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Deliverable 4.1

Selection of KPIs to be reported by Horizon Europe projects of the INFRAEOSC calls

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Deliverable Abstract

This deliverable gives an overview of the monitoring of the European Open Science Cloud (EOSC) development through the achievements of EC-funded projects, specifically those resulting from the Horizon Europe (HE) INFRAEOSC calls. Monitoring of EOSC development is one of the core elements of the EOSC Partnership that allows the evaluation of its progress towards the objectives of the Strategic Research and Innovation Agenda (SRIA). The work presented in this deliverable is based on selected Key Performance Indicators (KPI) of the EOSC Partnership's Monitoring Framework. KPIs have been chosen both from specific and operational objectives.

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TERMINOLOGY

Terminology/Acronym	Definition
AAI	Authentication and Authorisation Infrastructure
AAP	Additional Activities Plan
BMR	Biennial Monitoring Report
DG CNECT	The Commission's Directorate-General for Communications Networks, Content and Technology
DG RTD	The Commission's Directorate-General for Research and Innovation
DMP	Data Management Plan
EC	European Commission
EOSC	European Open Science Cloud
FAIR	Findability, Accessibility, Interoperability, and Reuse of digital assets
GO	General Objective
HE	Horizon Europe
INFRAEOSC	HE projects enabling an operational, open and FAIR EOSC ecosystem (Destination INFRAEOSC)
KPI	Key Performance Indicator
MoU	Memorandum of Understanding
OO	Operational Objective
PID	Persistent Identifier
REA	Research Executive Agency
RFO	Research Funding Organisation
RPO	Research Performing Organisation
SO	Specific Objective (former Strategic Objective)
SRIA	Strategic Research and Innovation Agenda

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Executive Summary

Monitoring the status of the European Open Science Cloud (EOSC) development through the achievements of EC-funded projects is a core element of the EOSC Partnership, as described in its Monitoring Framework [R1][1], that allows the evaluation of its progress towards the objectives of the Strategic Research and Innovation Agenda (SRIA) [R2]. It is foreseen that efficient monitoring will increase transparency and trust, and strengthen the realisation of the common vision for EOSC. It will also foster the exchange between the EOSC Association and Horizon Europe (HE) projects, specifically those resulting from the INFRAEOSC calls, as well as a dialogue among projects themselves. It will generate a compilation of results from HE INFRAEOSC projects that will help establish synergies among them.

The monitoring and evaluation framework of the Key Performance Indicators (KPIs) was provisionally defined in the SRIA and committed to in the Partnership's Memorandum of Understanding (MoU) [R3]. According to the MoU, all three parties to the EOSC Partnership (European Commission (EC), Steering Board and EOSC Association) will provide data for the Monitoring Framework.

The initial set of KPIs to be reported by the EOSC Partnership includes 53 items, but it is understood not all of them will be relevant for HE INFRAEOSC projects. In order to avoid overlapping and minimise additional workload of reporting done by the projects, a limited set containing the most relevant indicators has been selected and is presented in this deliverable.

[1] Numbers in square brackets refer to the references contained in Section 4 on page 9.

1 Background

1.1 The EOSC Partnership

The three main stakeholders involved in the creation and implementation of the European Open Science Cloud (EOSC), i.e. the European Commission (EC), the EOSC Association (EOSC-A), and the Steering Board that represents EU Member States, agreed to establish the "Co-programmed European Partnership for the European Open Science Cloud", or EOSC Partnership[2] in short, as the appropriate tool to achieve the goals and realise the vision for EOSC described in the Strategic Research and Innovation Agenda [R2]. The EOSC Partnership, established by the signature on 30th July 2021 of the Memorandum of Understanding [R3] by the three members of the Tripartite Governance—again, the EC, EOSC-A and the Steering Board—defines the means to align research and innovation policies and to build the EOSC ecosystem through participation of all stakeholders.

1.2 Monitoring: the EOSC Partnership Monitoring Framework

To assess the performance and development of the EOSC Partnership, the EC will monitor its progress throughout its whole life cycle using the evidence base provided by the Biennial Monitoring Report (BMR) [R5], which sets the common framework to monitor all European Partnerships. The outcome of the BMR will also be employed to inform strategic discussions on Horizon Europe's new policy approach by introducing common indicators for all Partnerships. In turn, all Partnerships must formulate their own monitoring framework based on the general, specific, and operational objectives at programme level, allowing progress towards achieving the respective Partnership goals to be tracked[3]. This has been done for the EOSC Partnership through the EOSC Partnership Monitoring Framework (adopted on April 7th, 2022, during the 3rd EOSC Partnership Board meeting, [R1]) which sets out the KPIs to monitor the progress towards achieving the general, specific and operational objectives set out in the MoU.

The EOSC Partnership Monitoring Framework [R1] is a living document, currently including 3 general, 9 specific, and 14 operational objectives. 19 KPIs have been derived from the latter group, and 15 additional KPIs have been defined on the basis of the specific objectives. The baseline will be set via an initial survey at the end of 2022 targeted to EOSC-A members, including many involved in Horizon 2020 or Horizon Europe projects. The validation of results and the baseline report are scheduled to be published in the first quarter of 2023, with continued evaluations planned for 2023, 2025, 2027 and 2030 (i.e. by the end of the EOSC Partnership). The list of KPIs will be revised in view of the interaction with the first round of surveys. This deliverable will also be a living document, to be updated upon refinement of the KPIs when the new Destination-INFRAEOSC projects start. Measuring the evolution of KPIs over time, in combination with other reports, studies, and project reporting obtained for the linked specific and operational objectives, will contribute to EOSC's overall goal of establishing Open Science as the "new normal".

[2] European Partnerships are the instrument created by the EC in the Horizon Europe Framework Programme to foster collaboration among and/or between public and private players to address societal challenges through concerted research and innovation initiatives. For an overview, see https://bit.ly/HE-partnerships.

[3] For an overview of the EOSC Patnership, see https://www.eosc.eu/partnership.

1.3 HE INFRAEOSC Projects

A special place in the EOSC ecosystem is held by projects resulting from Horizon Europe Destination INFRAEOSC calls, as they have been designed to develop critical components of EOSC. Unlike the previous Framework Programme Horizon 2020, or other Horizon Europe funding streams, the conditions of the Destination INFRAEOSC calls specified that all financed projects "are expected to participate in concertation activities in the framework of the EOSC Partnership". To facilitate this collaboration between HE INFRAEOSC project consortia in the EOSC Partnership, ensure the complementarity of results, and enable their uptake in the implementation of EOSC, EOSC-A, after consultations with the EC's DG RTD, DG CNECT (directorates-general for Research and Innovation and Communications Networks, Content and Technology, respectively) and REA[4] has created the so-called *Vademecum* [R6].

The Vademecum is conceived as a complement to the legal commitments acquired by Destination INFRAEOSC projects as EC-funded projects. The Vademecum is a handbook designed to assist HE INFRAEOSC project partners, coordinators, and work package leaders by providing operational mechanisms for coordinating their activities in the context of the Partnership. It sets expectations for collaboration activities in various areas: Governance, Administration, Communication, Monitoring, Technical Development, and Stakeholder Management. It is intended to cover the current phase of the implementation of EOSC within the context of the Partnership, i.e. the period 2021-2030.

It is perhaps worth taking a step back here to appreciate the full picture: the EOSC Partnership has conferred to the EOSC-A the responsibility of coordinating all efforts to make EOSC happen; the EC supports this endeavour with considerable funding, for Destination-INFRAEOSC projects in particular, critical for the success of EOSC; there is however no legal mandate for INFRAEOSC projects to make the results they produce available for the EOSC-A beyond the "concertation activities", mentioned in the Horizon Europe calls, and the appeals to cooperation and alignment described in the Vademecum. To help bridge this gap between the legal commitments for HE INFRAEOSC projects and the cooperation required to bring all ingredients necessary to "cook" EOSC together, the EOSC-A must use the legal framework provided by the EOSC Partnership to monitor the EOSC development.

To be sure, the EC has already included partnership monitoring as a central element in the evaluation of their programmes, of Horizon Europe in particular[5], and all EC-funded projects have moreover reporting duties set out in their respective Grant Agreements. Reports and deliverables cannot however guarantee a proper transmission of all the knowledge gained by the experts that have carried out the research and development work. If the EOSC Partnership wants to use all exploitable results from the INFRAEOSC projects to create EOSC, it needs to gain a deeper knowledge of how the projects are progressing and what they achieve.

1.4 EOSC Development

The effort carried out by the EOSC-A to monitor EOSC's development would not be possible without the support provided by the EOSC Focus project [R7], itself the result of the HORIZON-INFRA-2021-EOSC-01-02 call. This Coordination and Support Action (CSA) contains the specific objective of liaising with EOSC-related projects, in particular those of the Destination INFRAEOSC, to align them in a coordinated development of EOSC. The consolidation and enhancement of the monitoring framework to be done in EOSC Focus, together with the Vademecum that defines the cooperation with the projects, constitute the furthest EOSC-A can go in its engagement with projects to ensure alignment and creation of a joint vision.

To this end, the KPIs included in the EOSC Partnership Monitoring Framework that must be reported by the EOSC Association to the EC were examined in detail, to extract from them those that are relevant to HE INFRAEOSC projects. For this we followed the data sources and data providers suggested in the Monitoring Framework to select and cluster potential respondents. The identification of target groups facilitated the subsequent preparation of questions for each of the KPIs, which were refined in an iterative process. The selection presented in Section 3 of this deliverable is thus aimed at containing only those KPIs that will ensure that the EOSC-A, on behalf of the EOSC Partnership, obtains from HE INFRAEOSC projects all relevant information for their inclusion on the reporting for the EC.

1.5 Expected Benefits of Monitoring EOSC Development

Besides their contribution to the reporting commitments acquired by the EOSC Partnership, monitoring the EOSC development will serve other equally important purposes: it will generate a compilation of results from HE INRAEOSC projects that will contribute to their transparency, openness, and coherence, and will help establish synergies among them. Also, monitoring will not only be visible through reporting to the EC, but can demonstrate to EOSC-A stakeholders and (through the Steering Board) EU Member States the functioning of the Partnership, thus increasing its international visibility and positioning, also beyond Europe.

These are already by themselves important outcomes expected to be of interest for all involved: projects in the first place, but also, and more importantly for the future of Open Science and research in Europe, for the REA as a body mandated by the EC to manage Horizon Europe projects. They and the EC as an overarching entity should see in this effort not an exercise in data gathering but understand it as an opportunity to put all key exploitable results from the HE INFRAEOSC projects together to build the web of FAIR data and services for the common good of European society. This ambitious ultimate goal requires a good understanding of each other's responsibilities and mandates in order to make the most of the current window of opportunity for EOSC to become a reality.

[4] https://rea.ec.europa.eu/index_en

[5] https://bit.ly/Monitoring-HE

2 Projects to be Involved in Monitoring EOSC Development

The Monitoring Framework will remain in place throughout the lifetime of the Horizon Europe Framework Programme, i.e. between 2021-2027. Projects under Destination INFRAEOSC that have already started will be invited to discuss the monitoring of EOSC development. The list of relevant projects will grow each year as new INFRAEOSC calls are published and resolved, with the new projects being added as they start. Currently, the following HE INFRAEOSC projects from the 2021 INFRAEOSC call (HORIZON-INFRA-2021-EOSC-01) are included.

Figure 1 – Projects funded by Horizon Europe INFRAEOSC 2021

2.1 HE INFRAEOSC-2021 Projects

- Skills4EOSC – Skills for the European Open Science Commons aims to create a training ecosystem for open and FAIR science.

  (Additional information: https://cordis.europa.eu/project/id/101058527)

- EOSC Focus - EOSC Focus will support the co-programmed EOSC Partnership in delivering its mission of establishing Open Science as the "new normal" and achieving the key objectives, which are outlined in the Memorandum of Understanding between the European Union and the EOSC Association (EOSC-A).

  (Additional information: https://cordis.europa.eu/project/id/101058432)

- FAIRCORE4EOSC - The project focuses on the development and realisation of EOSC-Core components supporting a FAIR EOSC, addressing gaps identified in the SRIA.

  (Additional information: https://cordis.europa.eu/project/id/101057264)

- AI4EOSC - Artificial Intelligence for the European Open Science Cloud aims to deliver an enhanced set of advanced services for the development of Artificial Intelligence, Machine Learning and Deep Learning models and applications in the EOSC.

  (Additional information: https://cordis.europa.eu/project/id/101058593)

- EuroScienceGateway – The project aims to scale up the user base of supercomputing and cloud infrastructures and to deliver a robust, scalable, seamlessly integrated platform for data-driven research empowering all European researchers to embrace the new digital age of science.

  (Additional information: https://cordis.europa.eu/project/id/101057388)

- FAIR-EASE – The project focuses on customizing and operating distributed and integrated services for observation and modelling of the Earth System, Environment and Biodiversity.

  (Additional information: https://cordis.europa.eu/project/id/101058785)

- RAISE – Research Analysis Identifier SystEm has the mission to provide the infrastructure for a distributed crowdsourced data processing system, moving from open data to open access data for processing.

  (Additional information: https://cordis.europa.eu/project/id/101058479)

- FAIR-IMPACT – Expanding FAIR Solutions across EOSC, the project builds on the results of FAIRsFAIR and other relevant projects and initiatives.

  (Additional information: https://cordis.europa.eu/project/id/101057344)

- EOSC4Cancer - A European-wide foundation to accelerate Data-driven Cancer Research.

  (Additional information: https://cordis.europa.eu/project/id/101058427)

2.2 INFRAEOSC-2022 Projects

- GraspOS
- CRAFT-OA
- Blue-Cloud 2026
- AquaINFRA
- RDA TIGER
- SciLake

Projects from this group have not started at the time of writing of this deliverable and will be engaged in due time. Further projects will be added to this list when future INFRAEOSC calls are published and resolved.

3 Selected KPIs from the EOSC Partnership Monitoring Framework

Four KPIs have been selected from the EOSC Partnership Monitoring Framework (MF) to provide a measure of how Destination INFRAEOSC projects can support the achievement of some of the objectives set in the SRIA. The chosen KPIs are derived from one Specific Objective (SO) and three Operational Objectives (OO). This information shall be gathered from Destination INFRAEOSC projects through a survey, as primary data.

Additional information may be asked to other stakeholders, including EOSC-A members, Research Infrastructures, service providers, and research performing organisations, via a questionnaire, as secondary data.

The information to be derived from the implementation of INFRAEOSC projects, either as primary or secondary data, is subject to change, following potential modification of the EOSC MF, which was adopted as "a living document" in April 2022. .

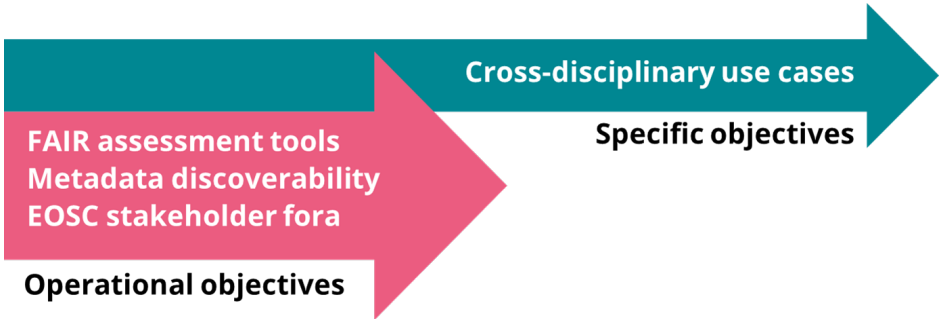

Figure 2 – Objective categories for monitoring EOSC development through projects

3.1 Primary Data: KPIs tracked through questionnaires addressed at project consortia

The four KPIs selected are targeted to HE INFRAEOSC projects directly:

(Note: the specific (SO), operational objectives (OO) and KPIs are taken from the EOSC Partnership Monitoring Framework 2022 [R1])

Specific (SO) and operational objective (OO)	KPI	Question
SO6: Provide an increased number of services and resources to ensure that European research is discovered and reused within and across disciplines to extract new knowledge	SO6_01 The number of inter and cross-disciplinary use cases conducted, on data sharing practices, using EOSC services	Has the project conducted inter- and cross-disciplinary use cases on data sharing practices, using EOSC services? If so, please list up to three examples.
OO6: Provide the metrics and tools to measure the adoption of the FAIR principles for research artefacts and provide frameworks to help in certifying that repository services enable FAIR in EOSC	OO6_01 Availability of FAIR assessment tools to measure the FAIRness of different research digital objects	Does the project use tools to measure the FAIRness of digital research objects, such as datasets, software, and DMPs?

throughout the lifespan of the Partnership		
OO12: Co-develop a minimum metadata framework and provide a common search and access mechanism to EOSC resources across the EOSC federation by 2025	OO12_02 Percentage of metadata belonging to publicly funded research datasets, from EOSC Association members, which are defined as Open Data, that are discoverable through EOSC federated infrastructure.	Please estimate the percentage of (meta)datasets belonging to your project that have been published open access and comply with the FAIR principles and are discoverable through the European Open Science Cloud[6].
OO13: Continuously monitor and promote the increased uptake of core services and EOSC resources, access to EOSC Exchange tools and services and ensure a feedback loop with the users	OO13_01 Frequency of EOSC stakeholder fora that are organised by the EOSC Association or by INFRAEOSC projects	Please indicate the number of EOSC stakeholder fora that were organised by your INFRAEOSC project in the past year.

3.2 Secondary Data: KPIs addressed to stakeholders other than project consortia

Secondary data may be collected regarding KPIs from the EOSC Partnership Monitoring Framework 2022 [R1] on information related to projects. This data would be approached indirectly, i.e. as secondary data, by asking additional stakeholders, including EOSC-A member base, infrastructures, service providers, and research performing organisations, or through desk studies.

[6] Here we understand EOSC as the generic term for the envisioned federation of research (data) infrastructures that will enable the Web of FAIR Data and Services and help researchers to perform Open Science and open up and exploit their data, publications, and code. *Cf.* SRIA 2021, page 175 [R2].

4 References

No	Description/Link
R1	The EOSC Partnership Monitoring Framework (2022) https://eosc.eu/sites/default/files/2022-05/Monitoring%20Framework.pdf
R2	European Commission, Directorate-General for Research and Innovation, Strategic Research and Innovation Agenda (SRIA) of the European Open Science Cloud (EOSC), Publications Office of the European Union, 2022, https://data.europa.eu/doi/10.2777/935288
R3	Memorandum of Understanding for the Co-programmed European Partnership for the European Open Science Cloud (2021) https://ec.europa.eu/info/sites/default/files/research_and_innovation/funding/documents/c_2021_4113_f1_annex_en_v3_p1_1213802.pdf
R4	Overview of all European Partnerships in Horizon Europe (accessed on 27 Oct 2022) https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe/european-partnerships-horizon-europe_en
R5	Biennial Monitoring Report (BMR) 2022 on partnerships in Horizon Europe (2022) https://op.europa.eu/en/web/eu-law-and-publications/publication-detail/-/publication/a6cbe152-d19e-11ec-a95f-01aa75ed71a1
R6	EOSC Focus project information at the Community Research and Development Information Service: https://cordis.europa.eu/project/id/101058432
R7	Vademecum: A Handbook for Effective Collaboration within the EOSC co-programmed Partnership (2022) https://eosc.eu/sites/default/files/2022-10/Vademecum%20HE%20EOSC-related%20Projects.pdf