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D3.6 - Mid-term technology WP3 project progress report

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Disclaimer

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Executive Summary

This document constitutes deliverable D3.6 of the ESCAPE project, the *Mid-term technology WP3 project progress report*.

Project Summary

ESCAPE (European Science Cluster of Astronomy & Particle physics ESFRI research infrastructures) addresses the Open Science challenges shared by ESFRI facilities (CTA, ELT, EST, FAIR, HL-LHC KM3NeT and SKA) as well as other pan-European research infrastructures (CERN, ESO, JIVE and EGO) in astronomy and particle physics. ESCAPE actions are focused on developing solutions for the FAIRness of large data sets handled by the ESFRI facilities.

These solutions shall: i) connect ESFRI projects to EOSC ensuring integration of data and tools; ii) foster common approaches to implement open-data stewardship; iii) establish interoperability within EOSC as an integrated multi-probe facility for fundamental science. To accomplish these objectives, ESCAPE aims to unite astrophysics and particle physics communities with proven expertise in computing and data management by setting up a data infrastructure beyond the current state-of-the-art in support of the FAIR principles. These joint efforts are expected to result in a data-lake infrastructure providing an open science cloud-based analysis facility linked with the EOSC. ESCAPE supports already existing infrastructures such as astronomy Virtual Observatory to connect with the EOSC. With the commitment from various ESFRI projects in the cluster, ESCAPE will develop and integrate the EOSC catalogue with a dedicated catalogue of open-source analysis software. This catalogue will provide researchers across the disciplines with new software tools and services developed by the astronomy and particle physics communities. Through this catalogue, ESCAPE will strive to provide researchers with consistent access to an integrated open-science platform for data-analysis workflows. As a result, a large community "foundation" approach for cross-fertilisation and continuous development will be strengthened. ESCAPE has the ambition to be a flagship for scientific and societal impact that the EOSC can deliver.

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Acronym list

EOSC-Hub:	Integrating and managing services for the European Open Science Cloud
ESAP	ESFRI Science Analysis Platform (ESCAPE WP5)
ESCAPE:	European Science Cluster of Astronomy & Particle physics ESFRI research infrastructures
ESFRI:	European Strategy Forum on Research Infrastructures
ESF/RI:	ESFRIs and major RIs as projects within ESCAPE
<i>FAIR</i> :	Findable, Accessible, Interoperable, Reusable
OSSR:	Open Science Software and Service Repository (ESCAPE WP3)
RI:	Research Infrastructure
UX:	User Experience
VO:	Virtual Observatory
WP:	Work Package

1. Introduction

This deliverable summarises and categories the status of the high-level technical solutions chosen and the necessary developments for the final implementation of the *Open-source Scientific Software Repository* (OSSR) which is the focus of ESCAPE WP 3.

As the development of the solution is done in an openly accessible and versioned GitLab environment, the low-level technical solutions will not be reported here, but instead the link to the relevant projects, groups, discussions and documents will be listed.

2. Related Documents

The following documents incorporate the main inputs, decisions and work descriptions that have been made within WP3 or have impact on the work within the work package, and which will be considered for the technical implementations. All documents are listed in the bibliography.

2.1. ESCAPE Project Documents

During the first 24 months of the project, the following deliverables and reports of the ESCAPE OSSR working group have been published:

- [1] ESCAPE Deliverable D3.1: Project Plan for WP3 - OSSR
- [2] ESCAPE Deliverable D3.2: Software and Service List and Integration Plan
- [3] ESCAPE Deliverable D3.3: Conceptual Design Report on the Software and Service Repository
- [4] ESCAPE Deliverable D3.7: License, provenance and metadata guidelines for the software and service repository
- [5] ESCAPE Milestone MS14: List of Software and Services

Reference to these documents will be used to allow for access to in-depth descriptions.

The general work within the ESCAPE project and its work packages have been summarised in the following documents and will not be repeated in this deliverable:

- [6] ESCAPE Progress Report Feb 2019 - Jan 2020
- [7] ESCAPE Periodic Technical Report 01/02/2019 - 31/07/2020

2.2. EOSC Documents

The following EOSC Executive Board and Working Documents have been considered and partly co-created during the WP3 work:

- [8] Strategic Research and Innovation Agenda (SRIA) of the European Open Science Cloud (EOSC)
- [9] EOSC architecture working group view on the minimum viable EOSC
- [10] Scholarly Infrastructures for Research Software - Independent Expert Report

- [11] A Persistent Identifier (PID) policy for the European Open Science Cloud (EOSC)
- [12] EOSC Authentication and Authorization Infrastructure (AAI)
- [13] EOSC Interoperability Framework

3. EOSC Technical Links

The linking of the OSSR to the catalogue of services in the EOSC portal will be established via the *EOSC Enhance* project¹ and to the EOSC core services and interoperability framework [9],[13] via the proposed *EOSC Future* project². This will be one part of creating a minimal viable EOSC [9].

From the perspective of the EOSC Enhance project, the OSSR is a provider of open-science products (here: software and services), and the current – to be developed – technical procedure to register with the portal is documented at <https://eosc-portal.eu/providers-documentation/eosc-provider-portal-basic-guide>.

In EOSC Future, the coordination of the implementation of OSSR into the future EOSC framework will be co-ordinated at the level of *WP2 - Project Strategy and EOSC Alignment* and *WP3 – Architecture and Interoperability*. The areas of co-ordination, harmonisation and co-development is the link of the OSSR to the EOSC interoperability framework and the EOSC core service as sketched in [9],[13]. As both, the OSSR development and the EOSC Future project, base their requirements and developments on the EOSC Working Group results (see Sec. 2.2), the technical implementation of interfaces and also the hand-over of resources and services should face no severe technical hurdles.

The OSSR will be tested and benchmarked via the two ESCAPE test science projects (*Dark Matter; Extreme Universe* and *Gravitational Waves*) in EOSC Future *WP6 - Integration of Community Services and Products into EOSC*. Also from there, technical requirements will be put forward that need to be taken into account later in the OSSR development.

As the EOSC Future project has not started yet, no technical procedures and requirements are available and thus cannot be reported in the technical implementations below.

4. Technical Implementation

The OSSR is currently in a prototype phase, changes in the chosen technology or platform are foreseen for some. The prototype consists of the landing page, the development platform and the repository [3], see Figure 1.

In the following, the current technical implementations and route to the final OSSR implementation is sketched. We will indicate what the current status of the process or services is, what gaps should be addressed, and what kind of action needs to be taken to overcome the gaps (research, development, deployment, adoption).

¹ <https://eosc-portal.eu/eosc-enhance>

² At the time of writing, the EOSC Future proposal was re-submitted to answer the H2020-INFRAEOSC-03-2020 call.

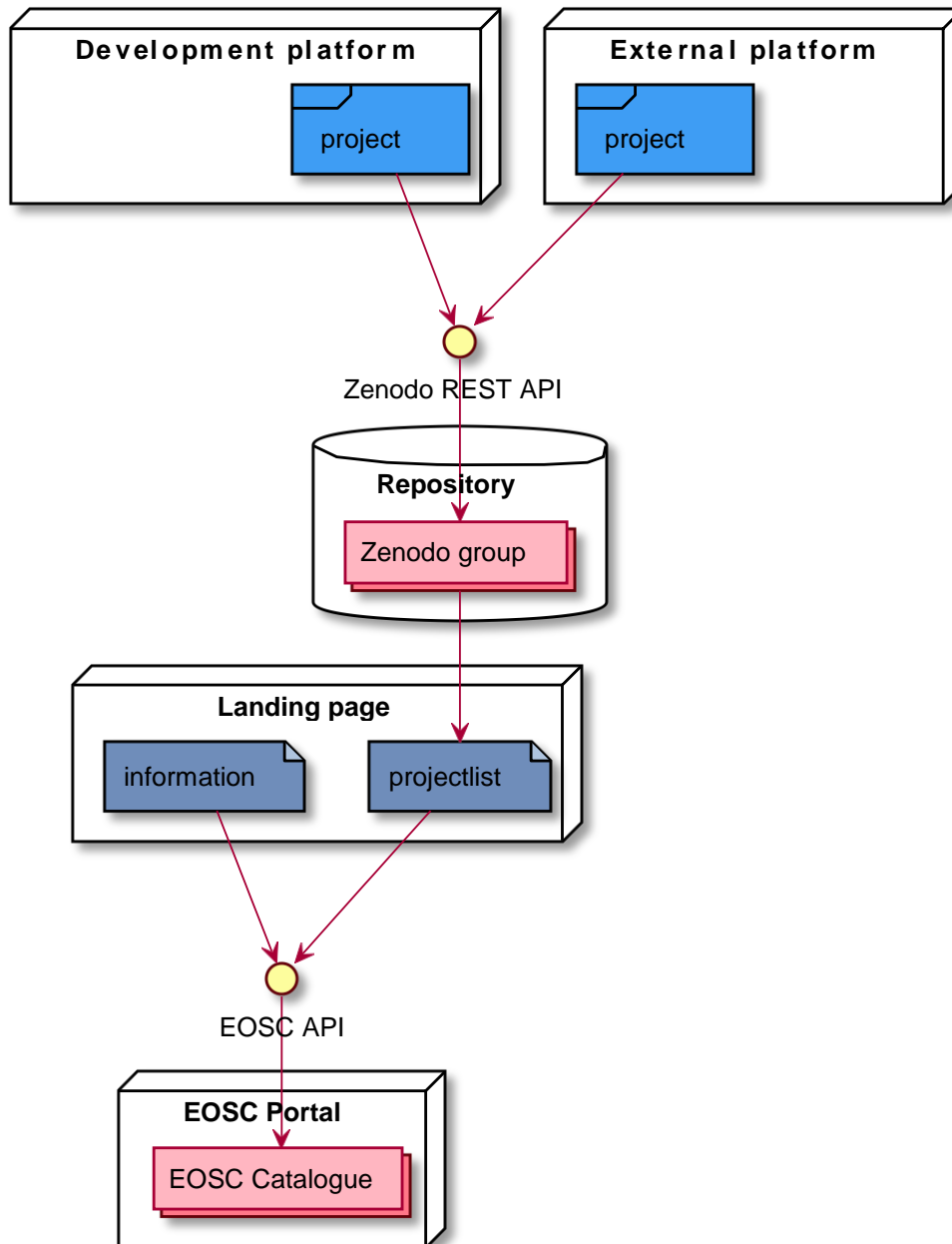


Figure 1 OSSR Technical Schema

4.1. Landing Page

The landing page – <http://purl.org/escape/ossr>³ - is the entry point of users to the OSSR products, as well as to other services within the ESCAPE EOSC cell. It also contains links to documentation and training materials.

³ A persistent URL in the implementation of the PURL service of the Internet archive, see <https://archive.org/services/purl/>, was chosen to provide permanent a permanent address for the landing page.

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Process or Service	Status	Gaps	Priorities
Technical Implementation	GitLab page ⁴	Extend content and add links to other resources; gather and implement UX requirements; investigate use of INVENIO RDM ⁵ ; harmonise with EOSC interoperability framework	Development, research, adoption
Terms of use, Documentation and Tutorials	Links on GitLab page ⁴	Continue documentation for licenses, metadata, best practices and terms of use ⁶	Development, deployment
Interface to Repository	using Zenodo REST API and OAI-PMH ⁷	Enrich displayed and searchable information; gather and implement user requirements;	Development
Registration with EOSC portal	Feedback gathering with EOSC Enhance finished	Implement link to EOSC portal API; finish provider registration procedure, see Sec. 3.	Development, adoption
Necessary Resources	IN2P3 GitLab instance, only minor resource needs	Harmonise with EOSC Core services	Adoption

4.2. Development Platform

The development platform provides a common place to gather the common developments, ideas, guidelines and templates for the community, as well as a platform for new developments if required by an institution/group without access to another solution. It showcases the full software lifecycle up to the publication in the repository.

The development platform is not to substitute the development platforms already used by each institution/group, the technical enhancements necessary to create project links to the OSSR can be equally well applied on the respective native development platforms.

⁴ See <https://escape2020.pages.in2p3.fr/wp3/ossr-pages/>

⁵ See <https://inveniosoftware.org/products/rdm/>

⁶ Following the recommendations [FORCE11 Best Practices for Software Registries](#)

⁷ See <https://developers.zenodo.org>



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Process or Service	Status	Gaps	Priorities
Technical Implementation	Gitlab group ⁸ , individual development platforms of partners (GitHub, GitLab or other services)	Finalise ZenodoCI library ⁹ for upload to repository via Zenodo REST API	Deployment, adoption
AAI	Shibboleth (EduGAIN, Fédération d'Identités RENATER)	Harmonise with EOSC AAI service [12]	Adoption
Metadata Handling	Codemeta2zenodo ¹⁰ project, metadata template ¹¹ project	Finalise CodeMeta metadata handling as described in [4]; include metadata for containers and workflows; harmonise with ESAP EOSC metadata system	Research, development, adoption
Template Project	Gitlab project ¹²	Complete example development project including best practices on all levels of a software lifecycle ¹³ , especially an integrated container solution for reproducibility and final product to link to ESAP	Development, adoption
Onboarding Process	Gitlab project and page ¹⁴	Finalise onboarding process; implement workflow in agreement with [10]	Development, deployment
Necessary Resources	Current: IN2P3 GitLab instance, only minor resource needs so far Future: unclear; scales with adoption by partners (alternative: own solution of partners)	Harmonise with EOSC Core Services	Adoption

⁸ See <https://gitlab.in2p3.fr/escape2020>

⁹ See <https://gitlab.in2p3.fr/escape2020/wp3/zenodoci>

¹⁰ See <https://gitlab.in2p3.fr/escape2020/wp3/codemeta2zenodo>

¹¹ See https://gitlab.in2p3.fr/escape2020/wp3/escape_metadata_template

¹² See https://gitlab.in2p3.fr/escape2020/wp3/template_project_escape

¹³ See <https://escape2020.pages.in2p3.fr/wp3/wossl/>

¹⁴ See <https://escape2020.pages.in2p3.fr/wp3/onboarding/>

4.3. Repository

The repository backend of OSSR is implemented as a Zenodo community¹⁵. It holds the long-term archived open science projects developed in the platforms (see Section 4.2) and is searchable via the landing page (see Section 4.1).

Process or Service	Status	Gaps	Priorities
Technical Implementation	Zenodo community ¹⁵	Interface to EOSC interoperability framework [13]	Deployment
Persistent Identifier	Zenodo DOI	Harmonise with EOSC PID policy [11]	Research and Adoption
Container Registry	GitLab container registry ¹⁶ , individual solutions of partners	Create central container registry (docker and singularity) in coordination with EOSC core services	Research, development and adoption
Certification	Zenodo Plan S – compliance self-assessment ¹⁷	Determine certification in agreement with EOSC core	Research and adoption
Necessary Resources	Scales with onboarded projects and success of downloads – currently ~100 projects with average size of ~ 1 GB planned	Harmonise with EOSC core and interoperability framework [13]	Adoption

¹⁵ See <https://zenodo.org/communities/escape2020>

¹⁶ See https://gitlab.in2p3.fr/escape2020/wp3/onboarding/container_registry

¹⁷ See <https://about.zenodo.org/principles/>

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