SUHF

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Roadmap for Open Science

with Action Proposals for Implementation

CONTENT

1. Introduction

The first version of The Roadmap for Open Science was adopted by The Swedish Association of Universities and Higher Education (SUHF) assembly on March 10, 2021. As a complement to the guidance, The Guidelines for the Implementation of the Roadmap for Open Science (2022) was developed.

The roadmap and the guidelines have been developed by SUHF's Research Data Group on behalf of SUHF's Coordination Group for Open Science. The content of the roadmap was revised in 2022 and 2024 and adjusted to align with guidelines and recommendations formulated by other stakeholders.

The latest revision was approved by the SUHF Presidency on 31 January 2025. In this revision, the roadmap and guidelines have been merged into a single document.

SUHF represents the interests of universities and higher education institutions and coordinates internal matters within the sector. The association consists of 38 voluntary members and serves as a platform for discussions on higher education policy issues. SUHF is internationally engaged through collaborations with The European University Association (EUA), The Nordic University Cooperation (NUS), and The International Association of Universities (IAU). Additionally, SUHF is a member of The Coalition for Advancing Research Assessment (CoARA) and, through Stockholm University, a member of The European Open Science Cloud (EOSC).

2. Background

According to UNESCO's recommendation[1], Open Science is about making scientific knowledge freely accessible, available, and reusable for everyone, regardless of discipline or research method. The aim is that openness and transparency should strengthen scientific quality and trust in research. By using open licenses to share publications, data, software, and hardware where possible, international collaboration and more efficient workflows are facilitated. UNESCO also argues that involving more stakeholders increases understanding of the scientific process, which helps decision-makers base their decisions on relevant research.

The National guidelines for open science[2], which *The National Library of Sweden* has developed on behalf of the government, are based on UNESCO's recommendations. The guidelines cover six priority areas: open access to scientific publications, open access to research data, open research methods, open educational resources, public involvement in the research process, and infrastructures supporting open science.

Academic freedom, good research practice, and open access to research results are all necessary for research to be reproducible and reusable, which in turn promotes new knowledge. A successful implementation of Open Science requires that this is recognized and becomes rewarding in the contexts where researchers are evaluated and assessed. SUHF supports the principle that publicly funded research should be as open as possible, given the conditions set by laws, regulations, and relevant aspects of global research security.

[1] UNESCO Recommendation on Open Science | UNESCO (2025-01-28)
[2] National guidelines for open science: https://urn.kb.se/resolve?urn=urn:nbn:se:kb:publ-738 (2025-01-28)

3. Roadmap and Action Proposals

The roadmap includes overarching recommendations that clarify the responsibilities of higher education institutions, as well as proposals for measures and capabilities that need to be established at these institutions during the transition to a responsible, secure, and open scientific system.

The roadmap is intended as support for the leadership of higher education institutions. Since each institution has its own internal structures, there is not always a one-size-fits-all solution. Practical implementation and local action plans may therefore vary between institutions. Swedish researchers should have access to the support and resources necessary to conduct high-quality research with full transparency. The goal is to ensure equivalent services and support within the open scientific system for all researchers, regardless of their institution or discipline.

Shared recommendations and objectives aim to encourage and strengthen coordination and collaboration between the country's higher education institutions. This is crucial for a successful and resource-efficient transition.

4. The Responsibility of Higher Education Institutions

Open science will become a natural part of a researcher's daily work. It is the responsibility of each researcher to understand and embrace the requirements and opportunities that the new scientific system entails. At the same time, it is the responsibility of each higher education institution to ensure that researchers have the framework, support, services, and training needed to actively participate in a scientific ecosystem based on open science.

Swedish higher education institutions should, both individually and collaboratively, ensure that researchers have access to the appropriate support and services, regardless of their institution or department. In the transition to a responsible open scientific system, institutions may need to adapt their operations and develop services and support systems by reallocating resources to actively promote the transformation, ensure infrastructure, security, funding, competence, and organizational development.

The European University Association's (EUA) *Agenda for Open Science 2025* identifies three main priority areas within open science: open access to scientific results in a fair ecosystem for scholarly publishing, FAIR research data, and research evaluation. In line with this agenda, Sweden's universities and colleges should be part of a scientific ecosystem characterized by:

- Academic ownership of scholarly communication and publishing
- A just scholarly publishing ecosystem (i.e. transparent, diverse, economically affordable and sustainable, technically interoperable, and steered by the research community)
- FAIR research data as the norm in producing and sharing scientific knowledge
- New professional profiles for dataintensive careers
- An active engagement in EOSC
- A responsible, transparent, and sustainable research assessment system
- Open Science as an integral part of research assessment practices
- Assessment approaches balancing qualitative and quantitative metrics[3].

[3] The EUA Open Science Agenda 2025 (2025-01-28)

Ten Commitments

The roadmap presents overarching recommendations that clarify the responsibilities of higher education institutions and provides suggestions for measures to promote the transition to a responsible, secure, and open scientific system. The recommendations can be summarized in the following ten commitments:

1. Research and educational environments that support and educate about open science as a practice.
2. Support and services to implement open science throughout the entire research process.
3. Promote the creation, sharing, and use of open educational resources.
4. Make research data, results, and source code accessible as openly as possible and as restricted as necessary through open research methods.
5. Offer secure infrastructural services that comply with applicable legislation and FAIR principles for the management, storage, accessibility, and preservation of research data and other digital research outputs over time.
6. Collaborate with other institutions, infrastructures, and funders for joint national solutions.
7. Promote and collaborate with international actors and initiatives.
8. Develop an incentive structure that promotes open science in merit assessment and funding allocation.
9. Advocate for research results' copyrights not to be exclusively transferred to commercial publishers.
10. Encourage public participation in research where appropriate and responsibly and sustainably engage with society at large.

5. Follow-up

Each year, SUHF sends out a survey titled *How Are The Higher Education Institutions Progressing in the Transition to an Open Scientific System* to all member institutions of the association. The questions are based on the action proposals in the roadmap. The purpose of the survey is to support institutions in their internal work and to monitor developments at the institutions through annual follow-ups. The compilation of responses is published on SUHF's website.

6. The Orientation Map

The Orientation Map tool is based on SUHF's recommendations and proposed actions. A working group within *The Swedish National Data Service* (SND), in collaboration with SUHF, has developed the tool.

SND is responsible for its updates and management. *The Orientation Map* provides support for planning, concretizing, and monitoring progress toward the goals of open science and serves as a basis for completing SUHF's survey. The tool also offers examples of actions from Swedish higher education institutions, with the possibility of sharing examples and experiences with one another.[4]

[4] https://zenodo.org/records/14678994 (2025-01-23)

7. The Roadmap's Recommendations with Associated Actions

The roadmap includes a number of overarching recommendations that higher education institutions are encouraged to follow. Each recommendation contains a series of proposed actions that institutions need to implement and monitor. Each action is accompanied by a target year (in parentheses) indicating when the action is expected to be completed.

Recommendation 1

To create research and educational environments that actively support, encourage, and educate about open science by developing and implementing local governance documents and frameworks that establish open science as a practice.

The institution should consider:

1. Establishing a strategic function for open science that represents the institution nationally and internationally and serves as a link to operational support functions (2022).

2. Adopting strategic governance documents that promote open science, including FAIR principles and open licenses (2023).

3. Clarifying the distribution of responsibilities for responsible and secure open science and ensuring that internal structures collaborate to support long-term technical readiness, skills development, and funding (2023).

Recommendation 2

To provide relevant support and efficient services that assist researchers in applying open research methods throughout the entire research process and that meet their needs resource-efficiently before, during, and after the research project.

The institution should consider:

1. Implement operational support functions that assist researchers with secure management, storage, accessibility, and preservation of research data. The support should complement discipline-specific expertise and cover archives, libraries, publishing, accessibility, information security, legal matters, funding support, and be linked to e-infrastructure and IT functions and services (2023).
2. Ensure the availability of training at the doctoral level and professional development for researchers, enabling them to acquire skills in open research methods and proper management of research data in accordance with current standards (2025).
3. Ensure that undergraduate and graduate-level education includes secure open research practices as an integral part of scientific methodology (2025).

Rekommendation 3

To promote a culture of sharing and collaboration around educational resources by actively encouraging the creation, sharing, and use of open educational resources.

The institution should consider:

1. Develop goals, strategies, and guidelines for open educational resources (2025).

2. Implement an incentive structure that recognizes and rewards work with open educational resources, such as in merit assessments (2026).

3. Begin offering support functions, services, and infrastructure that meet the needs of teachers and students for open educational resources in a resource-efficient manner (2024).

4. Educate and inform about how open licenses can enhance teachers' and students' ability to protect and control the copyright of their educational resources (2025).

5. Provide resources for the creation and sharing of open educational resources, for example, through service planning or project funding (2025).

6. Actively collaborate with other institutions and stakeholders, both nationally and internationally, in the development and dissemination of open educational resources (2024).

Recommendation 4

To ensure that research data, research results, and source code are managed, published as openly as possible, preserved, and disposed of in accordance with the FAIR principles and established guidelines for open source. Information security throughout the research process must be ensured in accordance with the institution's information security policy.

The institution should consider:

1. Implement data management plans for research projects. These plans should include information on methods for data collection, storage, information security, sharing, accessibility, and archiving, as well as continuous monitoring and quality assurance of the implementation throughout the entire lifecycle of the research data (2022).

2. Deepen researchers’ understanding of the FAIR principles and enhance their knowledge of how these can be applied to improve research quality, adherence to good research practices, and regulatory compliance. This can be achieved through targeted training sessions, workshops, and practical guides that clearly demonstrate the connection between the FAIR principles over time and high-quality research (2023).

3. Establish forums for knowledge exchange, idea development, and discussions on open science within research activities. Actively support and encourage researcher-driven initiatives aimed at promoting and integrating open science into research practices (2022).

4. Ensure that research data and source code produced in research are made as openly accessible as possible and as restricted as necessary. Established principles for open source should be applied to ensure that research software is accessible and can be reviewed, modified, and improved. Source code intended for unrestricted use should be made available under a recognized open license (2025).

Recommendation 5

To provide researchers with cost-effective, adequate, and secure infrastructural services — complying with current legislation and the FAIR principles — for the management, storage, accessibility, and preservation of research data and other digital research outputs. This includes archiving and disposal over time as an integral part of the research process and efforts toward open access.

The institution should consider:

1. Ensure that the institution provides a secure e-infrastructure tailored to researchers' needs, with workflows, support, and guidance for the proper and secure handling of research data. This includes storage, sharing, analysis resources, long-term preservation, and accessibility. The choice of service providers should be based on research needs, with decisions made at a strategic level (2023).

2. Include and, where appropriate, interconnect or create interoperability between more research-supporting services within the institution's IT architecture, such as links between e-archives, data management plans, and electronic laboratory notebooks (2025).

3. Integrate research-supporting services and guidance into a cohesive, secure digital infrastructure with long-term funding and governance. Ensure that these services can connect to national and international digital infrastructures through coordination and collaboration (2025).

4. Contribute to the development and funding of infrastructures that support open science (2025).

Recommendation 6

To actively collaborate with other institutions, infrastructures, and funders to develop resource- and cost-efficient national solutions through shared policy documents, frameworks, and infrastructural services.

The institution should consider:

1. a) Develop and actively promote expanded and coordinated collaboration between institutions and other stakeholders to ensure that Sweden has access to resource-efficient and effectively utilized e-infrastructure, both nationally and as part of the EOSC ecosystem (2022-2023).

b) Deepen collaboration between institutions by jointly working on policy development, creating and sharing educational materials, and developing and implementing shared training programs and technical solutions (2022-2023).

Recommendation 7

To actively participate in and collaborate with international initiatives such as the Coalition for Advancing Research Assessment (CoARA), the European Open Science Cloud Association (EOSC-A), the Declaration on Research Assessment (DORA), and the Barcelona Declaration.

The institution should consider:

1. a) Actively monitor international developments in open science and digital infrastructure, particularly within *The European Open Science Cloud* (EOSC) (2022-2023).

b) Strategically evaluate participation in international projects, such as EOSC projects funded by *The European Commission*, both individually and through national consortia like SND and other national infrastructures owned by institutions (2022-2023).

c) Join the membership organization *The EOSC Association* (EOSC-A) to influence and contribute to development within Europe. Collaboration among Swedish institutions would provide a stronger collective voice (2022-2023).

2. Sign *The Declaration on Research Assessment* (DORA) and implement internal measures aligned with its principles (2024).

3. Sign *The Coalition for Advancing Research Assessment* (CoARA) and implement internal measures aligned with its principles (2024).

4. Sign *The Barcelona Declaration* and implement internal measures aligned with its principles (2025).

Recommendation 8

To create an incentive structure that actively rewards and integrates open science in merit assessments and performance-based resource allocation, encouraging researchers to prioritize and value open research practices in their work.

The institution should consider:

1. a) Revise merit evaluation criteria in alignment with open science (2024).

b) Develop researcher support services for quality assurance (2024).

c) Provide expert reviewers with support to implement the institution's policies (2024).

2. In dialogue with researchers and funding bodies, develop new evaluation methods that respect disciplinary diversity and include effective follow-up mechanisms (2026).

Recommendation 9

To advocate for ensuring that copyright for research results is not exclusively transferred to commercial publishers, and to contribute to a transition where control over scientific publishing, regardless of the publishing format, remains within the academic community.

The institution should consider:

1. Actively support a transition to a publishing landscape where subscription-based and hybrid publishing agreements are gradually phased out (2022).

2. Provide clear guidance on licensing research results and information so that researchers can publish without relying on publishers' paid services for data accessibility (2022).

3. Promote awareness of academic ownership of scientific communication, ensuring that researchers and their institutions retain copyright instead of transferring it away (2022).

4. Expand strategic policy documents for open scientific publishing to include and highlight longer publication formats, such as books (2025).

5. Promote the development of open publishing platforms with peer review and FAIR principles, ensuring that publishing costs do not burden authors or readers, by encouraging researchers' engagement with these initiatives (2025).

Recommendation 10

To promote public participation in research, where appropriate, as an integrated part of the research process in a responsible and sustainable manner, to engage with the surrounding society.

The institution should consider:

1. Promote knowledge-enhancing initiatives to ensure that the principles and methods for involving the public in the research process are developed, well-known, and established across all research disciplines where relevant for data and fact collection (2025).

8. Closing remarks

Several higher education institutions face similar challenges and needs, regardless of their type or focus, both at the individual and organizational levels. By sharing resources within a common national and international framework, publicly allocated resources can be utilized optimally. The responsibility for implementtation rests with the institutions and requires collaboration with national infrastructures, other universities, research funders, and other authorities. Engagement and expertise are needed from university leadership, research support functions, and individual researchers alike.

Research is often conducted through national and international collaborations, and it is common for researchers to move between institutions during their careers. Research becomes both simpler and more efficient when policies and research support are based on shared principles and standards that are established and implemented by institutions, research infrastructures, and collaborative networks.