The CeOS Project

Citizen-Enhanced Open Science
Southeastern Europe

Recommendations for academic and research libraries within Citizen-Enhanced Open Science

ABSTRACT

Based on data collected from a wide range of LIBER libraries, this document provides a series of strategic and practical recommendations for research and academic libraries who wish to engage in Citizen-Enhanced Open Science.
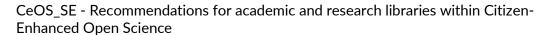
Authors:

Thomas Kaarsted

Oliver Blake

Kristian Hvidtfelt Nielsen

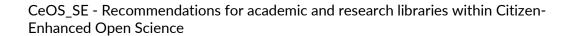Citizen-enhanced Open Science Southeastern Europe

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Introduction

In the following report, we make a number of recommendations for academic and research libraries (henceforth research libraries) who wish to engage (further) with citizen-enhanced open science. We suggest this could happen by exploiting skills and services already present in research libraries by engaging in citizen science activities or partnerships or via open science practices supporting researchers in that endeavour.

At the time of writing, the CeOS_SE project partners are set to participate at the LTTA (Learning, Teaching, Training Activites) event in Zagreb. We will present these preliminary recommendations at this forum to discuss and revise them, potentially enhancing their relevance and applicability.

1. Background and data

The inspiration for the below recommendations is based on three sets of data.

1) A scoping review of +900 articles within the field of research libraries, open science and citizen science, with an emphasis on 31 of the most relevant articles.
2) A survey with 121 respondents from LIBER libraries.
3) An in-depth questionnaire submitted by 29 LIBER libraries.

The data collection methods were designed in accordance with a comparable Danish study in collaboration with associate professor Kristian Hvidtfelt Nielsen, Aarhus University, Denmark (Agergaard et al. 2020).

1.1. A solid foundation

The data indicates there is a strong foundation for citizen-enhanced open data in European research libraries. A vast majority of libraries (79 %) are engaging with several or all of the pillars of open science mentioned in the LIBER Open Science Roadmap as well as implementing citizen science (46 %) or wanting to implement citizen science (49 %). Also, there seems to be a consensus on the terms of both concepts as well as their benefit to science and society.

Based on the data, however, it is also evident that research libraries differ greatly in relation to citizen science and open science. Research libraries have predominantly been established to serve research institutions with different objectives and working methods. In addition, there are local, regional, and national differences in terms of research, culture, demographics, policy, and economics. Even within individual countries there appear to be large differences. Therefore, when making recommendations for research libraries, it is worth bearing in mind that there can – and should – be differences in priorities and implementation. This is (almost) always preceded by analytical work concerned with adapting the recommendations to the specific context.

1.2. No one size fits all

Upon analysis of the data there appear to be three types of libraries with regards to citizen enhanced open science.

1) *Mature:* Strong and embedded commitment to open science. Institutional understanding of citizen science and examples of projects or plans to execute projects.

2) *Developing*: Citizen science still yet to feature on the agenda, however the commitment and emphasis on open science is in place. If evidence of citizen science it does not extend beyond isolated activities/mentions.

3) *Infant*: Libraries practice open science however this is not that widespread (e.g. only a focus on open access). No evidence of citizen science.

In connection, building on the literature and based on findings from the survey and questionnaire, a skills and competencies audit was done. This also bodes well for citizen-enhanced open science, as over three quarters of the libraries report skills within advocacy, arranging events, facilitating workshops, teaching, and communications. These are all core transferable skills for citizen-enhanced open science. Between 50-74% of respondents also report skills in the following seven areas: project coordination, project management, evaluation, research data management, publishing FAIR data, preservation of data and protocols, and GDPR.

The data, however, also revealed a number of barriers including lack of resources, lack of external funding, lack of policy and – importantly – a general lack of policy on both an institutional and national level with the greatest barrier being a lack of open science (and citizen science) policy at university level. This highlights that a perceived lack of skills is the smallest obstacle.

2. Recommendations

The below recommendations are set out on two levels: strategic and operational. At the strategic level, research libraries wishing to pursue citizen science can define their own role and contribution in dialogue with collaboration partners and stakeholders. At the operational level, the focus is on concrete areas of action and attention points, and this is where libraries can potentially have a role and add value to the whole citizen science field.

It is important to emphasise that the recommendations should be seen as inspiration for research libraries interested in engaging (further) in citizen science, and that preparatory work must be done before making the selected recommendations relevant to the individual organisation. Not all recommendations apply to every single library. Our research indicates that the following recommendations will be relevant for the three typologies of libraries, as defined above:

- *Mature*: Operational recommendations

- *Developing*: A mix of strategic and operational recommendations.

- *Infant*: All strategic and operational recommendations.

2.1. Strategic recommendations

Taking into account the diversity of research libraries, but also in order to anchor the individual research library, it is important most research libraries make concrete strategic considerations. For this work we put forward the following recommendations:

1. *Partnerships: Internally and externally*

The data suggest research libraries are already to some degree engaged or interested in citizen science, and the field has been undergoing stronger organisation in recent years. It is therefore recommended that research libraries seek partners and participate in existing working groups, organisations, networks or project consortia, or alternatively initiate new ones. In this way, research libraries can not only have access to useful links and resources themselves, but also provide access to researchers at their respective research institutions. We anticipate that in the future more funding opportunities will be available through national, pan-European and European funding institutions, and it is therefore a good idea to be linked to national and international networks to gain access to these funds. In connection, on the local level this could be done by:

a. mapping stakeholders at the local institution (university level). Besides faculties, other partners might be relevant: grants writers, communications, public engagement with science, strategic advisors, learning centres, outreach officers etc. These actors potentially have a stake in citizen science and societal impact.

b. a dialogue with relevant stakeholders and societal partners locally and nationally using all squares of the stakeholder involvement matrix: civil society, government, learning sector, and private sector.

c. engaging in the open science and citizen science working groups within LIBER or by joining the European Citizen Science Association (ECSA). Knowledge sharing on major funders like Horizon Europe, Erasmus+ and others.

2. *Institutionalisation*

The data has confirmed that the organisation of citizen science is primarily "bottom-up". Concrete citizen science projects are as a rule instigated by researchers, research groups or organisations without a broader institutional backing. If citizen science is to develop a stronger root network in the coming years, the work and energy of the "thousand flowers that bloom" must be channeled into a more solid institutional framework, such as a "single point of contact" or the Broad Engagement in Science, Point of Contact (BESPOC) (Ignat & Ayris 2020).

The BESPOC model aims to provide a holistic approach to research partnerships that aim to support Open Science principles with many types of actors and organisations and with many different objectives and funding. In this way, citizen science and research libraries are part of the many collaborations, tools and networks that can help promote openness, sharing and collaboration in research institutions. The institutionalisation of citizen science – and the

contribution of research institutions to this – is thus seen in the BESPOC model as part of a larger process of change in the research world.

3. Prioritisation

The data has shown that there is an interest in linking research libraries to citizen science initiatives, but that there are challenges surrounding capacity building and prioritisation. It is therefore obvious to recommend a clear managerial prioritisation of tasks related to citizen science for those research libraries that have an interest in the area. The priority must be clearly communicated both internally and externally. Your library is a possible partner, but herein lies another communication task: how is this made clear to staff or potential partners? In this context, reducing the complexity of the research library's work areas may be an additional point of attention. If a research library wishes to prioritise this area, it must simultaneously define its role (preferably in dialogue with partners) and be clear about the research library's specific roles and services in this regard.

4. Policy and strategy

In order to reverse the pull-effect that is a major factor in hampering citizen-enhanced open science and is causing a lack of funding, research libraries could set the agenda in a partnership with relevant stakeholders (researchers, funders, civil society and even private sector actors). This could be done by a joint push towards university management, national research councils and policy makers within the university sector. In connection, research libraries need to be able to communicate a strategy both internally and externally. With regards to policy and strategy the 'not one size fits all-approach' is particularly important. In some instances, universities employ a top-down approach where a strong commitment by upper-level management is crucial. The literature review found that libraries responded quickly when policy came from above, effectively pushing open science and acting as a change-driver. In other instances, the bottom up-approach works, where the library in a 'coalition of willing partners' do advocacy, explore citizen science in practice with researchers and communicate results.

2.2. Operational recommendations

At the operational level, we propose the following recommendations for research libraries:

5. Mapping of researchers and their projects – and responsiveness

Perhaps as a starting point for building relations with relevant researchers, research groups, institutes, and faculties, a mapping exercise could be done. Also, quite a few other research methods border on citizen science and as funders increasingly on the European level demands a focus on community based research, this could be explored, and possible partners contacted.

In connection, the role and internal organization of the library needs to be addressed. Existing services may need to be offered to new audiences, while new services may need to be offered to new or existing audiences. Shared services are likely to emerge, which will be offered in collaboration with other departments (e.g. research support and grants offices)

from the same institution or through entirely new partnerships. The citizen science field is characterised by many different organisational forms, and many different service needs have been identified in relation to specific projects. It is therefore recommended that libraries increasingly strive for a flexible form of organisation, possibly working within a project or matrix organisation. Flexibility is also necessary because library organisations are diverse and different from country to country and from library to library.

6. *Competences: Utilize the ones already present, focus on those you are missing*

An interesting finding of the data is the recognition of transferable skills already present for citizen-enhanced open science. The utilization of these skills requires a dialogue with staff and a joint recognition that this is the case. In this context, it is recommended that research libraries map the skills already present and focus on competence development in areas that are missing. Increasingly, the role of community manager is explored in citizen science projects as a supplement to the principal investigator (researcher in charge). In this connection, it is recommended that research libraries keep up to date with the latest knowledge about citizen science and, in dialogue with their research communities, present and discuss the concept and how it can be used in research and research dissemination. Similarly, recruitment and retention of citizen volunteers in future and existing projects is a crucial aspect of citizen science when research teams at times need partners such as research libraries.

7. *Utilize or expand existing infrastructure or services. FAIR Data and Open Access.*

The majority of research libraries report open science services. These services can be utilised to support citizen science. It is therefore recommended that research libraries:

a. help ensure access to DOIs, necessary data licenses and publication in open databases (repositories),

b. enter dialogue with researchers on the FAIR Data principles (DeiC, 2020) and on the development of data management plans and protocols at an early stage in projects,

c. help to ensure that the budget allocates funds for good data management in all parts of the project,

d. help to ensure that all publications from citizen science projects go through green Open Access (OA) as an example in compliance with the Danish national OA strategy (Danish Agency for Research and Education, 2021),

e. participate in international contexts (knowledge building) about FAIR Data and Open Access.

8. *Teaching citizen science*

In order for citizen-enhanced open science to become sustainable, there is a need for teaching citizen science to university students at all levels (bachelor, master and Ph.d.). Different teaching formats have been tested with the participation of staff from research libraries. We recommend that this work should be continued. A particular recommendation for citizen science teaching at doctoral level would be to integrate citizen science into

academic courses or broad "transferable skills" courses about, for example, responsible research practices or socially responsible research and innovation. A number of existing citizen science projects involve ongoing collaborations with primary and secondary schools, to which research library staff can also contribute. This requires necessary knowledge and skills in relation to:

a. structuring of courses and modules in bachelor and Master's programmes,

b. description and achievement of learning outcomes and subject descriptions in primary and secondary school,

c. didactics and pedagogy of collaborative, "co-created" learning activities, including the concepts of science literacy and nature of science (Khine 2012).

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