Open Science: Monitoring Progress, Assessing Impact

1. Background and rationale

Open science, as emphasised in the 2021 UNESCO Recommendation on Open Science, promotes inclusive, transparent, and collaborative research practices, ensuring that scientific knowledge is accessible to all. As its global adoption accelerates, effective monitoring mechanisms are essential to assess impact, identify gaps, and strengthen implementation strategies.

Launched in September 2022, PathOS (Open Science Impact Pathways) is a three-year project funded by the European Union. It aims to identify and measure the multifaceted impacts of open science while advancing state-of-the-art methodologies for its assessment. By examining causal relationships across the open science ecosystem, from inputs to ultimate outcomes, PathOS equips policymakers and institutions with evidence-based tools to design more effective policies. These tools, grounded in rigorous frameworks, provide insights into both **“what works”** and **“how to measure it”** in open science.

This conference on open science monitoring, organised in collaboration with UNESCO, OpenAIRE, EOSC Track, and OSMI, marks the culmination of PathOS. It serves as a platform for knowledge exchange through discussions and workshops, allowing participants to share findings, validate results, and reinforce the principles outlined in the UNESCO Recommendation on Open Science. By convening global experts, policymakers, and practitioners, the event fosters collaboration across diverse initiatives, contributing to the advancement of effective open science monitoring practices.

1.1 Evidence and tools (PathOS)

As **PathOS** nears its completion, it synthesises findings from existing literature and six in-depth case studies to clarify what is known, and what remains uncertain, about the impacts of open science. This work highlights key impact pathways and enablers, emphasising causal relationships and identifying gaps in current knowledge. PathOS also compiles existing and new indicators into an open science indicator handbook, providing practical guidance on measuring the impact of open science.

Additionally, it develops a cost-benefit analysis framework, applied in two case studies, to assess both tangible and intangible returns. These evidence-based outputs equip policymakers and organisations with practical insights and tools for monitoring, evaluating, and enhancing the impact of open science.

1.2 Principles of open science monitoring (OSMI)

The Open science Monitoring Initiative (**OSMI**) brings together institutions and individuals involved in monitoring open science, aiming to encourage the adoption of the Principles of Open Science Monitoring and promote their practical implementation. Developed through an international consultation, the Principles acknowledge the diversity of monitoring approaches while fostering comparability and collaboration. The Principles of Open Science Monitoring, the first output of OSMI, will support the adoption of standardised yet adaptable monitoring systems. They will form the foundation for practical implementation across institutions and organisations, ensuring robust monitoring methods that align with broader open science goals.

1.3 Implementing open science monitoring (EOSC Open Science Observatory, EOSC Track)

The Monitoring Framework for National Contributions to **EOSC** and Open Science provides a systematic model for tracking the implementation and uptake of the European Open Science Cloud (EOSC) and open science across European Union Member States and Associated Countries to Horizon Europe. The framework consists of a comprehensive set of indicators for policies, practices, and impacts related to EOSC and open science, implemented through an annual survey since 2021.

The results of the annual surveys are published openly in the EOSC Open Science Observatory, an interactive, one-stop-shop policy intelligence tool. Currently being developed within the EOSC Track project, the Observatory visualises survey data to support policymakers in evidence-based decision-making on open science.

1.4 Infrastructures for open science (OpenAIRE)

OpenAIRE is a non-profit European e-infrastructure that advances the discoverability, accessibility, interoperability, and monitoring of research outputs.

Central to these efforts is the OpenAIRE Graph, a comprehensive knowledge base interlinking approximately 300 million publications, datasets, software, and other research products. It powers services such as OpenAIRE MONITOR, the Open Science Observatory, and the National Open Access Monitor for Ireland.

Supported by a network of national open access desks, OpenAIRE also provides capacity-building and training, fostering the broad adoption of open science best practices. As a key implementer of the European Open Science Cloud (EOSC), OpenAIRE promotes interoperability across diverse infrastructures, helping to build a cohesive and inclusive global open science ecosystem.

1.5 Global vision and framework (2021 UNESCO Recommendation on Open Science)

At the foundation of these efforts is the **UNESCO** Recommendation on Open Science, the first global standard for fostering inclusive, equitable, and sustainable open science practices. Its framework aligns local and regional initiatives with a universal vision, promoting shared values such as transparency, accountability, and inclusiveness.

By providing actionable guidelines and emphasising the role of open science in achieving the Sustainable Development Goals (SDGs), UNESCO ensures that these efforts contribute to a cohesive global strategy. The monitoring of open science within the framework of the Recommendation is carried out through UNESCO Member States, which report on progress, challenges, and best practices, helping to track global implementation and inform future policy developments.

2. Objectives

- **Present emerging evidence and tools:** Showcase PathOS outputs through case studies and explore how to address causality, intangible benefits, and persistent evidence gaps in measuring the impacts of open science.

- **Discuss monitoring principles:** Examine OSMI's Principles of Open Science Monitoring in light of stakeholder consultations, exploring their applicability in diverse contexts. Consider the role of open science infrastructures and other key actors in operationalising them.

- **Scale monitoring efforts:** Launch and showcase the new design and functionalities of the EOSC Open Science Observatory and the updated Monitoring Framework for National Contributions to EOSC and Open Science. Engage participants in a focused panel discussion on best practices and challenges for broadening open science monitoring at national and European Union (EU) levels.

- **Advance a global vision:** Examine regional and national developments in open science and reflect on the implementation of the UNESCO Recommendation on Open Science. Consider how open science frameworks can be adapted to diverse contexts and support more inclusive, collaborative research ecosystems.

- **Explore practical approaches:** Participate in sessions showcasing methodologies developed in PathOS, including the Open Science Indicator Handbook, and the use of Cost-Benefit Analysis for assessing open science practices.

- **Strengthen collaboration and continuity:** Facilitate cross-initiative and cross-country collaboration and chart a path for sustained engagement. This includes refining indicators, enhancing monitoring frameworks, and ensuring that open science remains responsive to emerging challenges.

3. Bringing it all together

This conference provides a unique platform for global experts, policymakers, and practitioners to share knowledge, refine tools, and shape the future of open science monitoring. Through presentations, panel discussions, hands-on workshops, and open dialogue, participants will explore innovative approaches, address implementation challenges, and collaborate on practical solutions.

The conference will conclude with a joint session with Open and Universal Science (OPUS) to address misalignments in open science monitoring and policy across individual, institutional, national, regional (EU), and global levels.

By integrating evidence-based methodologies, guiding principles, and targeted training, the event aims to catalyse new partnerships, empower stakeholders, and advance a shared vision of inclusive, high-impact research practices worldwide.

We look forward to your participation and the valuable perspectives you will bring to this event