Charter of the EOSC Task Force on Infrastructures for Quality Research Software

Main objectives

Software plays an essential role in a broad spectrum of research activities, either as a tool, a research outcome, or object of study. In the scope of the EOSC task force on Infrastructures for Quality Research Software, we focus on "research software" defined as software that is produced by researchers and used as an enabler for scientific activities.

The main objectives of this task force are:

1. Foster the development and deployment of tools and services that allow researchers to properly archive, reference, describe with proper metadata, share and reuse research software.
2. Improve the quality of research software, both from the technical and organizational point of view for research software in general and in particular the software used in the services offered through EOSC.
3. Increase recognition to software developers and maintainers of research software as a valuable research result, on a par with publications and data, in the Open Science landscape.

For the first objective, the *EOSC SIRS (Scholarly Infrastructures for Research Software) report*[1] provides a detailed gap analysis and set of recommendations to enable **archiving, referencing, describing and giving credit** for software source code in research (also known as **ARDC**). The task force will **foster the rapid implementation of the actionable recommendations of the EOSC SIRS report,** engaging with the relevant existing infrastructures, and contributing to the Operational Objectives OO1 and OO7 of the Strategic Research and Innovation Agenda (SRIA)[2].

For the second objective, the task force will explore the critical issues needed to address the **production, maintenance, reproducibility and reuse** of research software, identifying common issues and requirements. The objective is to propose approaches to foster the adoption of best practices that may lead to *producing better research software, contributing to economic and organizational sustainability of research software development, and improving reproducibility of research results.*

For the third objective, the task force will explore the methodologies and best practices to assess research software and its impact and to **provide appropriate recognition to** *researchers and engineers that develop quality research software projects*.

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[1] **Scholarly Infrastructures for Research Software** (report from the EOSC task force) European Commission. Directorate General for Research and Innovation., 2020, ISBN: 978-92-76-25568-0 https://dx.doi.org/10.2777/28598

[2] See **EOSC Strategic Research and Innovation Agenda** : https://www.eosc.eu/sites/default/files/EOSC-SRIA-V1.0_15Feb2021.pdf

Core activities

The overall structure of the core activities of the EOSC task force on Infrastructure for Quality Research Software is organised around the working areas shown in Figure 1:
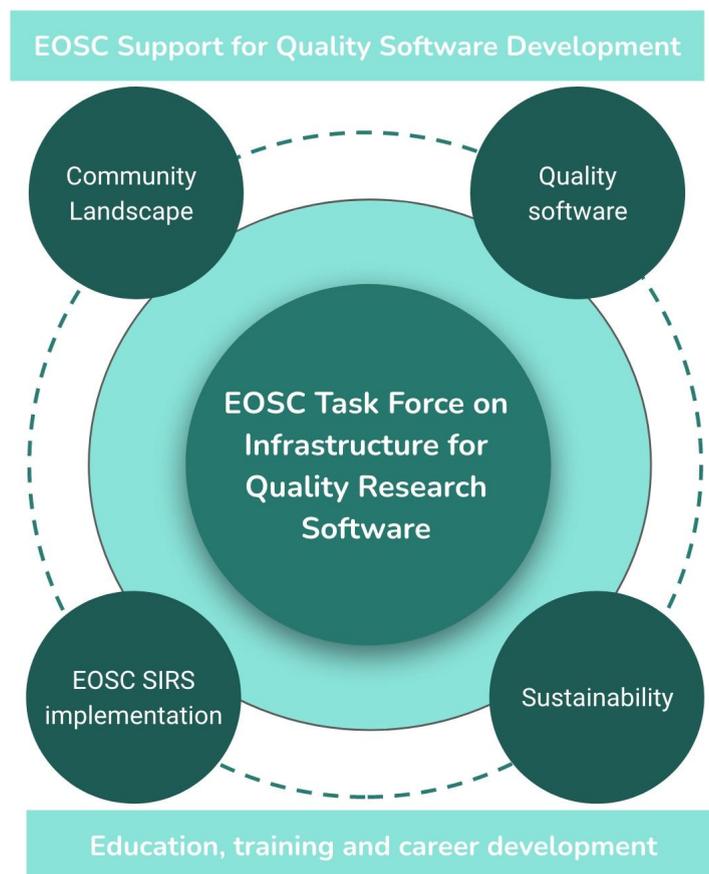

Figure 1. Structure of the working areas of the
Task Force on Infrastructure for Quality Research Software.

The **EOSC SIRS implementation working group** will address the first objective, contributing directly to OO1 and OO7 of the SRIA. It will be tasked with the following activities:

- Broad dissemination of the EOSC SIRS report, landscaping of, and actively engaging with scholarly infrastructure providers for research software.
- Participation in existing standardisation efforts on metadata and identifiers for research software source code.
- Federation and interconnection of the identified infrastructures, tools and services (leveraging in particular EOSC related projects and funding).
- Address the interconnection between articles, data and software (extending the EOSC SIRS report).

To address the second objective (production, maintenance, reproducibility and reuse of

research software), the following distinct working groups are foreseen:

1. The **Community Landscaping of practices and processes working group** will:
   - Explore tools, standards and platforms that are used in state-of-the-art software development.
   - Write a review of the methods and approaches deployed in different research disciplines to develop and maintain software projects, and for quality control.
   - Identify the best practices and the processes and procedures that lead to their adoption and dissemination in the different research communities.
   - Identify open source development communities with which the research communities have broad connections.
   - Formulate actionable recommendations and illustrate them with examples, taking into account the diversity of software size, complexity, organization and longevity that one finds in the research world.

2. The **Sustainability working group** will:
   - Build a landscape of the approaches to sustain the development of research software beyond initial seed funding.
   - Identify the blockers and limitations as well as the best practices for a sustainable research software lifecycle management.
   - Formulate actionable recommendations based on the findings.

3. The **Quality software services for the EOSC working group** will focus on defining unbiased quality criteria for research software and improving their use in the services offered through EOSC, and in particular:

   - Identify standard-(whenever possible) based best practices to write quality research software, covering topics such as: code style, conventions, or best practices for specification, testing, documentation and metadata, among others.
   - Scout the current technological landscape and identify both, qualitative and quantitative methodologies, to provide unbiased measurement of quality and impact taking into account the particularities of different scientific disciplines.
   - Agree on the methodology to make those measurements visible and verifiable, and find standard ways to place them in software repositories, attached to EOSC services and portals.
   - Identify software development best practices (e.g. DevOps and general guidelines) to streamline the deployment of research software on heterogeneous infrastructures, where a wide array of hardware and programming environment combinations are available, while retaining reusability, reproducibility and sustainability.

   On the side of infrastructure support to software development and deployment:

   - Gather standards that can be used to write guidelines and procedures in order to produce and deploy quality research software.

○ Provide requirements to infrastructure managers and resource providers to enable the provision of services to support quality research software, its development and execution.
○ Agree on the standards and infrastructure components able to connect research software and research data, detailing criteria to evaluate them, and making them available for future use.

To address the third objective, the **Education, training and career working group** will:

- Explore the existing education and training programs about software development implemented in various research areas (*e.g. Software Carpentry*).
- Identify existing organisations, disciplinary or cross-disciplinary, that federate actors of research software development (*e.g. DevLog in France, RSE-de in Germany*).
- Explore best practices to recognise software development in careers and evaluations (these practices differ from discipline to discipline, and from country to country).
- Develop a set of recommendations to improve the current situation based on the findings.

Planned duration

A first phase of 12 months will be followed by an evaluation, and possibly a second 12-month phase focused on the most promising areas that would require more work.

Working methodology

The work of the task force will start with a high level discussion on the common goals as well as the specific goals of each sub-task, establishing the roadmap and setting up the collaboration process.

The task force will conduct outreach activities towards a plurality of stakeholders:
- Existing and future EOSC projects and ESFRI infrastructures will be contacted through the EOSC association: information about the ongoing activities will be disseminated by email, and webinars will be offered to present the existing results.
- A broader community will be contacted leveraging the connections of the members of the task force, and through pointwise invitations in specific meetings, workshops or focus groups.

Dependencies

Connections with other EOSC Task Forces:

- **"Technical interoperability of data and services",** especially regarding the usage of open interfaces, and standards (both de jure, and de facto).
- **"Research careers, recognition and credit"**, in what regards the part of rewarding and skills development.

- **"Funding models for EOSC"**, encompasses all the activities.

<u>Liaisons, through the members of the task force, with representatives of:</u>

- Existing research initiatives and communities focused on software development.
- Graduate and doctoral schools, for Open Science education and skills development.
- Initiatives that address issues related to software development, funding, sharing and reuse in the public sector (e.g. the EU Open Source Program Office and the NGI initiative).
- Initiatives that address issues related to software development, funding, sharing and reuse in the private sector (e.g. CZI, Sloan, Ford, Wellcome trust).

Membership

Members of the task force will need to be directly concerned by the issues related to research software and Open Science. They must carry the voice of a community, discipline, region, or organisation.
We expect to see participation from:
- researchers,
- software developers,
- engineers,
- representatives of research performing organisations and funding organisations,
- representatives of graduate or doctoral schools that are in charge of curriculum development,
- representatives of open source communities, and
- representatives of the public sector involved in improving the development of publicly funded software, and in the adoption of Open Science principles.

Considering the number of identified core activities, it seems reasonable to expect an overall group size of no less than 30 and no more than 50 persons.

The participation in this task force will allow members to make connections with like-minded individuals to share experiences and knowledge that can further professional development.