



Policy Recommendations for Sustainability and Connection to the EOOSC

ABSTRACT

The CeOS_SE project set out policy recommendations for sustaining Citizen-enhanced Open Science in Southeastern Europe and connecting to the EOOSC.

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Introduction

The Citizen-Enhanced Open Science in Southeastern Europe (The CeOS project) set out to raise awareness and promote best practices in Southeast European countries (BG, CY, EL, HR, IT, RS) that lag in open science (OS) and citizen science (CS) and are lowly involved in developments like the European Open Science Cloud (EOSC). The project monitored OS and CS implementation, documented best practices in a fair manner, and engaged non-expert groups in social participation. The CeOS project increased the region's visibility, emphasizing its challenges and the value of its cultural and linguistic diversity. Partners from Denmark and the Netherlands led knowledge transfer to empower academic libraries in Southeast Europe to become knowledge hubs by enhancing staff skills in OS and CS, ultimately fostering collaboration with external partners.

The PR6 “Policy change in CeOS for sustainability and impact-connection to the EOSC” has upgraded an extensive set of actionable and aligned recommendations for the practice of Citizen-Enhanced Open Science in Southeastern Europe. These final recommendations encompass the work on all PR activities with outstanding PR1 “Framework for Transfer of Knowledge and Innovation on citizen enhanced open science” The recommendations were based on three sets of data: a scoping review of more than 900 articles within the field of research libraries, open science, and citizen science with an emphasis on the 31 relevant ones; a survey with 121 respondents from LIBER libraries; and an in-depth questionnaire submitted by 29 LIBER libraries. These recommendations in the first part prepared a solid theoretical and evidence-based analytical ground for enhancing initial recommendations in the last PR6 activity.

The further work in PR6 was based on several consultation stages culminating in the final activity, PR6A4: Policy Recommendations for Sustainability and Connection to the EOSC. LIBER, with the support of project consortium members, facilitated various consultations at both national and European levels during the first part of the 2024 project. These consultations were conducted in multiple formats, including two online vision-building workshops on April 18 and May 21, 2024; a dedicated online exchange for Dutch practitioners on June 21, 2024; and an in-person workshop on July 2, 2024, in Limassol, Cyprus, as part of the LIBER Conference. In total, these consultations engaged over 200 participants.

The final consultation occurred at the Multiplier Event in The Hague on December 4, 2024. Representatives from various project target groups—such as academic and public library staff, researchers, members of Open Science NL, the LIBER Citizen Science Working Group, and other international representatives—were present. They shared their perspectives on citizen science in higher education curricula, citizen science networks, CeOS policy recommendations, and their connection to the EOSC. The discussion on the connection to the EOSC focused on cultural change, sustainability, impact, and embracing diversity. Key stakeholders provided valuable insights on the policy changes needed to advance citizen science. Given that the current landscape of citizen science could benefit from better policy alignment among relevant stakeholders, these changes require a collaborative effort centred on policy recommendations for multiple parties. We have integrated all valuable feedback alongside constructive comments from consortium members, quality control checks, and input from the LIBER Working Group on Citizen Science.

PR1 Recommendations for academic and research libraries

The first recommendations are based on PR1's work for academic and research libraries that aim to further engage in citizen-enhanced open science. The CeOS consortium proposed that libraries can achieve this by utilising the existing skills and services within their research libraries to participate in citizen science activities or partnerships and by adopting open science practices that support researchers in these efforts. During the LTTA meeting in Zagreb, these preliminary recommendations were presented for discussion and revision to enhance their relevance and applicability.

Background and Data

The first set of recommendations was based on three sets of data: a scoping review of more than 900 articles within the fields of research libraries, open science, and citizen science, with an emphasis on the 31 relevant ones; a survey with 121 respondents from LIBER libraries; and an in-depth questionnaire submitted by 29 LIBER libraries. The data collection methods were designed by a comparable Danish study¹ in collaboration with associate professor Kristian Hvidtfelt Nielsen, Aarhus University, Denmark.

The data showed a strong foundation for citizen-enhanced open data in European research libraries. Most libraries (79%) engage with several or all the pillars of open science outlined in the LIBER Open Science Roadmap². Additionally, 46% of these libraries implement citizen science, while 49% plan to do so. There is also a general agreement on the definitions of both concepts and how they benefit science and society.

Research libraries show significant differences in their approaches to citizen and open science. These libraries have primarily been established to support research institutions, each with its objectives and methods of operation. Furthermore, there are variations in research practices due to local, regional, and national factors such as culture, demographics, policy, and economics. Even within the same country, these disparities can be substantial. Therefore, when making recommendations for research libraries, it is essential to recognise and embrace these differences in priorities and implementations. This process is typically preceded by analytical work that focuses on tailoring recommendations to the specific context of each library.

Analysis

Upon data analysis, three types of libraries regarding citizen-enhanced open science appear.

1. **Mature:** Strong and embedded commitment to open science. An institutional understanding of citizen science and examples of projects or plans to execute projects.
2. **Developing:** Citizen science has yet to feature on the agenda; however, the commitment and emphasis on open science are in place. If there is evidence of citizen science, it does not extend beyond isolated activities/mentions.

¹ Torben Esbo Agergaard, Gitte Kragh & Kristian Hvidtfelt Nielsen. Citizen Science i Danmark: Projekter, litteratur og aktører. Aarhus University Press. 2020. <https://unipress.dk/udgivelser/c/citizen-science-i-danmark/>

² LIBER Open Science Roadmap. 2018. <https://libereurope.eu/document/liber-open-science-roadmap/>

3. Infant: Libraries practice open science; however, this is not widespread (e.g., there is only a focus on open access). There is no evidence of citizen science.

An audit of skills and competencies was conducted in connection with the existing literature and the survey and questionnaire findings. This aligns well with the potential for citizen-enhanced open science, as over three-quarters of libraries reported possessing skills in advocacy, event organisation, workshop facilitation, teaching, and communications. These abilities are crucial transferable skills for fostering citizen-enhanced open science. Additionally, between 50-74% of respondents indicated they have skills in seven specific areas: project coordination, project management, evaluation, research data management, publishing FAIR data, data and protocol preservation, and compliance with GDPR.

The data revealed several barriers, including a lack of resources, insufficient external funding, and the absence of policies—particularly a significant lack of open science and citizen science policies at both the institutional and national levels. Notably, the perceived lack of skills emerged as the least considerable obstacle.

Recommendations (Part 1)

We presented our recommendations on two levels: strategic and operational. At the strategic level, research libraries interested in citizen science should define their roles and contributions through dialogue with collaboration partners and stakeholders. At the operational level, the focus was on specific areas of action and key considerations, highlighting where libraries can play a significant role and add value to the citizen science field.

The recommendations should serve as inspiration for research libraries that are interested in further engaging in citizen science. Preparatory work is necessary before adopting the selected recommendations to suit the specific needs of each organisation. Not all recommendations will apply to every library. However, the following recommendations appear relevant to certain types of libraries:

- Mature: Operational recommendations.
- Developing: A combination of strategic and operational recommendations.
- Infant: All strategic and operational recommendations are included

Given the diversity of research libraries and the need to establish each library's unique identity, most research libraries must develop specific strategic plans. We propose the following recommendations for this purpose:

Strategic-1: Institutionalisation. Create a “single point of contact” or the Broad Engagement in Science Point of Contact (BESPOC).

Strategic-2: Prioritisation. Clear managerial prioritisation. The priority must be clearly communicated both internally and externally.

Strategic-3: Partnerships. (A) map stakeholders at the local institution, (B) start a dialogue with relevant stakeholders and partners locally and nationally, and (c) join relevant working groups within LIBER or ECSA.

Strategic-4: Policy and strategy. To reverse the pull effect, partner with relevant stakeholders: researchers, funders, civil society, and even private sector actors.

Operational-1: Mapping of researchers & projects. Mapping relevant projects, research groups, centres, etc. How do you respond/organise yourself?

Operational-2: Competences. Utilise the ones already present. Focus on those you are missing. Explore the role of community manager.

Operational-3: FAIR Data and Open Access. Utilise or expand existing infrastructure or services. FAIR Data and Open Access.

Operational 4: Teaching citizen science. We recommend that this work be aimed at students at the bachelor's, master's, and PhD levels.

Additional Recommendations (Part 2):

As a result of this multi-stakeholder consultation process, several recommendations have emerged in the form of policy guidelines for implementation. These guidelines focus on developing policies on Citizen-Enhanced Open Science (CeOS) in Southeastern European institutions, considering the specific achievements made during the project. Steps for raising awareness about the CeOS, including Southeastern Europe, are provided based on the role of libraries as knowledge and innovation hubs and librarians as intermediaries, trainers, and more. These recommendations also include a set of guidelines and scalable best practices from other European regions for the area. Additionally, they aim to address the question: "Which policy changes are required to enhance Open Science and Citizen Science infrastructure?" Open Science and CS have been determined as a cultural shift within the global research community. In addition to the recommendations mentioned above, the CeOS project feels strongly that additional reflections could highlight this agenda.

Citizen Science as a Tool

- **Establish Partnerships for citizen science initiatives to succeed and prevent isolation.**

The concept of Citizen Science offers new opportunities for the public to engage and use library sources/collections. However, specific changes must occur within the libraries before citizens can fully participate. One of the primary issues is the need for more effective communication and collaboration between library departments. Citizen Science is relevant to all areas of a library's work, so cooperation among librarians is essential to develop and implement it successfully. Partnerships must be established for citizen science initiatives to

succeed and prevent isolation. These partnerships can include internal networks of colleagues or external networks of practitioners, such as associations of librarians, Citizen Science groups, and others. Citizen Science centres of universities can be associated with their Libraries as they are part of the research ecosystem and can act as a hub for bringing together researchers and Citizens.

Additionally, Libraries must maintain close links with faculties and research services of the Universities.

Education and Training

- **Incorporate citizen science into the curricula of higher education institutions.**

Another important component that emerged from all four CeOS-led events is the significance of education and training. While these are two distinct themes, they are intrinsically related. Integrating Citizen Science into higher education curricula ensures it is visible and actively used to build and strengthen the connection between Citizen Science events and society.

Data from the CeOS_SE project show that students are relatively unfamiliar with open and citizen science, underscoring the importance of including these concepts in educational programs.

To this end, it is not only the students who are being educated but also the teachers. Throughout the CeOS project, partners conducted a series of training sessions, leading to the following conclusions: PR3A2

Libraries as Knowledge Hubs:

- **Get involved in more advocacy work and be open to engaging with diverse communities.**

Libraries possess internal expertise and understand their roles well. New technologies are present within libraries, and some librarians can leverage them for various purposes and audiences. However, work culture requires specific changes for these technologies to be fully adopted.

The shift to new technologies is particularly important as libraries' newest end-users are digital natives. Libraries' ability to embrace technology directly affects their capacity to advance Citizen Science with newer audiences. Although libraries have long led projects with Citizen Science components, the terminology may not have always been used explicitly—citizen science was already present in practice.

A library can bring together local communities and offer them opportunities to engage with science (and sometimes scientists), information specialists, researchers, and more. Libraries have the potential to influence the next generation of scientists; it is their responsibility to foster a high level of understanding and to share knowledge on demand. The more people are aware of science, technology, and scientific projects, the more likely they are to pursue a scientific path themselves.

Societal Impact:

Societies are increasingly looking to universities to play a pivotal role in societal advancement. But how exactly does research empower communities and tackle the world's most daunting challenges? In light of this, we suggest that research libraries:

- **Start a discussion in LIBER libraries regarding the upcoming Framework 10 from the EU Commission.**
- **Engage in conversations with societal stakeholders to help clarify the definition of "societal impact."**
- **Collaborate with community stakeholders to create metrics and indicators.**
- **Acknowledge that these indicators and data feed into a sustainable global monitoring framework.**
- **Trust in citizen input. Citizen contributions can enhance research by increasing the volume of data, diversifying perspectives, promoting inclusivity and democratising the research process, fostering public interest, and advocating for scientific initiatives.**

Connection to the infrastructure and EOSC

- **Increase awareness of the advantages of enhanced data management and ensure they are FAIR—Findable, Accessible, Interoperable, and Reusable.**

The European Open Science Cloud (EOSC) aims to create a system that promotes FAIR principles—Findable, Accessible, Interoperable, and Reusable—research in Europe. This will be achieved by making the EOSC Federation, allowing European researchers to store, share, process, analyse, and reuse data and services across various disciplines and borders. The EOSC Federation embodies the EOSC's vision by providing European researchers in both academic and private sectors and citizen scientists with access to an extensive range of FAIR research outputs from diverse disciplines, sectors, and countries. Guided by the principles of Open Science and FAIR, the EOSC Federation will develop by utilising existing data repositories and their associated services while also mobilising resources from established Research Infrastructures, Institutes, and e-infrastructures.

Research libraries should contribute and foster building communities, including data competence and open science support centres about the EOSC Federation and EU node services. The research libraries should prioritise enhancing awareness of the benefits of improved data management practices, increased adoption and practical implementation of Open Science, and an improved user experience, especially in light of the launch of the EOSC EU Node, which will be the first node of the EOSC Federation. The EOSC EU Node is designed to support multidisciplinary and multinational research, promoting FAIR data and related services across Europe and beyond. Additionally, the EOSC EU Node will facilitate the establishment of the EOSC Federation, aligning with the architectural principle of federated research infrastructures.

FINAL RECOMMENDATIONS (Short Version)

1. **Strategic-1: Institutionalisation.** Create a “single point of contact” or the Broad Engagement in Science Point of Contact (BESPOC).
2. **Strategic-2: Prioritisation.** Clear managerial prioritisation. The priority must be clearly communicated both internally and externally.
3. **Strategic-3: Partnerships.** (A) map stakeholders at the local institution, (B) start a dialogue with relevant stakeholders and partners locally and nationally, and (c) join relevant working groups within LIBER or ECSA.
4. **Strategic-4: Policy and strategy.** To reverse the pull effect, partner with relevant stakeholders: researchers, funders, civil society, and even private sector actors.
5. **Operational-1: Mapping of researchers & projects.** Mapping relevant projects, research groups, centres, etc. How do you respond/organise yourself?
6. **Operational-2: Competences.** Utilise the ones already present. Focus on those you are missing. Explore the role of community manager.
7. **Operational-3: FAIR Data and Open Access.** Utilise or expand existing infrastructure or services. FAIR Data and Open Access.
8. **Operational 4: Teaching citizen science.** We recommend that this work be aimed at students at the bachelor's, master's, and PhD levels.
9. **Citizen Science as a Tool:** Establish Partnerships for citizen science initiatives to succeed and prevent isolation.
10. **Education and Training:** Incorporate citizen science into the curricula of higher education institutions.
11. **Societal Impact:**
 - Start a discussion in LIBER libraries regarding the upcoming Framework 10 from the EU Commission.
 - Engage in conversations with societal stakeholders to help clarify the definition of "societal impact."
 - Collaborate with community stakeholders to create metrics and indicators.
 - Acknowledge that these indicators and data feed into a sustainable global monitoring framework.
 - Trust in citizen input. Citizen contributions can enhance research by increasing the volume of data, diversifying perspectives, promoting inclusivity and democratising the research process, fostering public interest, and advocating for scientific initiatives.
12. **Connection to the infrastructure and EOSC:** Increase awareness of the advantages of enhanced data management and ensure it is FAIR—findable, Accessible, Interoperable, and Reusable.