a ticket for any of the EOSC Services (Hub and EOSC Portfolios)
 - Display all the tickets created by the owner
 - Find previously created tickets
 - Receive notifications about answers and changes to the tickets
 - Login with the EOSC AAI system
- Main features offered to the provider Helpdesk Team:
 - Notification when a new ticket is created
 - Classification of the tickets
 - Escalation of the tickets to the ticket handler team of EOSC-hub
 - Creation of a new support unit¹⁵ with assignation of an administrator role to specific users
 - Management of incident or disruption of Hub services
 - Interface for communicating with other service providers ticketing systems
 - First level support for EOSC integrated services as a service
 - Interface with a Known Errors Database and with a Change Management Database

EOSC services can use the EOSC Helpdesk choosing one of the following integration options:

1. Direct Usage: Use directly the EOSC helpdesk as the ticketing system for the service.

¹⁵ A support unit allows identifying tickets for a specific service. A dedicated team of supporters can be associated with a support unit.

2. Ticket Redirection: Use the EOSC helpdesk only as a contact point to redirect the entry request for the specific service to a mailing list.
3. Full Integration: Integrate an external ticketing system with the EOSC helpdesk infrastructure to enable transfer of tickets between them.

Why to use it

- Have a central point of contact for support of your EOSC users
- Route/reroute issues to where they can be solved within EOSC

How to integrate with it

The procedure to integrate a service in the EOSC helpdesk is the following, some steps are required only for the Direct usage and Full integration options.

1. Create a ticket in Helpdesk (<https://helpdesk.eosc-hub.eu/>). Add as "Subject": <Preferred way of integration> Helpdesk service for <name of service>
 - a. Preferred way of integration "Direct/Ticket redirection/Full"
2. Add in the "Describe the issue" field
 - a. (For all integration ways) A list of web pages that can be used in the 0 Level (like FAQ, How To,...) that users will be using for solving issues without creating a ticket.
 - b. (For all integration ways) Specify the main responsible(s) of the service by email and name.
 - c. (For all integration ways) Specify where to find the filled Service Description Template (<https://wiki.eosc-hub.eu/display/EOSC/Service+Provider+Documentation>) (Either by a link or attach a pdf with the filled form).
 - d. (For)
 - i. (Direct Usage) Emails and names of persons that will be responsible for 2nd (and 3rd if applicable) level support unit(s)
 - ii. (Ticket redirection) Mailing list of the external ticketing system.
 - iii. (Full integration) A user or a team should be specified which will be responsible for the creation of the SOAP interface. The SOAP interface must follow this guidelines: https://wiki.egi.eu/wiki/GGUS:SOAP_Interface_FAQ

Where to ask assistance

Open a ticket in the EOSC-hub Helpdesk (<https://helpdesk.eosc-hub.eu/>).

4. Managing research data

EOSC-hub offers various services for service providers to help them more easily manage research data and implement scenarios where research data (often 'big data') need to be stored, transferred, analysed, indexed, etc. Some of the typical situations when a service can benefit from such support:

- Your service needs to store and analyse data with the use of external compute and storage resources (e.g. cloud resources);

- Your service needs to copy/move big data between your premises and other sites;
- Your service needs an external repository to deposit research data or scientific applications for broader sharing and reuse

Figure 1 positions the relevant services along the ‘virtuous cycle of research’, showing the different services of EOSC-hub that can be used to

1. Discover existing research data and services/applications
2. Process and analyse digital research data
3. Archive and curate research data
4. Deposit and make available research data for reuse

These services, even if they are positioned within the same stage of the cycle, provide different features and/or are offered with different conditions of use.

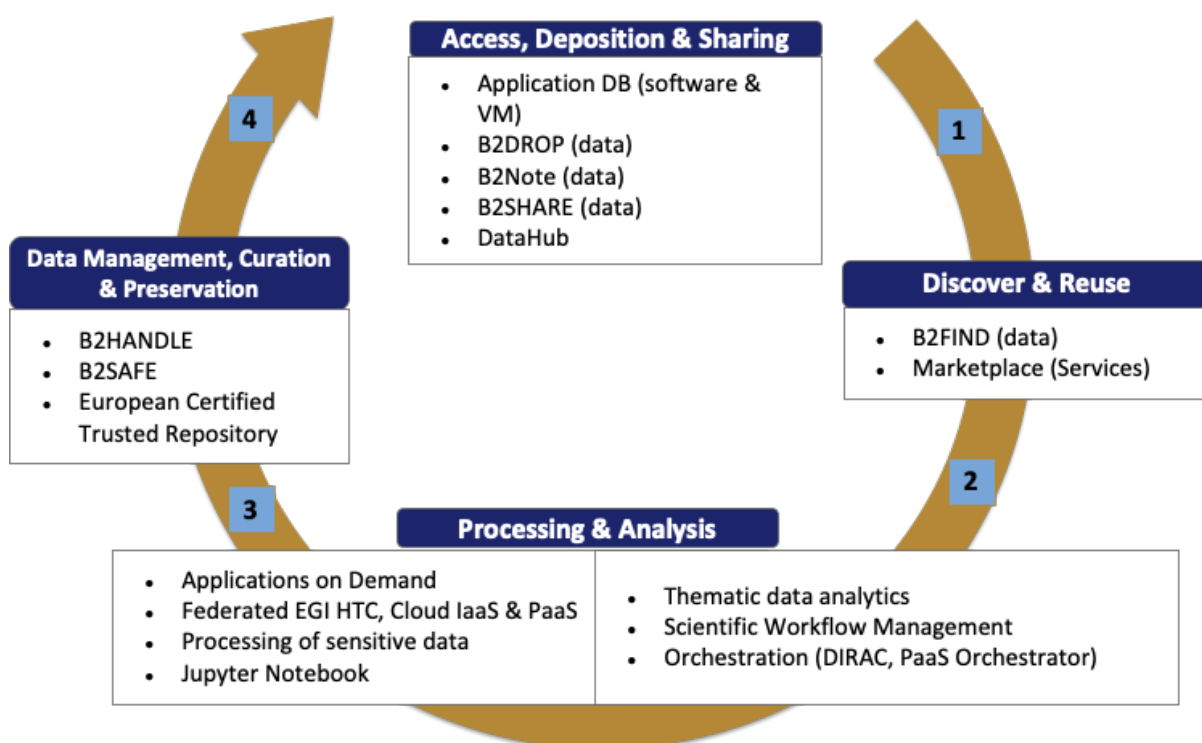


Figure 1. EOSC-hub services to support the virtuous cycle of research

The services can be all found in the EOSC Marketplace (<https://marketplace.eosc-portal.eu/>) and their Marketplace entries provide high level information, as well as pointers to user guides and other relevant materials.

Because the topic of research data management is very broad and complex, the marketplace entries may not provide you with a full understanding of the capabilities of these services. Therefore we advise you to apply to the consultancy service that EOSC-hub provides for scientific communities to uptake the data management services. The consultancy service can be requested via the EOSC-hub Helpdesk (<https://helpdesk.eosc-hub.eu/>). Please describe in the ticket the use case (or service) for

which you are seeking for support, and our experts will get in touch with you. The consultants will help you find the most suitable service (or combination of services) and will assist you in the use/integration of those within your research workflow. You can find stories about scientific communities that already benefit from this consultancy service on our website (<https://eosc-hub.eu/research-communities>).

5. Alignment with the service management system

5.1 Introduction to the EOSC-hub Service Management System

As part of the EOSC-hub contribution to EOSC, the project is developing and operating an IT Service Management system (SMS)¹⁶. The SMS ensures a robust and resilient service delivery in the EOSC federated infrastructure with different types of many-to-many relationships between users, providers and clients.

What is IT Service Management?

The key idea behind IT service management could be summarized like this: By following a service-oriented approach, an IT organisation (which may be everything from an internal IT department over a shared IT unit up to an external IT provider) is able to better understand what they do and offer, and how this is aligned to the needs of their customers and users. IT service management (ITSM) refers to the entirety of activities – directed by policies, organized and structured in processes and supporting procedures – that are performed by an organization to design, plan, deliver, operate and control information technology (IT) services offered to customers. And by implementing IT service management processes, the activities carried out to plan, deliver, operate and control these services become more structured and repeatable, with clearly defined responsibilities. All this helps an IT organisation to increase their level of professionalism and organisational maturity.

The EOSC-hub SMS represents the entirety of activities performed by the providers that contribute to the EOSC core to plan, deliver, operate and control the services offered to EOSC. The SMS also covers (to different extent) the activities of those service providers that have been onboarded to EOSC via the EOSC Portal.

The activities carried out in the context of the SMS are structured and organised into processes and procedures according to the FitSM IT Management standard¹⁷. FitSM is a free, pragmatic, lightweight and achievable standard aimed at facilitating service management in IT service provision, including federated scenarios. By defining requirements, the 14 processes of FitSM help service providers:

Process	Objective
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¹⁶ <https://www.eosc-hub.eu/eosc-hub-key-exploitable-results/#KER2>

¹⁷ FitSM IT Service Management standard: <https://www.fitsm.eu/>

Service portfolio management (SPM)	To define and maintain a service portfolio
Service level management (SLM)	To maintain a service catalogue, and to define, agree and monitor service levels with customers by establishing meaningful service level agreements (SLAs) and supportive operational level agreements (OLAs) and underpinning agreements (UAs) with suppliers
Service reporting management (SRM)	To specify all service reports and ensure they are produced according to specifications in a timely manner to support decision-making
Service availability and continuity management (SACM)	To ensure sufficient service availability to meet agreed requirements and adequate service continuity
Capacity management (CAPM)	To ensure sufficient capacities are provided to meet agreed service capacity and performance requirements
Information security management (ISM)	To manage information security effectively through all activities performed to deliver and manage services, so that the confidentiality, integrity and accessibility of relevant information are preserved
Customer relationship management (CRM)	To establish and maintain a good relationship with customers receiving services
Supplier relationship management (SUPPM)	To establish and maintain a healthy relationship with suppliers supporting the service provider in delivering services to customers, and monitor their performance
Incident and service request management (ISRM)	To restore normal / agreed service operation within the agreed time after the occurrence of an incident, and to respond to user service requests
Problem management (PM)	To investigate the root causes of (recurring) incidents in order to avoid future recurrence of incidents by resolving the underlying cause, or to ensure workarounds/temporary fixes are available
Configuration management (CONFM)	To provide and maintain a logical model of all configuration items (CIs) and their relationships and dependencies
Change management (CHM)	To ensure changes to CIs are planned, approved, implemented and reviewed in a controlled manner to avoid adverse impact of changes to services or the customers receiving services
Release and deployment management (RDM)	To bundle changes of one or more CIs to releases, so that these changes can be tested and deployed to the live environment together
Continual service improvement management (CSI)	To identify, prioritize, plan, implement and review improvements to services and service management

For each of these processes, as well as for a number of general aspects in the context of ITSM, FitSM (within the FitSM-1 document¹⁸) defines a small number of implementation requirements, while the FitSM-2 document¹⁹ provides guidelines on the activities to set up and implement ITSM using these processes. The FitSM-3 document²⁰ describes the proposed roles to be assigned to execute the ITSM processes as part of a service management system.

5.2 Participation as a service provider

At a base level, all onboarded services become in the scope of EOSC-hub SPM when they are included into the EOSC Service Portfolio, and then publicly exposed in a Service Catalogue (the EOSC Portal and its Marketplace - See Section 2 earlier). How the scope of other EOSC-hub SMS processes impacts on new onboarded services depends on the choices the service providers make for integrating with other Hub Portfolio components (those that are described in Section 3). For example, enabling 'ordering' (i.e. users have to request access to the service via the EOSC Marketplace) will bring Your service partially into the scope of CRM, using the Helpdesk involves Your service in the ISRM process, and so on. Additional integration activities may bring the services within the scope of other SMS processes.

Some examples will help to further illustrate this approach:

- Suppose that an onboarded external service wishes to make use of the EOSC hub Helpdesk service (Section 3.4). This requires you to provide a second line support entity, either with the helpdesk that You may already be using, or integrated with the EOSC-hub Helpdesk service. In both options Your support team will be expected to reply to the incidents in a timely manner according to the agreed timeline. These timelines are defined according to the Incident and Service Request Management (ISRM) process of the EOSC-hub SMS.
- Suppose now that an onboarded service wants to make use of an EOSC Authentication and Authorization Infrastructure (Section 3.1) to aid its users with single sign on functionality. This requires the provider to meet minimum security requirements (e.g. responsive security contact; channel for alerts about security incidents) and to accept the EOSC hub standard site security policy in order to ensure the secure exchange and processing of attributes of end users by the AAI. These requirements are defined in the Information security management (ISM) process of the EOSC-hub SMS.

5.3 Where to ask assistance

FitSM is and will remain free for everybody. This covers all parts of the standard, including the core documents (FitSM-0, -1, -2 and -3), the templates and samples (FitSM-4), the guides (FitSM-5) as well as the FitSM maturity assessment tool (FitSM-6) - all available at <https://www.fitsm.eu/downloads/>.

During EOSC-hub EGI offers training about FitSM to EOSC-hub member institutes. These trainings are organised at EOSC-hub events, and from Q3 of 2020 EGI is planning to conduct them remotely. EGI also provides consultancy for those who wish to implement FitSM within their organisation. Please

¹⁸ FitSM-1 document - Requirements: <https://www.fitsm.eu/downloads>

¹⁹ FitSM-2 document - Objectives and Activities: <https://www.fitsm.eu/downloads>

²⁰ FitSM-3 document - Role model: <https://www.fitsm.eu/downloads>

contact the team via the FitSM entry in the EOSC Marketplace: <https://marketplace.eosc-portal.eu/services/fitsm>.

6. Future outlook

The EOSC-hub project mobilised providers from the EGI Federation²¹, EUDAT CDI²², INDIGO-DataCloud²³ and over 20 major European research infrastructures and communities. These providers contributed to the EOSC Portal & Marketplace, and are delivering a rich set of services through those. The services will continue to be operated after the end of EOSC-hub.

The EOSC-hub project provided co-funding for the providers to serve new users via EOSC. Because this funding will be over at the end of 2020, some of the providers will need additional funding to continue delivering their service with 'free at point of use' conditions through EOSC. Those who cannot obtain additional funding may change their access policies (e.g. introduce payment option, or restrict eligibility), or may remove their service from the EOSC Portal altogether. These decisions are yet to take place, but there are several ongoing activities that indicate where we are going:

- The 'EOSC Core' is under definition by the EOSC Architecture Working Group²⁴. The EOSC Core will be the simplest set of services and interfaces that are required for EOSC to function. We expect that the EOSC Portal, Marketplace, and those federation services that were discussed above (in Section 3) will be part of the EOSC Core, and therefore will be sustained for the long term.
- A Horizon2020 call, titled '*INFRAEOSC-03-2020 Integration and consolidation of the existing pan-European access mechanism to public research infrastructures and commercial services through the EOSC Portal*'²⁵ will close on June 18, 2020. The project to be funded in this call will operate and further develop the EOSC Core. The project is expected to start in 2021 and run for 30 months.
- 6 Horizon2020 calls, titled '*INFRAEOSC-07-2020 Increasing the service offer of the EOSC Portal*'²⁶ will close on June 18, 2020. The projects that will be funded from this call will bring into EOSC (or continue to operate in EOSC) a diverse set of services from the following areas:
 - Distributed and cloud computing resources
 - Data services
 - Services supporting scholarly communication and open access
 - Above the net services (range from simple tools to complex collaborative platforms, including real-time communications and media)
 - Services and resources from non-research public sector data providers
 - Additional research enabling services (text and data mining or Copernicus services)

²¹ <http://egi.eu/>

²² <http://eudat.eu/>

²³ <https://www.indigo-datacloud.eu/>

²⁴ <https://www.eoscsecretariat.eu/working-groups/architecture-working-group>

²⁵ <https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/topic-details/infraeosc-03-2020>

²⁶ <https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/topic-details/infraeosc-07-2020>

The projects are expected to start in 2021 and run for 30 months. The projects are expected to cover, to a large extent, those research management services that have been outlined in Section 4.

- At the time of writing there are 47 active Horizon2020 project that contribute to, or relate to EOSC²⁷. Several of those aim to bring in many services services into EOSC, e.g. from a given geographical area (e.g. from South-East Europe²⁸; from the Nordics²⁹), from a specific discipline (e.g. Humanities and Social Sciences³⁰, environmental sciences³¹). A dedicated project, called EOSC Enhance³² started at the end of 2019 to increase the functionality of the EOSC portal. The EOSC Portal team (with EOSC-hub and EOSC Enhance included) is implementing a method to import and share whole service catalogues from in one-go, simplifying the service onboarding for provider consortia. With this move the EOSC Portal will become part of a 'network of EOSC portals' that agree on common principles for onboarding, can exchange content among themselves, and can present those content in ways most suitable for their target audiences.
- The mandate for the current EOSC Governance³³ ends on 31 December 2020. The EOSC Sustainability working Group, and specifically the Task Force on Legal Entities within the Working Group, supports the decision-process on the new EOSC Governance³⁴. A new EOSC legal entity is expected to be established before the end of 2020.

²⁷ <https://eosc-portal.eu/about/eosc-projects>

²⁸ <https://ni4os.eu/>

²⁹ <https://www.eosc-nordic.eu/>

³⁰ <http://sshoc.eu/>

³¹ <https://envri.eu/home-envri-fair/>

³² <https://www.eosc-portal.eu/enhance>

³³ <https://www.eosc-portal.eu/governance>

³⁴ <https://www.eoscsecretariat.eu/news-opinion/second-phase-eosc-next-steps-governance>