

**1. Enable the open sharing of knowledge and the re-use of research outputs, including through the development of the European Open Science Cloud (EOSC)**

Contact point: Michel Schouppe, DG R&I.A4

• **Description**

*What does the action consist of? Explanation of the problems being addressed, the means used, the objectives to be achieved. Are certain actions already ongoing? Interplay with other actions or policies (EU or national).*

The amount of data generated or used in public-funded research and innovation (R&I) activities is growing exponentially. However, a significant part of those data (i) is not shared openly, (ii) never makes it to a trusted and sustainable repository, (iii) is poorly annotated or not formatted in a standardised way allowing for machine-readability. Consequently, many research experiments producing or based on those data cannot be reproduced, increasing the risk of mistrust in their outcomes. Efficiency and productivity of the research is also reduced. The cost of not having FAIR<sup>1</sup> research data has been estimated to more than 10 B€ every year<sup>2</sup> for Europe.

This action should allow a step change across scientific communities and research infrastructures in Europe towards open sharing, seamless access and reliable re-use of data and all other digital objects produced along the research life cycle e.g. methods, protocols, software and publications. The development of the European Open Science Cloud (EOSC) is a key enabler for this to happen as the material and immaterial infrastructure sustaining the transition to open science and digital research.

The action requires a strong involvement by the Member States (MS) and Associated Countries (AC) to engage scientific communities and research infrastructures in Europe towards: (i) FAIR management of scientific data and other publicly funded research digital output such as codes and software, and (ii) the sharing of these research outputs following the principle “as open as possible, as closed as necessary”.

This is at the core of the EOSC ambition to provide European researchers, innovators, companies and citizens with an accessible, trusted and open distributed environment where they can publish, find and re-use each other's data and tools for research, innovation and educational purposes, as well as access relevant services. EOSC is transitioning to a stakeholder-driven approach with a shared vision, common objectives and complementary contributions at European, national and institutional levels. An EOSC Strategic Research and Innovation Agenda (SRIA) has been co-developed to set the general, specific and operational objectives and the related action areas of the EOSC European co-programmed partnership until 2030. It includes the development and

<sup>1</sup> FAIR: Findable, Accessible, Interoperable and Re-usable ([www.go-fair.org/fair-principles/](http://www.go-fair.org/fair-principles/)).

<sup>2</sup> Cost-Benefit analysis for FAIR research data - Cost of not having FAIR research data, PwC study commissioned by the European Commission in 2018 ([http://publications.europa.eu/resource/ellar/d375368c-1a0a-11e9-8d04-01aa75ed71a1.0001.01/DOC\\_1](http://publications.europa.eu/resource/ellar/d375368c-1a0a-11e9-8d04-01aa75ed71a1.0001.01/DOC_1))

|                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                   | <p>deployment of EOSC foundations and federating services as well as EOSC value-added services for scientists. As part of this action, there is a commitment from the Member States, the European Commission (EC) and the EOSC association to establish a joint mechanism to collect data and contributions related to EOSC.</p> <p>Outcomes:</p> <ol style="list-style-type: none"> <li>1) <b>Deploy Open Science principles in synergy with other relevant ERA actions and identify Open Science best practices by the various communities to progressively make Open Science (OS) 'the new normal'</b>. This includes notably:             <ul style="list-style-type: none"> <li>• Mainstreaming OS across Horizon Europe and national research funding programmes e.g. through requiring and/or encouraging OS practices as part of projects' methodologies and rewarding OS practice as part of proposals' evaluation.</li> <li>• Policy actions to support OS training actions, capacity-building such as for institutional Open Access publishing or for citizen science.</li> <li>• EOSC provisioning of services, tools and data on the usage, quality and impact of research outputs and on the uptake of open science practices. This EOSC capacity would also underpin research assessment systems that incentivise open science practices (in synergy with ERA action 3).</li> <li>• Catalogue of OS best practices across the Member States and Associated Countries, and intensified EOSC outreach and communication including through national EOSC events.</li> <li>• Contributing to the establishment of a critical mass of data scientists, data stewards and general FAIR data-literacy in Europe.</li> </ul> </li> <li>2) <b>Deploy the core components and services of EOSC, federate existing data infrastructures in Europe and develop community frameworks for interoperability of research data and quality control of EOSC resources.</b> This includes notably:             <ul style="list-style-type: none"> <li>• Procuring an "EOSC Core Infrastructure and Exchange platform" with functionalities available 24/7.</li> <li>• Increasing EOSC connections across the European research infrastructure (RI) landscape (in synergy with ERA action 8).</li> <li>• Investigating sustainability options over the long-term including financial models for cross-RI service provision through the EOSC.</li> <li>• Research actions to evolve the EOSC platform and advance the 'Web of FAIR research data and service for science'.</li> </ul> </li> <li>3) <b>Establish a mechanism to collect data and investments, policies, digital research outputs, open science skills and infrastructure capacities related to EOSC and link it to the ERA Monitoring Mechanism</b> (in synergy with ERA action 19).</li> </ol> |
| <ul style="list-style-type: none"> <li>• <b>Actors</b></li> </ul> | <p><i>Who should implement the action? Member States, Commission, Associated Countries, other 3<sup>rd</sup> countries, stakeholders, etc.</i></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

|                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|----------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                  | <p><i>Please note whether half of Member States are already expected to be involved (para. 10 of Council conclusions)</i></p> <p>A tripartite EOSC governance has been set up in 2021 to advance EOSC implementation and develop wider synergies between the multiple EOSC stakeholders at European, national, community and institutional levels:</p> <ul style="list-style-type: none"> <li>• The European Commission representing the EU;</li> <li>• The EOSC Steering Board<sup>3</sup> representing the voice of the participating countries: the Member States and the Associated Countries (EC expert group);</li> <li>• The EOSC association<sup>4</sup> (AISBL) representing the research community and its service providers.</li> </ul> <p>The ERA Forum is in a unique position to enhance interaction of Action 1 with other ERA Actions of relevance to Open Science (e.g. Actions 2, 3, 4, 8, 14 and 19).</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <ul style="list-style-type: none"> <li>• <b>Timing and milestones</b></li> </ul> | <p>As far as a calendar can be established already at this stage.</p> <p>1) Continuous deployment of open science principles and identification of open science best practices:</p> <ul style="list-style-type: none"> <li>• Strengthened mainstreaming of OS across Horizon Europe, to be reviewed as part of the Horizon Europe mid-term review in 2024.</li> <li>• Contributions by the MS and AC through annual surveys of the EOSC Steering Board and annual plans for additional activities by the EOSC Association and its members (including member organisations mandated by the MS and AC).</li> <li>• Policy actions to support OS through HE calls under the WIDERA work programmes 2021-2022 and 2023-2024.</li> <li>• EOSC capacity to underpin research assessment systems and actions to support OS &amp; FAIR data-literacy in Europe through HE calls under the Research Infrastructure work programmes 2021-2022 and 2023-2024.</li> <li>• EOSC tripartite events including the CZ Presidency event in Prague on 14-15/11/2022 and its contribution to an extended catalogue of OS best practices across the MS and ACs. Awareness raising and communication actions targeting researchers in all disciplines (as contributors and/or users of the EOSC)."</li> </ul> <p>2) Deployment and evolution of the EOSC federation (EOSC core) and expansion of the EOSC Value-added Services for scientists (EOSC Exchange) from 2023, both with the support of topics and procurements under the Horizon Europe Work Programmes for Research Infrastructures.</p> |

<sup>3</sup> 25 Member States are already represented in the EOSC Steering Board, plus several countries associated to Horizon Europe.

<sup>4</sup> The EOSC Association involves 238 participating entities including 161 members and 73 observers.

*TEMPLATE FOR EXPLANATORY DOCUMENTS ON ERA ACTIONS FROM THE ERA POLICY AGENDA  
This document is a working document and should not be considered as representatives of the  
European Commission's official position.*

|                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|----------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                            | <p>3) Deployment of the EOSC Observatory to support MS/AC and other EOSC stakeholders in tracking EOSC contributions and relevant policies, programmes and investments: dashboard development in Q1 2022, testing in Q2 2022 and initial roll-out in Q1 2023. Common interface with the ERA Scoreboard and Dashboard in Q2 2022 (in synergy with ERA action 19).</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <ul style="list-style-type: none"> <li>• <b>Funding</b></li> </ul>         | <p><i>Identification of different sources of funding (EU, national, private, etc.) and if possible projected amounts.</i></p> <ul style="list-style-type: none"> <li>• A co-investment (in kind and in cash) in EOSC by the EU and non-EU partners of at least €1 Billion is currently foreseen for the next seven years. The EU contribution will essentially come from the Horizon Europe Work Programmes for Research Infrastructures.</li> <li>• Ongoing EOSC-FUTURE H2020 grant (EU investment of EUR 40+ Mio in the period 2021-2023).</li> <li>• Policy support actions under the HE WIDERA work programmes.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <ul style="list-style-type: none"> <li>• <b>Expected impact</b></li> </ul> | <p><i>It is important to attempt to identify the expected impacts of the action, even if at an early stage there may be many unknowns.</i></p> <p>The following objectives should be achieved by 2030:</p> <ul style="list-style-type: none"> <li>• Ensure that Open Science practices and skills are rewarded and taught, becoming the 'new normal'.</li> <li>• Standards, tools and services allow researchers to find, access, reuse and combine results.</li> <li>• A federated infrastructure under community governance enabling open sharing of scientific results is deployed and sustained.</li> <li>• Europe in the driving seat towards a web of FAIR research data with established links to other data spaces.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                            |
| <ul style="list-style-type: none"> <li>• <b>Monitoring</b></li> </ul>      | <p><i>Qualitative and quantitative elements that allow progress in the implementation to be monitored. Once the policy platform is operational, Member States and Commission will be able to use it for this purpose.</i></p> <p>1. Continuous deployment of open science principles (A monitoring framework for the EOSC Partnership is being developed as a living document which will be refined over time). Envisaged indicators of performance relate to:</p> <ul style="list-style-type: none"> <li>• Number of national education systems that recognise European curricula for data stewardship.</li> <li>• Trends in organisations that recognise Open Science activities in research career assessment.</li> <li>• Trends in publications that become immediate open access.</li> <li>• Trends in research data which are deposited in repositories that are made as open as possible.</li> <li>• Trends in policies which require FAIR to be implemented in project design via Data Management Plans.</li> <li>• Trends in organisations that have data stewards to support their research.</li> </ul> |

*TEMPLATE FOR EXPLANATORY DOCUMENTS ON ERA ACTIONS FROM THE ERA POLICY AGENDA  
This document is a working document and should not be considered as representatives of the  
European Commission's official position.*

|                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                   | <ul style="list-style-type: none"> <li>• Number of research organisations located in the Member States and Associated countries joining as members of the EOSC partnership and impact of member organisation mandated by the participating countries.</li> </ul> <p>2. EOSC deployment in the period 2022-2024<br/>(Based on the EOSC KPIs set in the EOSC partnership Memorandum of Understanding):</p> <ul style="list-style-type: none"> <li>• A first generation of pan-European federation of infrastructures for preservation, management and sharing of research software is available.</li> <li>• Number of core functions of Minimum Viable EOSC that are developed to make the EOSC ecosystem accessible to researchers across disciplines and countries.</li> <li>• Percentage of the repositories in EOSC that will implement a certification mechanism.</li> <li>• Percentage of research disciplines that have documented standards and protocols for data sharing and reuse.</li> <li>• Percentage of the metadata related to publicly funded research datasets which are defined as Open Data that are discoverable through EOSC federated infrastructure.</li> </ul> <p>3. EOSC observatory deployment in 2022-2024<br/>(Indicators considered by the EOSC-FUTURE project):</p> <ul style="list-style-type: none"> <li>• Aspects such as service level, availability, reliability, capacity and quality of service parameters against user requirements.</li> </ul> |
| <ul style="list-style-type: none"> <li>• <b>Communication</b></li> </ul>          | <p><i>What communication actions could be useful to promote the action, and who should do so (Commission, national public authorities, stakeholders, etc.)?</i></p> <ul style="list-style-type: none"> <li>• Communication by the Commission in May 2022 on the occasion of the Prior Information Notice in OJ/TED of the procurement on “Delivering the EOSC core infrastructure and services”.</li> <li>• Communication by the Commission in 2023 on the occasion of the contract awards notice in OJ for the procurement on “Delivering the EOSC core infrastructure and services”.</li> <li>• Communication by the Commission, the EOSC Association and the EOSC-FUTURE consortia in 2023 on the occasion of the roll-out of the EOSC Observatory.</li> <li>• Communication by the Commission, national public authorities and the EOSC Association on the occasion of the EOSC tripartite events, EOSC Symposia, and national events.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <ul style="list-style-type: none"> <li>• <b>Additional information</b></li> </ul> | <ul style="list-style-type: none"> <li>• <a href="#">EOSC on Europa</a></li> <li>• <a href="#">EOSC Steering Board</a></li> <li>• <a href="#">EOSC Association</a></li> <li>• <a href="#">EOSC Strategic Research and Innovation Agenda</a></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |