Roadmap on CeOS

in the Balkans

Citizen-Enhanced Open Science

Nataša Dakić, PhD
Aleksandra Trtovac,PhD
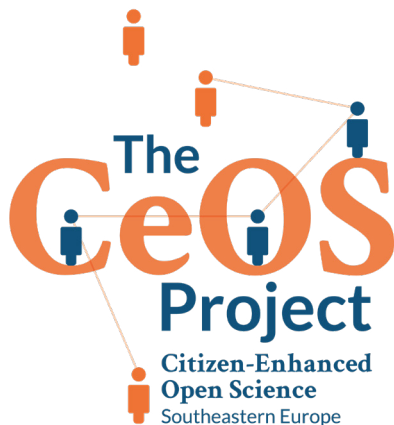
Akademiζki trg — Place de l'Académie — Zag

We are looking for seed beetles!

The CeOS Project

Citizen-Enhanced Open Science
Southeastern Europe

Authors:
Nataša Dakić, PhD
Aleksandra Trtovac,PhD

Citizen-enhanced
Open Science
Southeastern Europe

Roadmap on CeOS in the Balkans

Overview	
Document title	Roadmap on CeOS in the Balkans
Dissemination Level	Public
Date of completion	25.09.2023.
Type	Roadmap
Version	3.0 - final
Number of Pages	127

Deliverable Factsheet

Project number	KA220-HED-15D886A6
Project acronym	CeOS_SE
Project title	Citizen-enhanced Open Science in Southeastern Europe Higher Education knowledge hubs
Document title	Roadmap on CeOS in the Balkans
Authors	Nataša Dakić, Aleksandra Trtovac
Output	PR4A3
Due date according to contract:	31/08/2023
Contributor(s)	All project partners
Reviewer(s)	Sylvia Koukounidou (UCY)
Language editor(s)	Rosie Allison (LIBER)
Approved by	All project partners
Abstract	This document outlines the potential for Citizen Science, as a component of Open Science, to be more broadly used in the Balkan countries. It highlights the importance of knowledge exchange, trust-building, and long-term collaboration in the region, specifically focusing on the topic of CeOS (presumably referring to a specific field or initiative). The Roadmap aims to identify the capacities of university libraries in the Balkans and uncover any unused opportunities for public involvement in Open Science.
Keyword list	Open Science; Citizen Science; university libraries, collaboration, Balkan
Copyright	CC BY 4.0

CONSORTIUM		
Organisation	**Country**	**Author**
Stichting LIBER	The Netherlands	Project Coordinator
Syddansk Universitet	Denmark	Partner
Universita degli Studi di Torino	Italy	Partner
Panepistimio Patron	Greece	Partner
University of Cyprus	Cyprus	Partner
Univerzitetska biblioteka "Svetozar Marković"	Serbia	Partner
Nacionalna i sveučilišna knjižnica u Zagrebu	Croatia	Partner
Universitet po bibliotekoznanie i informacionni tehnologii	Bulgaria	Partner

DOCUMENT HISTORY			
Version	**Date**	**Description**	**Author**
0.0	06.06.2023.	Draft version of the document	Nataša Dakić, Aleksandra Trtovac
1.0	20.06.2023.	Revision of the document based on the Consultations with stakeholders	Nataša Dakić, Aleksandra Trtovac
2.0	28.07.2023.	Preprint version	Nataša Dakić, Aleksandra Trtovac
3.0	25.09.2023.	Final version	Nataša Dakić, Aleksandra Trtovac

Roadmap on CeOS in the Balkans

Executive Summary

Open Science (OS) and Citizen Science (CS) are two distinct but related concepts that can significantly improve the quality of scientific and innovation outputs, while also promoting public engagement with science and technology, openness, and active citizenship.

Open Science is a movement towards making scientific research more accessible, transparent, and collaborative. It involves the sharing of research data, methods, and publications openly and freely, so that anyone can access and use them. OS also promotes the use of open-source software, OA journals, and other tools to enhance scientific collaboration and facilitate knowledge transfer across different disciplines and sectors.

By promoting transparency and collaboration, OS can help to reduce bias and improve the quality of scientific research outputs. It can also lead to more efficient and effective use of research resources and increase the impact and relevance of scientific research to society.

Citizen Science, on the other hand, involves the active participation of members of the public in scientific research projects. It can take many forms, including collecting data, conducting experiments, or analysing data, among others. CS provides an opportunity for individuals and communities to engage with scientific research, contribute to scientific discovery, and develop a better understanding of scientific issues.

Citizen Science can also help to democratise scientific research by involving people who may not have scientific training or access to traditional research resources. By involving a broader range of

participants in scientific research, CS can generate new ideas and perspectives and promote innovation.

Together, Open Science and Citizen Science can complement each other and lead to a more inclusive, transparent, and collaborative scientific research ecosystem. They can also promote public engagement with science and technology, openness, and active citizenship, which are essential for building a more sustainable and equitable society.

Higher Education Institutions (HEIs) are increasingly recognising the importance of OS and CS activities in enhancing the educational, scientific, innovation, and social impact of their institutions. As a result, many HEIs are organising various OS/CS activities to engage their staff, researchers, and students in collaborative and open research projects.

Images: All cartoons by Frits Ahlefeldt, CC BY-NC-ND 4.0
https://fritsahlefeldt.com/

Some examples of OS/CS activities that HEIs are involved in include:

- Hackathons: These are events that bring together individuals with different backgrounds to collaborate on solving a specific problem using technology.
- Datathons: These are events that focus on analysing and interpreting data to extract insights and develop new knowledge.
- Service jams: These are events that focus on designing and developing innovative services, often involving participants from multiple disciplines.
- Knowledge café: This is an informal gathering that promotes open conversation and knowledge sharing.
- Fablabs: These are workshops that provide access to digital fabrication tools and resources, such as 3D printers and laser cutters, to enable individuals to create and prototype their own designs.
- Game labs: These are spaces for creating and developing games, often using open-source software and resources.
- Innovation sprints: These are events that focus on developing new ideas and prototypes quickly and efficiently, often involving intense periods of collaboration and experimentation.

This roadmap is designed to assist HEIs and libraries in enhancing the educational, scientific, innovative, and social impact of their OS/CS activities. It provides guidance on how to organise and facilitate these activities effectively, including identifying the right participants, setting clear goals, and selecting appropriate tools and resources. The roadmap also includes information on how to measure and evaluate the impact of these activities, as well as best practices for promoting and sustaining engagement among participants.

The roadmap is also of interest to independent initiatives that are organising OS/CS activities. By following the guidance provided in the roadmap, independent initiatives can enhance the impact of their activities and promote greater engagement among participants. Overall, the roadmap provides a valuable resource for any organisation or individual looking to promote and engage in OS/CS activities.

1. Introduction ▶

Open Science (OS) and Citizen Science (CS) are both characterised by cross-border interactions that are transparent, accessible, shareable, and open to participation. In both cases, the activities of these movements extend beyond the traditional group of participants and engage individuals from diverse fields, sectors, communities, and cultures. The inclusion of these diverse perspectives is an essential aspect of both OS and CS.

In OS, the focus is on making scientific research more open and accessible, allowing for greater collaboration and knowledge sharing across disciplines and sectors. This approach encourages researchers to share their findings, data, and methods with others in the scientific community and the public, creating a more inclusive and transparent approach to research.

Similarly, CS involves the participation of non-scientists in scientific research projects, often using digital platforms and tools to facilitate participation. This approach provides an opportunity for individuals from diverse backgrounds to contribute with their expertise and perspectives to scientific research, resulting in a more inclusive and comprehensive understanding of scientific issues.

In both cases, the inclusion of citizens with experience in fields other than academia and science is essential to creating a more comprehensive understanding of scientific issues. By involving individuals from diverse backgrounds and cultures, OS and CS projects can generate new ideas and perspectives, leading to more innovative and effective solutions to scientific problems.

In addition, the transparency and openness of OS and CS related activities allows greater public engagement with science and technology. By providing accessible and shareable information about scientific research and its applications, OS and CS can promote a greater understanding of science and technology among the general public. This increased public engagement can help to create a more informed and active citizenry that is better equipped to participate in decision-making related to science and technology.

Overall, the shared characteristics of cross-border interaction, transparency, accessibility, shareability, and openness to participation make both OS and CS valuable movements that promote collaboration, inclusivity, and public engagement with science and technology.

Frits Ahlefeldt

Also, following the trends, the new term is defined, CeOS, or "Citizen-Enhanced Open Science," which is a concept that aims to broaden the scope of open science by involving the public in scientific research. It recognizes the value of citizen participation in various aspects of scientific endeavours, such as data collection, problem-solving, decision-making, and science communication. By integrating citizens into the research process, CeOS enhances the quality and quantity of data, fosters public trust in science, and increases scientific literacy among the population. The term highlights the interconnectedness of citizen involvement and open science, emphasising the potential of citizens to contribute significantly to advancing scientific knowledge and addressing societal challenges[1].

---

[1]   Zourou, Katerina, and Ziku, Mariana. "Citizen Enhanced Open Science in Cultural Heritage - Review and Analysis of Practices in Higher Education". Zenodo, July 21, 2022. Retrieved 14.05.2023, https://doi.org/10.5281/zenodo.6875126

2. Open Science ▶

2.1. OS Definition

To support policy making related to Open Science, it's crucial to have a clear understanding of what this term encompasses. Policy makers need to know what they are being asked to support and why it matters. Unfortunately, open science means different things to different people. Even the words "open" and "science" defy easy description.

Open Scholarship Initiative's (OSI) core recommendation on the question of defining Open Science is "to recognize that open science is fragmented and fluid, rooted in different understandings of the word 'open,' a wandering evolutionary path of the open concept, different uptake and adoption by different fields, and different philosophical underpinnings for different audiences"[2].

> *"Open Science is the practice of science in such a way that others can collaborate and contribute, where research data, lab notes and other research processes are freely available, under terms that enable reuse, redistribution and reproduction of the research and its underlying data and methods "*[3].

OS has developed many areas of practice, as Knoth and Pontika's widely circulated "Open Science Taxonomy"[4] chart shows. Each of these areas has its own businesses, users, standards and communities of practice; between these areas, even though there is awareness of each other's existence, there isn't necessarily policy alignment or coordination. This is a rich and diverse ecosystem of practice-based elements.

To sum up, there are numerous individuals and groups involved in OS, but they may not all be working together or recognized as being part of the movement. The recommendation from OSI is to involve all of

---

[2]   Hampson, G, M DeSart, J Steinhauer, EA Gadd, LJ Hinchliffe, M Vandegrift, C Erdmann, and R Johnson. "OSI Policy Perspective 3: Open science roadmap recommendations to UNESCO". *Open Scholarship Initiative* (June 2020), doi 10.13021/osi2020.2735

[3]   "Open Science Definition". FOSTER, https://www.fosteropenscience.eu/taxonomy/term/100

[4]   P. Knoth and N Pontika. *Open Science Taxonomy*, (2015), doi: 10.6084/m9.figshare.1508606.v3

these groups in policy discussions, not just the ones that are commonly heard from. UNESCO and OSI are particularly interested in engaging researchers more effectively and creating a stronger connection between the public and science. This will help to facilitate the transfer of the benefits of scientific research to the public more effectively than is currently happening[5].
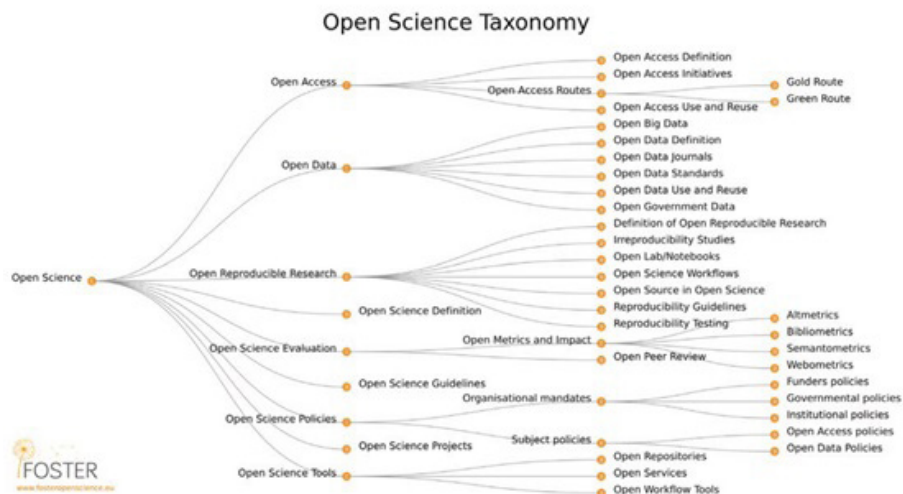
Graph 1: Open Science Taxonomy, retrieved from FOSTER website

2.2. OS National Policies

According to OS Policy research from April 2021[6], in Europe was found 16 national policies, of which 12 are those of EU member states (Belgium, Cyprus, Czech Republic, Finland, France, Ireland, Lithuania, The Netherlands, Slovenia and Slovakia and Spain) and four non-EU

5   Glenn Hampson, Mel DeSart, Jason Steinhauer, Elizabeth Gadd, Lisa Janicke Hinchliffe, Michael Vandegrift, Chris Erdmann, and Rob Johnson. "Open Science Roadmap." *Open Scholarship Initiative Proceedings*, December 18, (2020), doi 10.13021/ osi2020.2735

6   Thordis Sveinsdottir, Davidson, Joy, & Proudman, Vanessa. "An Analysis of Open Science Policies in Europe, v7 (Version 7)". 2021. Zenodo. https://doi.org/10.5281/ zenodo.4725817

members (Switzerland, Norway, Serbia and the UK) (Table 1). Based on the thorough examination of components within national policies, the following findings have been yielded:

- Approximately two-thirds of national policies contain a definition for data.
- Data sharing is predominantly suggested rather than obligatory in most policies.
- While exceptions to data sharing are permitted in a majority of policies, only a few currently necessitate formal justifications.
- Explicit reference to the FAIR principles is present in less than half of the policies, although most imply their importance.
- The majority of policies mandate or recommend the use of Data Management Plans (DMPs).
- Expectations regarding data citation are not yet widely integrated into policies.
- None of the policies require the inclusion of data availability statements.
- Intellectual Property (IP) is addressed in most policies.
- Specific licence types are outlined in approximately one-third of the policies.

The European Commission has reaffirmed its dedication to promoting OS through the participation requirements of the R&I Framework Programme Horizon Europe[7], spanning from 2021 to 2027. This program seeks to integrate "open science practices for enhanced quality and effectiveness of research and innovation, as well as active involvement of society"[8]. The draft of the General Model Grant Agreement, released on February 25, 2021, outlines the precise grant conditions for recipients. Within Horizon Europe, participants will be obligated to[9]:

- Establish and regularly update a Data Management Plan.
- Deposit data in a trusted repository and provide Open Access (OA) through it.
- CC BY or CC0 (or equivalent) licence required to open data.

---

[7] Horizon Europe https://ec.europa.eu/info/horizon-europe-next-research-and-innovation-framework-programme_en

[8] European Commission. *Horizon Europe - Investing to shape our future*, March 19, 2021, https://ec.europa.eu/info/files/horizon-europe-investing-shape-our-future_en

[9] European Commission. *General Model Grant Agreement, Horizon Europe (HORIZON): Euratom Research and Training Programme (EURATOM)*, April 2022, 108-109, https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/common/agr-contr/general-mga_horizoneuratom_en.pdf

- Apply exceptions to (duly justified in the DMP; legitimate interests or constraints).
- Provide information via the repository about any other research output or any other tools and instruments needed to re-use or validate the data.
- Ensure that metadata is open under CC0 or equivalent licence and are in line with the FAIR principles, including grant information, licensing terms, and PIDs.
- Calls may, in addition, require beneficiaries to provide (digital or physical) access to data or other results to validate scientific publications.
- In the case of a public emergency, beneficiaries must – if requested – immediately deposit any research output in a repository and make it under a CC BY licence, a Public Domain Dedication (CC0) or equivalent.
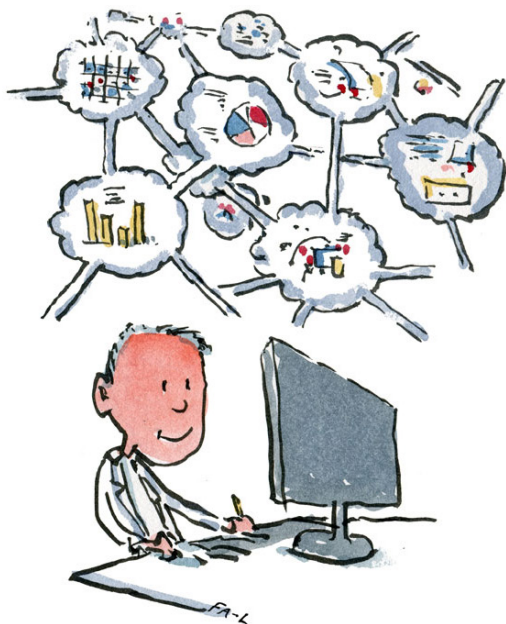
Nr.	Member state / country	Type of policy (statute, government ministry, funder policy)	Name of policy	Year policy came into effect	Sponsoring organisation (ministry, funder, etc)	Scope / coverage beyond data	Linked to open access/ open science policy?
	EU						
1.	BE	Code of Ethics	Code of Ethics for Scientific Research in Belgium[1]	2009	Learned Societies, supported by Federal Government	Protocols	No
2.	CY	National policy	National Policy of the Republic of Cyprus for Open Science Practices[2]	2022	Deputy Ministry of Research Innovation and Digital policy (Ad hoc committee for Open Science)	Open Science aspects and practices	Yes
3.	CZ	National Strategy	National Strategy on Open Access to Scientific Information of the Czech Republic for 2017–2020[3]	2017	Ministry of Science, Research and Innovation	Publications	Yes
4.	ES	State Plan	State Plan for Research, Development and Innovation 2017-2020[4]	2018	Ministry	Covers data alongside many other RDI related issues, including OA	Yes
5.	FI	Action plan	Open Science and data - Action Programme for the Finnish Scholarly Community[5]	2018	Finnish Universities' Council of Rectors	Data only	No
6.	FR	Law/National Plan	Law for a Digital Republic[6] / National Plan for Open Science[7]	2016/2018	Parliament/ Ministry	Covers data alongside many other ICT related issues, including OA	Yes
7.	IE	National Framework	National Framework on the Transition to an Open Research Environment[8]	2019	Ministry for Training, Skills, Innovation, Research and Development	Publications, Infrastructure	No

8.	IT	National Plan	National Research Plan 2021-2027 [9]	2021	Ministry of Research and Higher education	N/A	N/A
9.	LT	Law	Law on Higher Education and Research[10]	2016	Parliament	Publications	Yes
10.	NL	National Plan / Concordat	National Plan Open Science[11]	2017	Ministry	Publications	Yes
11.	SK	National Action Plan	The Open Government Partnership National Action Plan of the Slovak Republic 2020-2021[12]	2017	Government	Publications	Yes
12.	SI	National Policy	National Strategy of Open Access to Scientific Publications and Research Data in Slovenia 2015-2020[13]	2015	Government	Publications	Yes
	NON-EU						
13.	NO	National Strategy	National Strategy on Access to and Sharing of Research Data[14]	2017	Government	Only data	No
14.	CH	White Paper	White Paper for a Swiss Information Provisioning and Processing Infrastructure 2020[15]	2014	Universities	Covers data alongside many other ICT related issues, including OA	Yes
15. RS		National policy	Open Science Platform[16]	2018	Ministry	Open Science	Yes
16.	UK	National Policy / Concordat	Concordat on Open Research Data (Policy of a UK multi-stakeholder group, including research funders and higher education associations)[17]	2015/2016	Funding Council, Research Councils, Universities, Private Funder	Software (in the FAQs and Concordat)	No

Table 1: European countries with National Policies in Place

According to the OS Policy, fifteen EU states that do not yet have active policies in place but are known to be developing national approaches are: Austria, Bulgaria, Croatia, Denmark, Estonia, Germany, Greece, Hungary, Latvia, Luxembourg, Malta, Poland, Portugal, Romania and Sweden.

Footnotes from the Table 1:

[1]   Document available at: https://www.kuleuven.be/english/research/integrity/practices/belspo-code

[2]   Document available at: http://opensciencecy.ucy.ac.cy/wp-content/uploads/2019/09/FINAL-EN-National-Policy-for-Open-Access-to-Scientific-Information.pdf

[3]   Document available at: https://www.vyzkum.cz/FrontClanek.aspx?idsekce=876326&ad=1&attid=876341

[4]   Document available at: http://www.ciencia.gob.es/stfls/MICINN/Prensa/FICHEROS/2018/PlanEstatalIDI.pdf

[5]   Document available at: http://www.doria.fi/bitstream/handle/10024/164174/UNIFI_Open_Science_and_Data_Action_Programme.pdf?sequence=1&isAllowed=y

[6]   Document available at: https://www.legifrance.gouv.fr/eli/loi/2016/10/7/ECFI1524250L/jo/texte

[7]   Document available at: https://www.ouvrirlascience.fr/national-plan-for-open-science-4th-july-2018/

[8]   Document available at: http://norf-ireland.net/wp-content/uploads/2019/07/NORF_Framework_10_July_2019-2.pdf

[9]   Document available at: https://www.mur.gov.it/it/news/lunedi-20062022/pubblicato-il-piano-nazionale-della-scienza-aperta

[10]   Document available at: https://e-seimas.lrs.lt/portal/legalAct/lt/TAD/548a2a30ead611e59b76f36d7fa634f8?jfwid=rp9xf47k7

[11]   Document available at: https://www.openscience.nl/en/national-platform-open-science/national-plan-open-science

[12]   Document available at: https://www.opengovpartnership.org/wp-content/uploads/2019/12/Slovakia_Action-Plan_2019-2021_EN.pdf

[13]   Document available at: https://www.gov.si/assets/ministrstva/MIZS/Dokumenti/ZNANOST/Strategije/National-strategy-of-open-access-to-scientific-publications-and-research-data-in-Slovenia-2015-2020.pdf

[14]   Document available at: https://www.regjeringen.no/contentassets/3a0ceeaa1c9b4611a1b86fc5616abde7/en-gb/pdfs/national-strategy-on-access_summary.pdf

[15]   Document available at: https://www.swissuniversities.ch/fileadmin/swissuniversities/Dokumente/Organisation/SUK-P/SUK_P-2/WhitePaper_V1.1-EN.pdf

[16]   Document available at: http://www.mpn.gov.rs/wp-content/uploads/2018/07/Platforma-za-otvorenu-nauku.pdf

[17]   Document available at: https://www.ukri.org/wp-content/uploads/2020/10/UKRI-020920-ConcordatonOpenResearchData.pdf

2.3. OS in Balkan Region

Among the countries in the Balkan region, Serbia stands out as the sole European country that has adopted national policies referring to OS. These policies demonstrate Serbia's commitment to promoting and fostering open and accessible scientific research. On the other hand, Bulgaria, Croatia and Greece are marked as countries that do not have explicit national policies dedicated to OS. However, despite the absence of formal policies, these countries actively engage in the OS community, indicating their recognition of its importance and their participation in related initiatives and practices. While they may not have official policies, Bulgaria, Croatia, and Greece contribute to the advancement of OS through various activities, collaborations, and initiatives within their scientific communities.

2.4. OS Perspectives

The EU Directive on Open Data and the Re-use of Public Sector Information (PSI Directive)[10] or Open Data Directive was adopted on 20 June 2019 and Members States should aim to have implemented the Directive by 16 July 2021. The Directive highlights the importance of improving the accessibility, availability, and sharing of publicly funded research data. The aim of the changes made to this directive was to enhance digital public services by prioritising data openness, promoting the utilisation of artificial intelligence (AI), and providing business support to technology start-ups, among other objectives. Article 10 of the directive states that "Member States shall support the availability of research data by adopting national policies and relevant actions aiming at making publicly funded research data openly available (' policies') following the principle of 'open by default' and compatible with FAIR principles." This directive is applicable to data generated from publicly funded research and co-funded projects involving both the public and private sectors. It adheres to the principle of the European Commission, which aims for data to be "as open as possible, as closed as necessary" and accordingly allows for legitimate data sharing exceptions.

Furthermore, It highlights the development of the European Open Science Cloud (EOSC) as a common, federated, European framework

---

[10]   European Union, EUR Lex. *EU Directive on Open Data and the Re-use of Public Sector Information (PSI Directive)*, https://eurlex.europa.eu/legal-content/EN/TXT/?qid=1561563110433&uri=CELEX:32019L1024

for openly sharing research data and services and sees it grow into a trusted European research and innovation space and platform for various sectors. It also reports the launch of its Open Research Europe publishing platform seamlessly integrating publicly funded research into a single European data space.
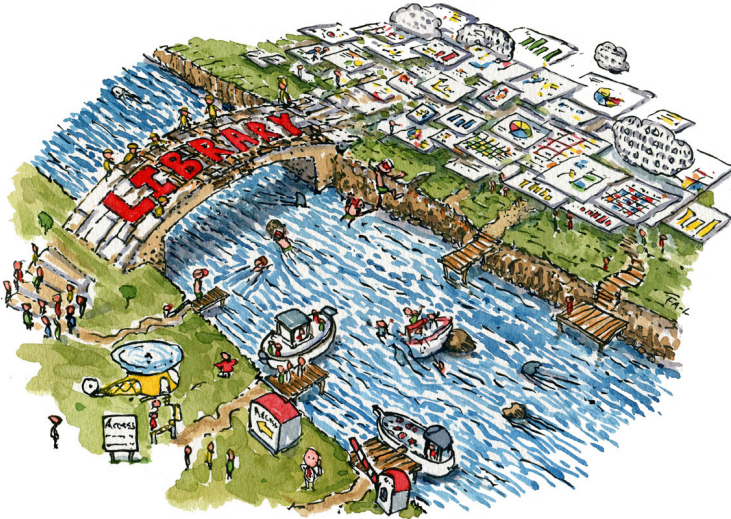
In addition to the PSI Directive, the European Commission (EC) has reaffirmed its dedication to promoting OS through the eligibility criteria for participation in the R&I Framework Programme Horizon Europe[11], which runs from 2021-2027. The primary objective of this program is to establish and implement OS practices to enhance the quality and efficiency of research and innovation, while fostering active engagement with society[12]. Furthermore, EC emphasises the establishment of the European Open Science Cloud (EOSC) as a shared and federated framework within Europe. The EOSC is envisioned as a trusted space for openly sharing research data and services, fostering collaboration and innovation across various sectors. The Commission aims for the EOSC to evolve into a robust European platform for research and innovation, enabling seamless access and utilisation of resources.

---

[11] European Commission. *Horizon Europe,* https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe_en

[12] European Commission. *Horizon Europe - Investing to shape our future,* March 19, 2021, https://research-and-innovation.ec.europa.eu/system/files/2022-06/ec_rtd_he-investing-to-shape-our-future_0.pdf

Additionally, the European Commission has launched the Open Research Europe[13] publishing platform, which serves as a pivotal component in integrating European funded research into a unified European data space. This platform aims to streamline the dissemination of research outputs, ensuring broader accessibility and visibility of research findings within Europe.

Overall, the European Commission's commitment to Open Science is evident in both the requirements for participation in Horizon Europe and the establishment of initiatives such as the European Open Science Cloud and Open Research Europe platform. These endeavours aim to foster a collaborative and inclusive research environment, enabling the sharing and utilisation of research data and outputs to drive innovation and societal progress.

With the European Union countries moving towards the establishment of OS National policies, it becomes increasingly important for non-EU countries to develop their own OS policies if they aspire to be part of the European scientific community. For countries outside the European Union that wish to engage and collaborate with the European scientific community, developing their own OS policies becomes a crucial step. These policies can ensure compatibility and coherence with the European standards and practices, allowing for effective cooperation and integration into European research initiatives. By adopting OS policies, non-EU countries signal their dedication to promoting transparency, to research outputs, and data sharing. This alignment with OS principles not only facilitates collaboration with European Union member states but also enhances international cooperation, promotes knowledge exchange, and attracts research partnerships and funding opportunities. Moreover, implementing OS policies enables non-EU countries to tap into the benefits of open research practices. It fosters innovation, accelerates scientific progress, and enhances the quality and impact of research outcomes. By embracing openness and collaboration, countries can foster a vibrant research ecosystem, attract talented researchers, and contribute to global scientific advancements. Furthermore, developing OS policies allows non-EU countries to contribute to the ongoing global momentum towards Open Science. The OS movement is gaining traction worldwide, with many countries recognising its potential for driving scientific discovery, societal development, and evidence-based decision-making. By aligning with OS principles, countries can actively

---

[13] European Commission. *Open Research Europe*, https://open-research-europe.ec.europa.eu/

participate in shaping the future of research and contribute to the global OS community.

In conclusion, as European Union member states establish their OS National policies, it becomes increasingly vital for non-EU countries to develop their own OS frameworks to engage with the European scientific community effectively. By doing so, these countries can foster collaboration, enhance research practices, attract opportunities, and align with the global momentum towards OS. Embracing openness and transparency in research will enable non-EU countries to actively participate and contribute to the global scientific landscape.

Frits Ahlefeldt

2.4.1. Croatia

Croatia made significant progress in promoting Open Science through various initiatives. According to The Council for National Open Science Coordination (CoNOSC)[14], in 2016, the Ministry of Science and Education introduced the Plan for the European Research Area (2016-2020)[15] to guide Open Science policies within the country. The plan emphasised the importance of establishing a system for both existing and future public research infrastructure and equipment.

Building upon these efforts, the Initiative for Croatian Open Science Cloud (HR-OOZ)[16] was established in 2021. This initiative aims to facilitate and promote OS practices by providing necessary resources and services for data collection, processing, and storage. Its ultimate goal is to ensure sustainable access, reuse, and sharing of research data across Croatia.

A draft version of the National policy and Open Science Plan is available from 2022, and a final version is expected to be released in autumn 2023.

2.4.2. Greece

Greece has embraced and fostered the concept of Open Science, with prominent research institutions actively participating in European endeavours, including the implementation of the European Open Science Cloud (EOSC). In Greece, the ATHENA Research Center has played a crucial role in establishing the pan-European infrastructure known as OpenAIRE, which has been providing support to over 35 European countries for over a decade. In 2020, the Open Science Task Force (OSTF) published their collective proposal for a National Open Science Plan in Greece[17]. On February 28, 2022, thirteen prominent research, technology, and innovation organisations in Greece, previously members of the OSTF (Open Science Task Force), signed a Memorandum of Understanding to establish the "Hellenic Open Science Initiative - HOSI." The main objective of HOSI is to effectively implement Open Science policies in Greece and ensure coordinated and participatory national representation and contribution to the European Open Science Cloud (EOSC).

---

14 CoNOSSC website available at: https://conosc.org/#page-content
15 More at: https://mzo.gov.hr/UserDocsImages/dokumenti/Znanost/EIstrazivackiProstor/Plan%20implementacije%20Republike%20Hrvatske%20za%20razdoblje%202016.%20-%202020..pdf#page=16&zoom=100,90,114
16 More at: https://www.srce.unizg.hr/en/node/470
17 Document available at: https://zenodo.org/record/4656150#.YoIpCqhBw2x

To facilitate institutional policymaking, all member organisations of HOSI will adopt the National Open Science Plan and actively work towards its implementation. Presently, only two universities, namely the University of Patras and Technical University of Crete, have implemented policies that encompass regulations and guidelines for handling research data.

2.4.3. Montenegro

Montenegro aims to base research on Open Science principles, serving society and ensuring transparent allocation of public funds. Therefore, the Government of Montenegro, Ministry of Science, issued The Program for Open Science Implementation (2020-2022)[18] which aims to provide scientific papers, national academic publishing, and research data. It also focuses on research infrastructure availability, raising awareness through training, and considering OS in research evaluation. The programme applies to researchers, organisations, and funders, with an Action Plan outlining specific activities, actors, and resources. Montenegro plans to align with the European Research Area, following OS standards and frameworks like Horizon 2020 and Horizon Europe. This programme is the first step towards aligning Montenegro's research ecosystem with OS principles in the European Research Area. Additionally, the recognition of the importance of all aspects of OS has resulted in adoption of Policy for to Research Infrastructures at University of Montenegro in October 2020, as the first such policy framework for capitalisation on existing infrastructure and opening it to third parties.

2.4.4. Serbia

In 2020 The Ministry of Education, Science and Technological Development (MESTD), adopted new Law on Science and Research[19] (in Serbian) which shows a commitment to Open Science. In one of the introductory articles (Article 4) the law states that "conducting research work in accordance with the principles of open science" is recognised as a fundamental principle of science and research.

---

[18]   Republika Crna Gora. Program ostvarivanja principa „Otvorena nauka" u Crnoj Gori s Akcionim planom (2020-2022), https://wapi.gov.me/download-preview/4314c441-9ba1-48a4-a398-d49b50ad2cd0?version=1.0

[19]   Republika Srbija, Ministarstvo prosvete, nauke i tehnološkog razvoja. *Zakon o nauci i istraživanjima*, https://prosveta.gov.rs/wp-content/uploads/2019/07/Zakon-o-nauci.pdf

Article 6 is also entirely dedicated to OS, as follows:
- In order to increase the quality and visibility of scientific work, research is conducted in accordance with the principles of OS, with optimal use of scientific research infrastructure.
- The principle of OS and to scientific publications and research data is based on the recommendations of the European Commission and international good practice.

Serbia adopted a national science policy called the "Open Science Platform"[20] in July 2018. The policy, developed and released by the primary research funding body in Serbia, serves as the country's official OA policy.

The policy sets out the basic requirements for the depositing procedures, responsibilities for training, administration, monitoring the efficiency of OA policies, etc., but details will be set out in institutional policies. According to the policy, universities and research institutes should define and adopt their OS platforms within six months. Progress and compliance will be monitored by the Ministry. The overall focus of the policy is on OA publications resulting from MESTD research funding, which should now be mandatory (Green OA). Open research data is not mandated but recommended. The policy furthermore specifies instances where data should not be shared.

All these national and institutional documents are a continuation of significant previous efforts made in Serbia in advocating OS concepts for more than a decade. The largest and oldest Serbian university – the University of Belgrade – in 2011 has signed the Berlin Declaration on Knowledge in the Sciences and Humanities, establishing its institutional digital repository based on the OA principles.[21] The process of digitisation and formation of different OA collections started intensively from 2012, followed by the increasing number of repositories mostly in research institutes. Finally, almost all scientific journals in Serbia are available in OA and a large number of them are accessible through some online platforms. Promotion of OS principles is realised through different events like "Open Access week", annual "Days of Open Science" etc.

---

[20] Republika Srbija, Ministarstvo prosvete, nauke i tehnološkog razvoja. *Platforma za otvorenu nauku*, https://prosveta.gov.rs/wp-content/uploads/2018/07/Platforma-za-otvorenu-nauku.pdf

[21] Berlin declaration (on Serbian). *Berlinska deklaracija o slobodnom pristupu naučnom znanju*, http://www.bg.ac.rs/files/sr/nauka/Berlinska_deklaracija.pdf

3. Citizen Science ▶

3.1. CS Introduction

Citizen Science, which involves the participation of the general public in scientific research, is an important factor in strengthening the relationship between science and society. In this context, it plays a crucial role in promoting the principles of Open Science. CS is also one of the eight pillars of OS according to the European Commission[22].

By engaging the public in the scientific research process, CS projects can promote innovation that is more closely aligned with the needs of society. This approach encourages scientists to work in collaboration with non-scientists, which can lead to the development of new ideas, technologies, and approaches that better meet the needs of society.

In addition, Citizen Science can promote reciprocal learning between scientists and the public. Non-scientists participating in CS projects can gain a deeper understanding of scientific research, its processes, and its applications. Scientists can learn from the insights and perspectives of non-scientists, leading to new approaches and solutions to scientific problems.

Moreover, CS can foster a scientific culture across society as a whole. By providing opportunities for non-scientists to participate in scientific research projects, it can promote public engagement with science and technology. This increased engagement can help to create a more informed and scientifically literate public, which is better equipped to understand and participate in decisions related to science and technology.

Overall, CS is an essential element in establishing new links between science and society. It can promote innovation, foster reciprocal learning, and cultivate a scientific culture across society as a whole. Therefore, it is crucial to implement CS as part of the broader efforts to promote OS.

---

[22]   UCL (University College London). *8 Pillars of Open Science*, https://www.ucl.ac.uk/library/open-science-research-support/open-science/8-pillars-open-science

3.2. CS Definition

There are variations in the exact definition of CS, with different individuals and organisations having their own specific interpretations of what Citizen Science encompasses.

Eric Hand believes that CS is "the participation of the public in scientific research" whose outcome often leads to the advancement of scientific research and improved public understanding of science[23]. The terms Citizen Science and citizen scientists were entered the Oxford English Dictionary only in 2014:

"Citizen science n. scientific work undertaken by members of the general public, often in collaboration with or under the direction of professional scientists and scientific institutions."

"Citizen scientist n. (a) a scientist whose work is characterised by a sense of responsibility to serve the best interests of the wider community (now rare); (b) a member of the general public who engages in scientific work, often in collaboration with or under the direction of professional scientists and scientific institutions; an amateur scientist."[24]

---

[23] E. Hand. "Citizen science: People power". *Nature* 466 (2010): 685–687, https://doi.org/10.1038/466685a
[24] Oxford English Dictionary. *New words list June 2014.* Oxford: Oxford University Press, 2014, https://www.oed.com/

3.3. ECSA

In the same year, 2014, the nonprofit organisation European Citizen Science Association (ECSA) was founded, bringing together individuals, organisations, and institutions involved in CS projects in Europe. The organisation's goal is to establish CS as a recognized, promoted, and funded approach, one that nurtures scientific literacy and democratises science. To that end, in September 2015, the organisation published the *Ten Principles of Citizen Science*, which provides a framework for the implementation of existing and the creation of new CS initiatives, with the aim of achieving excellence in all aspects of Citizen Science[25]:

1. CS projects actively involve citizens in scientific endeavours that generate new knowledge or understanding. Citizens may act as contributors, collaborators, or as project leaders and have a meaningful role in the project.
2. CS projects have a genuine science outcome. For example, answering a research question or informing conservation action, management decisions or environmental policy.
3. Both the professional scientists and the citizen scientists benefit from taking part. Benefits may include the publication of research outputs, learning opportunities, personal enjoyment, social benefits, satisfaction through contributing to scientific evidence e.g. to address local, national and international issues, and through that, the potential to influence policy.
4. Citizen scientists may, if they wish, participate in multiple stages of the scientific process. This may include developing the research question, designing the method, gathering and analysing data, and communicating the results.
5. Citizen scientists receive feedback from the project. For example, how their data are being used and what the research, policy or societal outcomes are.
6. CS is considered a research approach like any other, with limitations and biases that should be considered and controlled for. However unlike traditional research approaches, CS provides an opportunity for greater public engagement and the democratisation of science.
7. CS project data and meta-data are made publicly available and where possible, results are published in an OA format. Data sharing

---

may occur during or after the project, unless there are security or privacy concerns that prevent this.

8. Citizen scientists are acknowledged in project results and publications.
9. CS programmes are evaluated for their scientific output, data quality, participant experience and wider societal or policy impact.
10. The leaders of CS projects take into consideration legal and ethical issues surrounding copyright, intellectual property, data sharing agreements, confidentiality, attribution, and the environmental impact of any activities.

So far, the principles have been translated into 38 languages[26]. As for the Balkan region, translations are available in Albanian, Croatian, Greek, Macedonian and Serbian[27].

Over the years, ECSA has created a vibrant and inclusive community with a multitude of members comprising various entities and individuals. These members not only hail from Europe but also extend their reach beyond its borders. Within this diverse network, ECSA attracts a wide range of stakeholders from different sectors. Among the participants, one can find esteemed research institutes that contribute to scientific advancement, museums that promote public engagement and education, and universities that serve as hubs for academic excellence. In addition, ECSA welcomes the active involvement of non-governmental organisations (NGOs) and civil society organisations (CSOs) that champion environmental causes and societal well-being. Moreover, the private sector, representing businesses and industries, plays a crucial role in supporting CS initiatives through their resources and expertise. Furthermore, CS groups, which involve enthusiastic individuals from various backgrounds, contribute to data collection, analysis, and overall project implementation. They come from a range of different fields, including biology, environmental science, citizens' groups, 'do-it-yourself' approaches and social sciences, among many others. Overall, the ECSA network represents a broad spectrum of expertise and perspectives, encompassing a multitude of sectors and fields. This diversity strengthens the collective efforts in advancing CS, promoting collaboration, and fostering a more inclusive and sustainable approach to scientific research and environmental stewardship. ECSA network is constantly spreading. For the current situation see Table 2 and Graph 2.

---

[26] Date of research: 18.05.2023.
[27] More at: https://zenodo.org/record/5127534#.ZGXVEXZByUm

Country	Members
Australia	3
Austria	20
Belgium	19
Brasil	2
Bulgaria	1
Chile	1
Croatia	1
Cyprus	1
Czech Republic	5
Denmark	13
Ecuador	1
Finland	3
France	12
Germany	59
Greece	9
Hungary	4
Ireland	13
Israel	4
Italy	33
Kenya	1
Latvia	2
Lithuania	1
Luxembourg	3
Malaysia	1
Malta	1
Mexico	1
Nepal	1
Netherlands	33

North Macedonia	1
Norway	7
Oman State	1
Peru	1
Poland	3
Portugal	20
Romania	2
Serbia	3
Slovakia	2
Slovenia	3
South Africa	1
Spain	27
Sweden	5
Switzerland	15
Thailand	1
Turkey	4
Uganda	1
UK	37
USA	13

Table 2: ECSA members per country in 2022
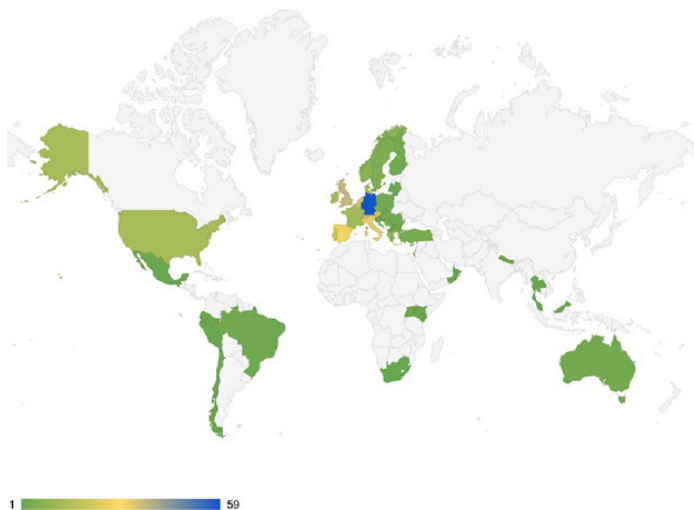
Graph 2: ECSA members per country in 2022

3.4. CS Projects

In recent years, advancements in technology, improved data collection methods, seamless coordination facilitated by the Internet and social media platforms, and the proven success of CS projects have led to a significant increase in opportunities for participation. This trend has transformed CS into a dynamic and flourishing field, offering a wide range of avenues for individuals to engage in scientific research and contribute to the advancement of knowledge.

According to the research conducted by Kullenberg and Kasperowski in 2016[28], based on the Web of Science (WoS) database, the concept and practice of CS were barely visible in the WoS database in the mid-1990s. It was only around the turn of the millennium that there was an obvious growth, and since 2010, there has been a significant increase in articles published in WoS-referenced journals (Graph 3). According to the same source, the greatest impact of CS has been observed in research related to biology, nature conservation, and ecology, while CS has found the widest application in data collection and classification methodologies.

---

[28] Christopher Kullenberg and Dick Kasperowski. "What Is Citizen Science? – A Scientometric Meta-Analysis." *PLoS ONE* 11, no. 1 (2016), https://doi.org/10.1371/journal.pone.0147152.
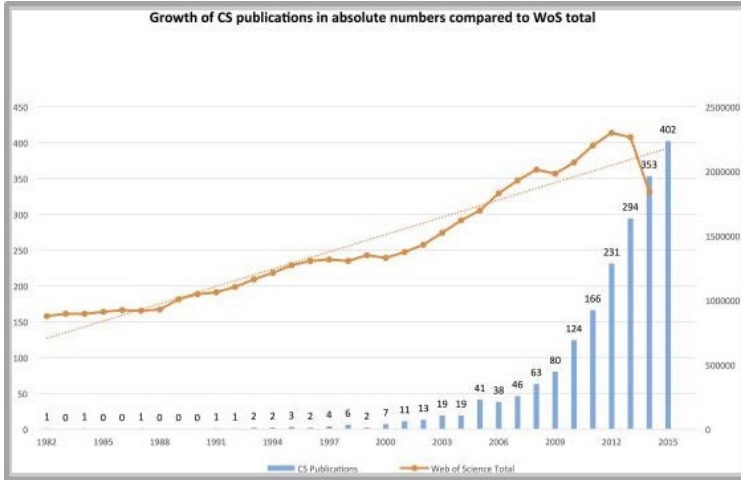
Graph 3: Increase in the number of articles on citizen science
in scientific journals referenced in WoS according
to the research by Kullenberg and Kasperowski

One key factor contributing to the growing diversity of CS opportunities is the accessibility of technology. With the proliferation of smartphones and other portable devices, individuals now have powerful tools at their fingertips that enable them to collect data, capture images, record observations, and contribute to scientific projects. This ease of access to technology has lowered barriers to participation and expanded the pool of potential citizen scientists.

Furthermore, the ability to gather and process data has improved significantly, thanks to advancements in data collection methods and analysis tools. CS projects often provide participants with protocols and instructions for data collection, ensuring that data quality is maintained. Additionally, the availability of open data platforms and online databases has made it easier for citizen scientists to contribute their findings and collaborate with researchers from around the world.

The Internet and social media have played a vital role in connecting individuals and facilitating collaboration within the CS community. Online platforms and social networks provide spaces for sharing project ideas, discussing methodologies, seeking assistance, and disseminating project outcomes. These digital tools have made it easier for citizen scientists to connect with researchers, professionals, and fellow enthusiasts, regardless of geographical boundaries. As a result, the CS community has grown more diverse, with participants from different

31

backgrounds, expertise, and interests coming together to contribute to a wide range of scientific disciplines.

The success stories and proven impact of CS projects have also fueled the growing trend. Numerous CS initiatives have led to significant scientific discoveries, contributed to policy-making processes, and empowered communities to address local environmental challenges. These achievements have gained recognition from the scientific community and policymakers, further motivating individuals to get involved in CS.

The growing trend of CS signifies a shift towards a more inclusive and democratised approach to scientific research. It recognises that science is not confined to professional researchers but can be driven by the collective efforts and diverse perspectives of individuals from all spheres of life. By actively involving the public in scientific research, CS not only expands the scope of scientific inquiry but also fosters public engagement, scientific literacy, and a sense of ownership and stewardship over environmental issues.

In conclusion, the increasing diversity of CS opportunities is a result of technological advancements, improved data gathering abilities, enhanced coordination through digital platforms, and the impressive track record of CS projects. This trend reflects a growing recognition of the valuable contributions that individuals from various backgrounds can make to scientific research and the importance of engaging a wider audience in the pursuit of knowledge. Citizen Science is no longer a niche field but a flourishing trend that is enriching the scientific landscape and empowering individuals to become active participants in scientific discovery and environmental stewardship.

4. Our Vision ▶

Open Science is playing an important role in shaping research and society in the EU by helping science tackle the major challenges faced by our societies today. OS is driving changes in the scientific and societal landscape to promote accountability, transparency and sustainability. Citizen Science is a crucial component of OS and has been recognised as a key field for the future of science, as noted in UNESCO's "Recommendation on Open Science" in 2021. CS has been rapidly expanding in recent years, with many scientists leading CS projects and millions of volunteers participating in a growing number of CS initiatives. There are many online platforms for sharing knowledge, tools, training and resources for CS like EU-Citizen.Science[29] or Zooniverse[30].

Still, there is a need to establish a strong connection between society and science, while research libraries have been identified as important players in this effort, as outlined in the Strategic Research and Innovation Agenda (SRIA) of the European Open Science Cloud (EOSC). Some libraries have already created services to support CS projects, while others involve citizens in processing their collections. In collaboration with academic libraries, CS initiatives like SciStarter[31], have developed guidelines for effective implementation of CS projects, as seen in "The Library & Community Guide to Citizen Science"[32] created with Arizona State University. Also, LIBER Working Group for CS produced a guide for Citizen science in Research Libraries[33].

4.1. Current Situation

There are disparities among EU countries regarding the development of OS and CS, with Southeastern Europe (SE) countries lagging behind, according to the EU report "Supporting Open Science and collaborative

---

[29] More at: https://eu-citizen.science/
[30] More at: https://www.zooniverse.org/
[31] More at: https://scistarter.org/
[32] D. Cavalier, C. Nickerson, D. Stanton. eds. *The Library and Community Guide to Citizen Science: Understanding, Planning, and Sustaining Ongoing Engagement in Citizen Science at Your Library*. Scistarter; Arizona State University. 2019. https://orrery-media.s3-us-west-2.amazonaws.com/curated/LibraryGuideFebruary.pdf
[33] LIBER. Citizen Science Working Group. "Citizen Science Skilling for Library Staff, Researchers, and the Public." In *Citizen Science for Research Libraries — A Guide, Series 1*, https://libereurope.eu/wp-content/uploads/2021/11/guide.pdf

Research within the Western Balkans"[34] in 2018 and the outcomes of the 2021 EOSC workshop "Research Libraries, Researchers & the EOSC: How do they interact? Southern European Landscape"[35]. Most Southeastern European countries have not yet established national policies for Open Science, and their current activities do not include Citizen Science, as noted in SPARC's report "An Analysis of Open Science policies in Europe; v7" in 2021[36]. Additionally, only one HEI from the region is listed as a member of the European ECSA network of stakeholders.

A positive aspect of the situation in Serbia is that the Center for the Promotion of Science (CPN), a public institution established in 2010 by the Serbian Ministry of Science, plays an active role in the scientific community and fosters inclusion of CS in the scientific policies of Serbia. Notably, the CPN is a member of ECSA.

The integration of CS into the scientific policies of Serbia is a significant milestone, facilitated by the implementation of the Action Plan within the broader framework of the Strategy for Scientific and Technological Development of the Republic of Serbia for the period 2021-2021[37]. The adoption of this framework in mid-2021 signifies the commitment of Serbia to promote and embrace CS as an integral part of scientific advancement and societal engagement. To support the implementation of CS, a dedicated annual budget of 15 million RSD has been allocated starting from 2022. This funding will provide the necessary resources to facilitate and advance projects in this domain. Furthermore, the budget for the year 2023 has already been approved, ensuring a continued commitment to supporting CS.

The initiation of the first call for proposals is planned for the autumn of 2023. During this time, researchers and organisations interested in engaging in CS will have the opportunity to submit their project proposals. To assist applicants, a comprehensive set of objectives, criteria, and an accompanying guide for the application process will be made available in September 2023. This guidance will provide

---

[34] "[Theme in Focus] Promoting Open Science and Collaborative Research within the Western Balkans" (September 2018), https://wbc-rti.info/object/document/19625.

[35] Mihaela Blagaić Kišiček. "Research libraries, researchers & the EOSC: how do they interact? Southern European Landscape". Zenodo, March 31, 2021. https://doi.org/10.5281/zenodo.4744819

[36] Thordis Sveinsdottir, Davidson, Joy, and Proudman, Vanessa. "An Analysis of Open Science Policies in Europe, V7". Zenodo, April 28, 2021. https://doi.org/10.5281/zenodo.4725817

[37] Document available at: https://prosveta.gov.rs/wp-content/uploads/2021/12/Strategija-nauc-tehnol-razvoj-RS-Moc-znanja.pdf

clear instructions and specifications to ensure that projects align with the intended goals and standards. The proposed duration for selected projects is set to be 1.5 to 2 years, allowing for comprehensive research and meaningful outcomes. This time frame ensures that the projects have sufficient time to conduct thorough investigations, gather data, and analyse the results to generate valuable insights. To promote awareness and engagement, an initial call for proposals will be accompanied by an extensive campaign. Additionally, scientific research organisations will be visited, and supporting events will be organised to foster dialogue and collaboration among researchers and institutions involved in civil scientific research. This concerted effort to integrate CS into the scientific landscape of Serbia demonstrates a commitment to harnessing the power of citizen participation and collaboration in advancing scientific knowledge and addressing societal challenges. The availability of dedicated funding, clear guidelines, and a supportive environment for researchers and organisations lay a solid foundation for the successful implementation of CS initiatives in the country.

Additionally, colleagues from the Faculty for Philosophy at the University of Novi Sad, in partnership with the Science Fund of the Republic of Serbia, have achieved a significant milestone by publishing the very first guide on CS[38] in Serbia. This accomplishment highlights the dedication and efforts of these academic and funding institutions to promote and facilitate CS initiatives within the country. The publication of this guide is a significant step forward in advancing CS in Serbia. It serves as a comprehensive resource that provides guidance, information, and practical advice for individuals and organisations interested in participating in CS projects. By offering clear instructions, best practices, and examples, the guide aims to encourage and empower citizens to actively engage in scientific research, contribute their expertise and knowledge, and collaborate with researchers and scientists. The collaboration between the Faculty for Philosophy and the Science Fund of the Republic of Serbia demonstrates the recognition of the importance of CS in fostering public participation, enhancing scientific understanding, and addressing societal challenges. By providing this guide, they have taken a proactive approach in supporting and promoting CS as a valuable and accessible approach to scientific discovery and innovation.

Although all of this is a significant step forward, there are still substantial challenges and opportunities ahead of us in terms of engaging citizens in OS. We have a long journey ahead as we strive to foster active participation and collaboration between the general public and the scientific community. The path towards fully embracing OS principles and involving citizens in scientific research is complex and multifaceted, requiring continuous efforts in areas such as awareness-raising, capacity-building, policy development, and creating a supportive infrastructure. However, with dedication and a collective commitment, we can navigate this road and make significant strides in promoting citizen involvement in OS initiatives.

South East European countries are currently recognising several challenges that hinder their progress in the realms of OS and CS. These obstacles encompass factors such as limited financial resources, language barriers, and a scarcity of professional skills pertaining to OS and CS within HEIs. Moreover, another significant barrier lies in the lack of acknowledgment regarding the advantages of involving stakeholders

---

[38] Bojana, Dinić, Selka Sadiković, Milan Oljača, Ilija Milovanović i Snežana Smederevac. *Vodič za građansku nauku*. Novi Sad; Univerzitet u Novom Sadu, Filozofski fakultet, 2022, http://star.ff.uns.ac.rs/genius/vodic_za_gradjansku_nauku.pdf

beyond their immediate environment. Additionally, there is a pressing requirement for training and guidance targeted at library directors in the region to enhance the culture of OS and CS. Identifying and addressing these hindrances, while providing support and resources to library directors, is vital for promoting citizen involvement in OS initiatives in the region.

The CeOS_SE project aims to integrate CS results into the OS cycle and link it with the European Open Science Cloud (EOSC). This project focuses on the SE region, where there is a demonstrated lack of OS and CS synergies and a need for support, with HEI libraries serving as hubs for open knowledge and innovation and collaborating with public libraries.

The pivot of the project is a Balkan region, to which half of CeOS_SE partners belong (Croatia, Bulgaria, Greece and Serbia), and also is composed of countries that have joined the EU at different times, resulting in differences in their absorption and use of EU funds. Due to the heterogeneity in terms of European dimension, common European values and differences in absorption and use of EU funds for development, CeOS_SE aims to assist the convergence among countries of this region, by engaging the four Balkan countries of the partnership plus Cyprus, as well as countries that have expressed interest in the project (i.e. countries whose institutions have provided letters of intent - Montenegro, Bosnia and Herzegovina, and Republic of North Macedonia). In this way, we hope to enable knowledge exchange, foster discussion, and build trust and long-term collaboration in the region on the topic of CeOS.

Image: 1st CeOS_SE Transnational Meeting and LTTA
held in Zagreb, Croatia 19.9.2022 – 23.9.2022.;
all photographs courtesy of CeOS Project Consortium

4.2. Motivation Issues

During the socialist era in the Balkans (1945-1990), there were various forms of mandatory volunteering and collective work activities that were organised and promoted by the ruling parties. One prominent example was the practice of "working Saturdays" or "volunteer Saturdays" in schools, where students and teachers were obligated to participate in community work projects such as planting trees, cleaning up garbage, or engaging in other public service activities. These activities were often organised with the intention of instilling a sense of collective responsibility, fostering a strong work ethic, and promoting community development.

Additionally, there were larger-scale working actions that aimed at building infrastructure such as roads, train tracks, and other public facilities. These actions, often referred to as "volunteer actions" or "volunteer campaigns," involved mobilising a large number of people, including workers, students, and members of various organisations, to contribute their labour and skills towards specific development projects. These campaigns were often driven by the ruling party or government and were seen as a demonstration of socialist solidarity and collective effort.

It is important to note that these forms of mandatory volunteering and collective work were characteristic of the specific socio-political context of the socialist era in these countries[39]. While they were often presented as voluntary acts of civic duty, they were, in practice, obligations imposed by the ruling party or government.

Since the transition to democracy and market-oriented economies in these countries, the concept of volunteering has evolved. Today, volunteering is more commonly understood as a voluntary and altruistic act, where individuals willingly offer their time, skills, and resources to support various causes or organisations without coercion or obligation.

But the historical context of mandatory volunteering and collective work during the socialist era in the Balkan countries can indeed have an impact on the current challenges faced in finding volunteers for CS projects. Firstly, the legacy of mandatory volunteering may have created a perception among individuals that volunteering is an obligatory duty rather than a voluntary choice. This mindset can make

---

[39]   Gašper Mithans, "Youth Labour Brigades in Yugoslavia and Representations of Volunteerism: A Study of Participation in Restored Federal Labour Actions by the People's Youth in the District of Koper." *Annals for Istrian & Mediterranean Studies / Annales: Series Historia et Sociologia* 32, 4 (2022): 603–618, doi:10.19233/ASHS.2022.38

it challenging to mobilise individuals to participate in CS projects, as they may associate volunteering with compulsory labour or political agendas. Overcoming this perception and highlighting the voluntary and empowering nature of CS participation is crucial in encouraging individuals to engage willingly.

Furthermore, the transition from a centrally planned economy to a market-oriented one in the post-socialist era has had socio-economic consequences that may affect volunteerism. Individuals in the Balkan countries have had to navigate significant changes in their lives, including economic hardships, job insecurity, and the restructuring of social institutions. These factors can impact people's willingness and ability to dedicate their time and resources to volunteer work, including CS projects.

Additionally, there may be limited awareness and understanding of CS among the general public in the Balkan region. The concept of CS might be relatively new or unfamiliar to many individuals, which can contribute to a lack of enthusiasm or hesitation to participate. Efforts to raise awareness about the importance and benefits of CS, as well as providing clear information on how individuals can get involved and make a meaningful contribution, are essential in addressing this challenge.

To overcome these challenges and encourage volunteer participation in CS projects in the Balkan region, it is crucial to take several approaches. These include:

1. Public awareness campaigns: Promote CS and its benefits through targeted outreach campaigns, media platforms, and community events. Emphasise the voluntary nature of participation and highlight the positive impact that CS can have on scientific research, environmental conservation, and community development.
2. Education and capacity building: Offer training programs, workshops, and educational materials to familiarise individuals with the principles and practices of CS. Provide guidance on how to participate, collect data, and contribute to scientific research.
3. Collaboration and partnerships: Forge alliances with local organisations, universities, and community groups to foster collaborations and mutual support for CS initiatives. Leveraging existing networks can help generate interest and encourage volunteer participation.

4. Tailored communication and language support: Ensure that project materials, instructions, and communication are available in multiple languages, addressing the diverse linguistic landscape of the Balkan region. Providing translation services or multilingual platforms can facilitate accessibility and engagement.

5. Highlighting local relevance and impact: Emphasise the local relevance and impact of CS projects, showcasing how participation can contribute to addressing community challenges, promoting environmental stewardship, or preserving cultural heritage.

By implementing these strategies and addressing the unique challenges stemming from the historical context of mandatory volunteering, it is possible to overcome the difficulties in finding volunteers for CS projects in the Balkan region. By effectively communicating the voluntary and empowering nature of CS and demonstrating its value to local communities, more individuals can be motivated to participate and contribute to scientific research and community development.

5. The Roadmap ▶

5.1. The Role of the University Libraries in the Process of Engaging Citizens in the OS Cycle

University libraries are essential in the implementation and adoption of OS policies and infrastructure. They serve as intermediaries between end-users and OS practitioners, and play a significant role in bringing the end-user perspective into the OS framework. Additionally, university libraries have been recognised as an important stakeholder group in the development and uptake of the EOSC, due to their role as a structural component of OS infrastructure. They are in excellent position to be pioneers and champions of OS by raising awareness, providing training, opening up research collections to innovative research methods and developing supportive policies and infrastructures[40].

It is only natural that university libraries are able to connect Open to Citizen Science, and to engage citizens in the OS cycle. This, in turn, improves their position as experts in conveying knowledge and evaluating the proposed framework.

5.2. Turning the Wheel of Citizen Engagement

Engaging citizens in the OS cycle in Balkan countries faces several challenges. One of the main challenges is the lack of awareness and understanding of Open and Citizen science among the general public. There is also a lack of resources and infrastructure to support CS projects, including funding, equipment, and training. Additionally, language barriers can make it difficult to engage citizens who do not speak the dominant language of a particular region.

Furthermore, there may be cultural barriers to CS, including a lack of trust in scientific institutions or a belief that science is only for experts. There may also be political and economic challenges, such as limited support for OS policies and a lack of incentives for researchers to engage in CS.

Addressing these challenges requires a concerted effort from various stakeholders, including governments, scientific institutions, civil society organisations, and individual citizens. This effort should

---

involve raising awareness about the benefits of Open and Citizen Science, providing resources and infrastructure to support CS projects, and fostering trust and collaboration between scientists and the public.

5.3. Work Done to Benefit From

The initiative encourages HEIs to be more transparent, responsible, and willing to embrace societal changes that come with citizens advocating for a greater role in decision-making in modern societies, such as active citizenship, civic engagement, and bottom-up public intervention. Through CeOS_SE, these social changes are transformed into opportunities for academic and library staff, HE management, research and teaching staff, students and policymakers.

The project addresses the needs in Southeastern Europe through a range of approaches, split into Project Results (PRs) including:

- Sharing knowledge and innovations with libraries to make them hubs for knowledge and innovation in the region (PR1).
- Facilitating dialogue and action among various types of libraries, including public, university, and research libraries (PR2).
- Providing training opportunities to HE academic and library staff through public activities organised by CeOS_SE (PR3).
- Developing a "Roadmap on CeOS in the Balkans" to guide future activities in the region (PR4).
- Creating an impact report to demonstrate the effect of CS on HEIs (PR5).
- Implementing policy changes to promote the potential of CeOS_SE, starting at the national level and then expanding to the European knowledge-building level and the EOSC landscape (PR6).

The main result of the PR1 is the report "Recommendations for academic and research libraries within Citizen-Enhanced Open Science"[41], based on data collected from a wide range of LIBER libraries, which provides a series of strategic and practical recommendations

---

[41] Kaarsted, Thomas, Oliver Blake and Kristian Hvidtfelt Nielsen. "*Recommendations for academic and research libraries within Citizen-enhanced Open Science.*" *LIBER. CeOS project*, https://ceosse-project.eu/wp-content/uploads/2022/04/CeOS_SE_PR1A3-Recommendations-Report.pdf

for research and academic libraries who wish to engage in Citizen Enhanced Open Science (CeOS).

PR2 was focused on creating the Report on implementation of citizen-enhanced open science in various open knowledge hubs in SE Europe. During this work package, all eight partners were engaged in the sustained exchange and collaboration with other libraries in the country (on local, regional or national levels) with the aim to maximise citizen involvement in OS across several knowledge and innovation hubs in the country. Academic research libraries have proven to be effective in engaging with public libraries and other stakeholders, including Public Engagement Offices, Open Science Offices, municipalities, museums, and others, according to the study "Upscaling collaboration between academic and public libraries for CeOS in SE Europe"[42]. In addition, they have demonstrated to be excellent in participating in CS marketing activities, in promoting a positive attitude towards CS, and, last but not least, in organising events to support CS in different ways.

PR3 used a dual approach and focused on training activities and learning by doing activities, making an effort to upskill additional trainers/multipliers to assist researchers, administrative personnel, public libraries, and citizens in CS projects and activities by employing a Train-the-Trainer methodology.

Image: CeOS_SE Train the Trainers Activity - Croatia

---

[42]   Dolores, Mumelaš, Alisa Martek, and Dorja Mučnjak. "*Upscaling collaboration between academic and public libraries for CeOS in SE Europe: Study.*" *LIBER. CeOS project.* Retrieved 07.06.2023, https://ceosse-project.eu/wp-content/uploads/2022/04/CeOS_SE_PR2A3_Study_FINAL_version-1.pdf

To align perspectives and basic knowledge, the University of Torino (UniTo) carried out in July 2022 a CS training course and in September an OS one for all partners. Later on, in October and November 2022, all CeOS_SE partners spread out the gained knowledge and carried out 10 CS training local events and 8 learning by doing activities. A total of 408 stakeholders, including academic librarians, librarians from national libraries, public librarians, researchers, university students, citizens and some other CS stakeholders, participated in 18 events organised by CeOS_SE partners for institutional and external stakeholders[43]. CeOS_SE partners were able to develop a structured technique for training librarians on OS and CS topics and for planning CS activities.

Image: CeOS_SE Train the Trainers Activity - Bulgaria

As a result of attending a Train the Trainers course, participants were able to:
- plan training courses for different audiences at different levels;
- deliver training courses for different audiences at different levels;
- assess the training course participants' upskills;
- assess training course impact;
- deliver proven facilitative skills to promote learner engagement, reflective practice, critical thinking, and skill acquisition;

---

[43] Maria Cassella, and Elena Giglia. ."Assessment Report on CeOS_SE Activities at Partner Institutions", https://ceosse-project.eu/wp-content/uploads/2023/05/CeOS-Document-Report-PR3A2.pdf

- show an ability in delivering key training strategies commonly used (brainstorming, roleplays, practice sessions…);
- initiate a personal path to strengthen their training and facilitation skills.

Image: CeOS_SE Train the Trainers Activity - Serbia

The Train the Trainers activity was carried out very effectively in the Balkan region, with a total of 167 librarians participating in the knowledge transfer activities. These activities were designed to enhance the skills and expertise of the librarians in the field of CS and to enable them to serve as trainers for other individuals in their communities.

Broken down by country, there were:
- 23 participants from Bulgaria,
- 32 participants from Croatia,
- 60 participants from Cyprus,
- 20 participants from Greece, and
- 32 participants from Serbia.

These librarians engaged in a range of training activities, including workshops, seminars, and hands-on learning experiences, which allowed them to develop a deeper understanding of Citizen Science and its applications in different contexts. As a result of these activities, they are now better equipped to train and support others in their communities, which can ultimately lead to increased engagement with CS and greater participation in OS initiatives.

Additionally, NSK (National and University Library Zagreb, Croatia) accredited the webinar "Citizen Science in libraries"[44] for all types of libraries of the Republic of Croatia as a part of the Training Center for Continuing Education of Librarians in the Republic of Croatia (CSSU). The first webinar module was carried out on 28 February 2023. The course was attended by 140 library specialists. The second webinar module was held on 3 March and gathered 80 librarians.

UNILIB also succeeded in accrediting a new CS training course in Serbia for librarians. Namely, as a part of Accredited professional development programs for librarians, a course "Citizen Science: libraries as a link between civil society and science" has been accredited for the 2022/2023 year. The first course was held on 8 March in Novi Sad and gathered around 200 participants including public, school, and academic librarians.

To sum up, approximately 500 librarians from the Balkan region have acquired knowledge, skills, and competencies in the field of CS through the project. They have also gained an understanding of the significance of their role in promoting CS and have become active trainers themselves. By participating in the project, these librarians are better equipped to support CS activities and promote engagement with Open Science. Their enhanced knowledge and skills have the potential to contribute to the growth and success of CS initiatives in the region.

5.4. The Roadmap as an Instrument

The CeOS_SE Project is built on six interconnected objectives, each resulting in a tangible project result (PR) for the targeted region (SE Europe). The 4th objective focuses on a region of SE Europe, the Balkans. The ultimate aim of the PR4 is to address more carefully the heterogeneity and the synergetic elements in capacity building with respect to CeOS. Therefore, the leading organisation of the PR4, University Library "Svetozar Marković", Belgrade, has created a Roadmap on CeOS in the Balkans.

The Roadmap is a planning tool that provides a structured approach to achieving a particular goal. It provides a step-by-step guide that outlines the key activities and milestones necessary to achieve a specific objective. It can help institutions and organisations to identify the necessary resources, stakeholders, and timelines required to achieve their goals.

---

[44] Centar za stalno stručno usavršavanje knjižničara u RH. "II.15. Građanska Znanost u Knjižnicama", http://cssu.nsk.hr/tecajevi/gradanska-znanost-u-knjiznicama/

In the context of Open and Citizen science, the Roadmap is a valuable tool for building capacity and promoting awareness of OS/CS practices among researchers, students, and other stakeholders. It can help to foster a culture of openness and collaboration, and encourage the adoption of new and innovative research methods that involve citizens and promote greater transparency and accountability in research. By providing a clear and comprehensive set of guidelines and recommendations, the Roadmap can help to accelerate the adoption of Open and Citizen Science practices and facilitate greater collaboration and engagement between researchers, citizens, and other stakeholders.

5.5. Survey Analysis

This Roadmap draws upon the experiences of several countries in the Western Balkans and their application of Open and Citizen Science. It encompasses insights from eight countries: Serbia, Croatia, Greece, Bulgaria, Bosnia and Herzegovina, the Republic of North Macedonia, Montenegro, and Cyprus - which, although not part of the Balkans, is included in the analysis.

To evaluate the status of Open and Citizen Science in the Balkan region, UNILIB, as part of PR4, developed a survey. This survey was distributed to partner institutions within the region, academic libraries, as well as selected public and national libraries. The aim was to gather information and perspectives from a broad range of stakeholders.

Upon the completion of the survey, a total of 99 responses were received. These responses served as the foundation for further research and the subsequent analysis of the obtained results. The survey encompassed three distinct sets of questions: general questions (11 questions), Open Science (12 questions), and Citizen Science (26).

The general questions aimed to gather an overview of the participating institutions and libraries, their backgrounds, and their engagement with Open and Citizen Science practices. This section provided context for the subsequent exploration of specific areas within OS/CS.

The Open Science section delved into various aspects of OS, including OA publishing, research data management, open educational resources, and the utilisation of OS platforms. These questions aimed to assess the level of adoption and implementation of OS principles and practices within the participating institutions.

The Citizen Science section focused on the involvement of the public in scientific research and data collection. It examined the extent to which CS projects were undertaken, the types of activities involved, and the perceived benefits and challenges associated with CS initiatives.

By examining the responses to these three sets of questions, UNILIB conducted a comprehensive analysis of the state of Open and Citizen Science within the Balkan region. The findings and insights obtained from this research endeavour formed the basis for developing a roadmap that outlines potential strategies and recommendations for further advancing Open and Citizen Science practices in the region.

5.5.1. General Questions

By reviewing the graph with the answers, we found that the largest percentage of respondents are 40-50 years old (39.4%), followed by 50-65 years old (35.4%), which makes a total of 74.8% and indicates that mainly experienced librarians answered. We therefore expected that they would have a sufficient knowledge of the questions asked in the survey.

Age

99 responses
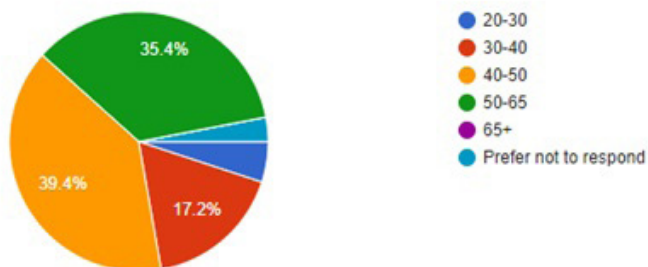
Graph 4: Age of survey respondent

When examining the results by country, the most answers are from Serbia (55), followed by Bulgaria (11), Greece (8), Bosnia and Herzegovina (7), Montenegro (6), Cyprus (5), the Republic of North Macedonia (4) and Croatia (3). When distributing the survey, UNILIB used its role as the parent library for academic libraries in Serbia and thus achieved a high response rate within Serbia.

Of the total number of respondents, 79 are academic librarians, 5 are public librarians, and 4 are librarians of national libraries. Graph 5 shows the areas in which the majority of respondents are employed.

Graph 5: Scientific area

On average, the institutions that answered the survey show cooperation with internal and external stakeholders. Based on the provided answers, it appears that the institutions has various forms of cooperation with internal partners, NGO's, public libraries, and other stakeholders:

1. Projects and cooperation:
   - Cooperation with NGOs and public libraries.
   - Collaboration on the implementation of practical high school teaching in the field of tourism.
   - Cooperation with academic staff on presentations and activities for high school students to inform them about library services and research opportunities.
2. Promotions and exhibitions:
   - Promotions and exhibitions for scientific publications, including book exhibitions.
   - Cultural events, concerts, exhibitions, and literary evenings.
   - Organising exhibitions of scientific works by professors, scientists, and colleagues.
3. Academic and educational programs:
   - Educational workshops, conferences, and seminars.
   - Academic lectures for the broader public.
   - Erasmus+ program involvement, including scientific conferences and expert meetings.
   - Information literacy programs and seminars.
4. Open science and library services:
   - Exploring national strategy and being part of the OA movement and OS community.
   - Institutional repository and library services focused on supporting research activities.
   - Creation of a scientific portal gathering bibliographic data related to scientists.
   - Seminars and education initiatives related to OS and research support.

Overall, the organisation engages in a wide range of activities, including collaborative projects, exhibitions, educational programs, promotions, and initiatives related to OS and research support.

Based on the provided answers, it is evident that the organisation has a strong cooperation with external partners. Here's an analysis of the different types of collaborations mentioned:

1. Collaborations with other departments and institutions:
   - Collaboration with departments for scientific research.
   - Collaboration with colleagues from other departments.
   - Collaboration with faculty departments and institutes for activities like accreditations and curriculum enhancement.
   - Collaboration with faculty libraries of other universities.
   - Collaboration with museums and public and national libraries.
2. ERASMUS+ and international collaborations:
   - Collaboration with ERASMUS+ program, including guest lectures, joint scientific conferences, study stays, and exchange of books and research materials.
   - Collaboration with universities abroad.
   - Collaboration with business organisations and municipalities.
3. Interlibrary cooperation:
   - Interlibrary loan service with libraries outside the university.
4. Collaborations with specific departments or collections:
   - Collaboration with different departments.
   - Collaboration with professors to educate students in the use of library-provided content and tools.
5. General Collaborations and Feedback:
   - Collaboration with various university departments, students' clubs, and administrative departments.
   - Collaboration with external organisations in industry and business sectors.
   - Collaboration between the library and the Rector's Office.
   - Collaboration involving joint projects, joint programs, and joint conferences.

Overall, the organisation's cooperation with external partners encompasses a wide range of activities, including research collaborations, interdepartmental exchanges, international partnerships, interlibrary cooperation, and collaborations with specific departments or collections. This indicates a proactive approach to fostering partnerships and utilising external resources to enhance the services and offerings of the organisation.

5.5.2. Open Science

After analysing the set of questions related to Open Science, several key findings emerged. Out of the 99 responses received, it was determined that a significant majority, specifically 88 respondents, were familiar with the concept of OS. This suggests a notable awareness and understanding of the principles and goals associated with OS among the surveyed institutions and libraries.

Furthermore, the analysis revealed that 65 institutions reported active engagement in OS projects and activities. This indicates a substantial level of involvement and participation in initiatives aimed at promoting and advancing OS within the Balkan region.

Regarding OA services, it was found that 68 libraries among the surveyed institutions offer such services to researchers (Graph 6). This suggests a commitment to providing access to scholarly information and research outputs without financial or technical barriers.

Does your library offer Open Access services to researchers?

99 responses
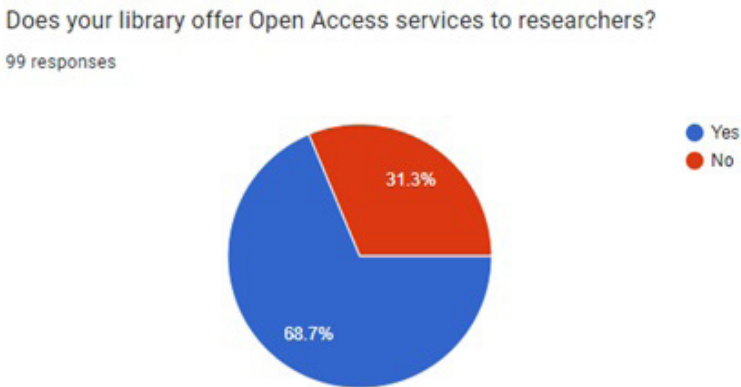
Graph 6: Offer of Open Science services to researchers

In terms of support and training activities, the analysis revealed that 63 out of the 99 institutions surveyed provide assistance or training related to OS for researchers, students, or citizens. This indicates a proactive approach in fostering the necessary skills and knowledge required to effectively engage with OS practices.

Overall, the analysis highlights a positive landscape within the surveyed institutions and libraries regarding OS. The familiarity with OS, engagement in projects and activities, provision of OA services, and the provision of support and training activities all demonstrate a significant commitment to advancing OS principles and practices

within the Balkan region. These findings provide valuable insights for further promoting and enhancing OS initiatives in the future.

Upon analysing the survey responses, several insights emerged regarding the knowledge and perception of existing policies or strategies to promote OS at different levels. Here is a breakdown of the findings:

1. Knowledge of existing policies or strategies:
   - Out of the 99 respondents, 61 indicated having knowledge about existing policies or strategies to promote OS at the national level.
   - 53 respondents reported awareness of such policies or strategies at the university level.
   - 51 respondents had knowledge of OS policies or strategies at the library level.
2. Knowledge of implemented policies for OS:
   - Among the respondents, 70 were familiar with policies for OS proposed and implemented at the national level.
   - 63 respondents had knowledge of policies implemented at the university level.
   - 55 respondents were aware of policies implemented at the library level.
3. Perceived barriers for making and implementing OS policies and strategies:
   - 47 respondents identified barriers at the national level for making and implementing OS policies and strategies.
   - 45 respondents perceived barriers at the university level.
   - 41 respondents perceived barriers at the library level.
4. Barriers identified:
   - Lack of policy at the national level was identified as a barrier by 41.1% of respondents.
   - Lack of OS policy/strategy at the university level was mentioned by 35.7% of respondents.
   - Insufficient resources, including staff, time, and institutional funding, were cited as barriers by 78.6% of respondents.
   - Lack of administrative resources was reported as a barrier by 51.8% of respondents.
   - Lack of external funding was perceived as a barrier by 50% of respondents.
   - Lack of knowledge about OS was mentioned as a barrier by 42.9% of respondents.

Overall, the findings indicate varying levels of knowledge about existing OS policies or strategies at different levels. While a significant number of respondents reported familiarity with national-level policies and strategies, the knowledge seemed to decrease at the university and library levels. Moreover, barriers were identified, including the lack of policies, insufficient resources, administrative challenges, lack of external funding, and limited knowledge about OS.

These insights shed light on the current state of OS policy implementation and highlight areas that require attention and improvement. Addressing the identified barriers, enhancing awareness, and allocating sufficient resources could contribute to the effective promotion and implementation of OS policies and strategies at all levels.

Upon examining the current state of national policies on OS in the Balkan countries and Cyprus, the following observations can be made:

Existing policies or strategies to promote OS	National level		University level		Library level	
	Yes	No	Yes	No	Yes	No
Bosnia and Herzegovina	0%	100%	15%	85%	0%	100%
Bulgaria	100%	0%	63%	27%	55%	45%
Croatia	67%	33%	67%	33%	67%	33%
Cyprus	100%	0%	100%	0%	100%	0%
Greece	75%	25%	50%	50%	75%	25%
Montenegro	50%	50%	50%	50%	83%	17%
R. of North Macedonia	75%	25%	75%	25%	25%	75%
Serbia	67%	33%	66%	34%	66%	34%

Table 3: Situation with existing policies or strategies to promote OS by country

Analysing the data, we can observe variations across different countries and levels. Some countries, such as Bulgaria and Cyprus, have achieved high levels of implementation at the national, university, and library levels, with policies and strategies in place to support OS. On the other hand, countries like Bosnia and Herzegovina and Montenegro show a lack of implementation, with no existing policies or strategies at any level.

In the table below, we present the detected barriers categorised by countries and the corresponding percentage of respondents who acknowledged the presence of these barriers hindering the implementation of OS in their respective environments.

Country Lack	BIH	BGR	CRO	CYP	GRE	MNE	MAC	SER
Lack of policy nationally	100%	50%	0%	0%	0%	0%	0%	29%
Lack of OS policy/ strategy at the university level	50%	50%	0%	0%	67%	100%	0%	29%
Lack of resources	100%	100%	100%	100%	100%	100%	100%	57%
Lack of administrative resources	100%	50%	100%	100%	50%	100%	100%	43%
Lack of external funding	0%	50%	0%	80%	33%	100%	100%	14%
Lack of knowledge	50%	50%	50%	80%	33%	50%	100%	43%
Lack of skills	50%	25%	50%	0%	17%	0%	100%	43%

Table 4: Lacks in implementation OS policies and strategies by country

The percentages represent the lack of certain aspects related to OS support in each country. For example, in Bosnia and Herzegovina, there is a lack of resources, administrative resources, and knowledge in promoting OS. In Bulgaria, there is a lack of external funding,

administrative resources, knowledge, and skills related to OS. The other countries also show varying degrees of lacking in different areas of OS support.

This analysis provides insights into the existing policies or strategies to promote OS, as well as the areas where there is a lack of support or resources in each country. The implementation of OS policies and strategies faces shortcomings in various countries, indicating areas where improvements are needed – from national policies, administrative resources, external funding to knowledge and skills.

In terms of OS advocacy, 49.5% of respondents declared that they have a colleague in their library who deals with this work, and even 78.8% of them stated that there are no barriers in terms of OS advocacy in libraries.

Those respondents who said that there are barriers, pointed out the following problems:

1. Lack of staff
   - Limited resources in small libraries within vocational HEIs
   - Perception of OS goals as irrelevant due to more pressing matters and resource allocation priorities
2. Omissions in legislation
   - Inadequate provisions or gaps in legal frameworks related to OS
3. Insufficient information and cooperation
   - Lack of information at the beginning of creating a strategy
   - Insufficient cooperation with librarians involved in researchers' data entry
   - Lack of unification of national repositories for researchers
4. Lack of national funding
   - Insufficient financial support for OS projects and initiatives at the national level
5. Lack of cooperation between libraries
   - Limited collaboration among libraries, especially at the university level
   - Lack of cooperation with universities and university libraries
6. Lack of information and skills
   - Insufficient awareness and knowledge about OS principles and practices
   - Lack of skills among stakeholders, including library staff

7. Lack of institutional recognition and policies
- Absence of an institutional OS policy
- The library's role not being recognised in OS efforts

8. Copyright issues
- Complex copyright regulations and restrictions impacting the dissemination and sharing of research outputs

9. Lack of resources
- Insufficient resources including staff, time, and institutional funding

10. Different priorities
- Misalignment in priorities between the library and university administration.

This structured outline provides a clear breakdown of the various barriers faced in OS advocacy in the Balkans and points out key problems. Addressing these specific barriers requires a comprehensive approach that includes resource allocation, policy development, training and education, collaboration, and advocacy for legislation.

The situation regarding the implementation of OS infrastructure in libraries is shown in the following graph:

My library has implemented and/or uses the following Open Science infrastructures:
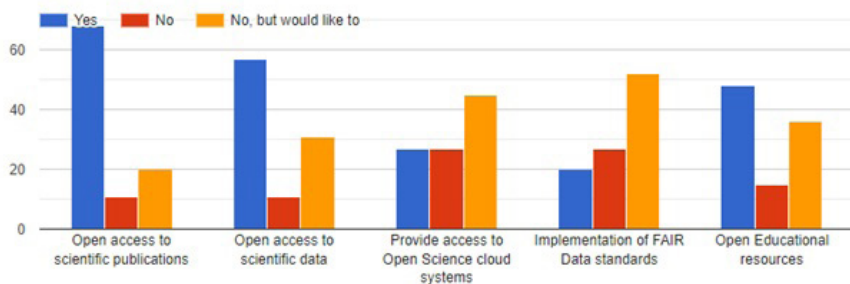
Graph 7: Implementation of OS infrastructures in libraries

If we analyse Graph 7, we would determine that about 70% of respondents point out that their library has OA to scientific journals, 57% of them have OA to scientific data, 48% use Open Educational Resources, but only 27% provide access to OS cloud systems. There is a big problem with the FAIR principles because 79% of libraries have not implemented these principles.

When the results are examined in detail by country and there is a focus on certain OS infrastructures separately, more conclusions can be drawn. Based on the provided information, we can draw the following conclusion regarding OA to scientific publications in the mentioned countries:

- In Bosnia and Herzegovina, a significant portion (67%) of libraries have not implemented or used the OA infrastructure for scientific publications.

- In Bulgaria, there are mixed responses. While 67% of libraries have implemented or use OA infrastructure for scientific publications, a remaining 33% express a desire to do so. This suggests that efforts are being made to adopt OA, but there is still progress to be made.

- Croatia has achieved full implementation of OA to scientific publications across all libraries that were interviewed.

- In Cyprus, all survey participants' libraries have implemented or manage OA infrastructure for scientific publications, indicating widespread access to scientific publications in the country's libraries.

- In Greece, a majority (88%) of libraries have implemented or implemented or manage OA infrastructure and tools for scientific publications, demonstrating good accessibility to scientific publications. However, 12% of libraries still express a desire to implement this infrastructure.

- In Montenegro, only 33% of libraries have implemented OA infrastructure for scientific publications, suggesting limited access to scientific publications in most libraries.

- In the Republic of North Macedonia, all surveyed libraries have implemented or use OA infrastructure for scientific publications. This implies that scientific publications are readily accessible in the country's libraries.

- In Serbia, 67% of libraries have implemented or manage OA infrastructure and tools for scientific publications, while the remaining 33% express a desire to do so. Similar to Bulgaria, Serbia shows ongoing efforts to adopt OA, but there is room for improvement.

Overall, while some countries like Croatia, Cyprus, and the Republic of North Macedonia have achieved widespread implementation of OA to scientific publications in their libraries, others such as Bosnia and Herzegovina, Montenegro, and Serbia have lower implementation rates, indicating potential challenges in accessing scientific publications in those regions.

In the domain of the implementation of FAIR Data standards in the mentioned countries, we can draw the following conclusion:

- In Bosnia and Herzegovina, none of the libraries surveyed have implemented or use the FAIR Data standards.
- In Bulgaria, there are mixed responses. Only 18% of libraries have implemented or use FAIR Data standards, while others express a desire to do so. There is potential for future implementation.
- In Croatia, 33% of libraries have implemented or use the FAIR Data standards. The majority of libraries in the country still need to adopt these standards.
- In Cyprus, none of the libraries have implemented or use the FAIR Data standards. However, 100% of libraries express a desire to do so, indicating an awareness of the importance of these standards and a willingness to adopt them.
- In Greece, there are mixed responses. 50% of libraries have implemented or use FAIR Data standards, while the other 50% express a desire to do so. This suggests a relatively equal distribution of adoption and the potential for further implementation efforts.
- In Montenegro, there are mixed responses. Only 16% of libraries have implemented or use FAIR Data standards, while others express a desire to do so. This indicates a need for increased efforts to implement these standards.
- In the Republic of North Macedonia, none of the libraries have implemented or use the FAIR Data standards. However, 50% of libraries express a desire to do so, showing potential for future adoption.
- In Serbia, there are mixed responses. 78% of libraries have not implemented or use FAIR Data standards, indicating a significant lack of adoption. However, most of these libraries express a desire to implement these standards, suggesting a willingness to improve data practices.

Overall, the implementation of FAIR Data standards appears to be limited across the mentioned countries, with varying levels of adoption. While some countries show positive signs of adoption, such as Croatia and Greece, there is a need for increased efforts and awareness to promote the implementation of these standards in libraries across all countries.

Since Citizen Science is a part of OS, it is necessary to promote OS in the Balkan region, to establish all its principles and to use the infrastructure for OS in order to better prepare libraries for the implementation of the principles and activities of CS.

5.5.3. Citizen Science

In the third, and also the most extensive part of the survey, we analysed the situation with the implementation of CS in libraries in the Balkans and Cyprus.

On our first question *Are you familiar with the Citizen Science concept*, 51.5% of respondents answered affirmatively. But, 85,9% of them answered negatively regarding engaging their institution/library in Citizen Science projects or partnership.

By counties, the situation with positive answers is as follows:
- Bosnia and Herzegovina – 0%
- Bulgaria – 18%
- Croatia – 0%
- Cyprus – 100%
- Greece – 12,5%
- Montenegro – 17%
- Republic of North Macedonia – 25%
- Serbia – 7,25%.

The results may not accurately reflect the current situation, at least in terms of Croatia, which has recently recorded numerous activities and events related to CS in its libraries. Also, in some cases, librarians did not recognise that some activities they carry out in their libraries are based on the principles of CS.

Although the situation with CS in libraries across the Balkans is generally underdeveloped, 15% of respondents declared that they organise CS activities in their institutions. These activities are mostly:
- Trainings and lectures
- Active participation in environmental preservation.

- Research activities with citizens, in collaboration with schools and pupils.
- Collaborations with local universities, national libraries, and municipal educational and cultural institutions.
- Collaborations with some OpenAIRE projects.
- Engagement with the local community.

The respondents understand the potential of CS, and they believe that researchers (81.8%) and civil society (66.7%) are the primary potential partners in CS activities (Graph 8).

Whom do you see as potential partners for conducting Citizen Science activities?

99 responses
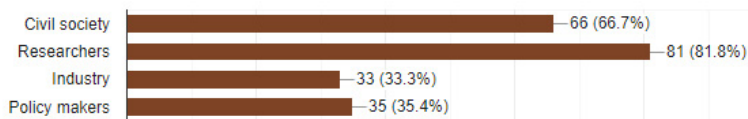
Graph 8: Potential partners in CS activities

On the other hand, 72,7% of libraries do not provide services for researchers and the scientific community that engage in CS and 76,8% do not offer support or training activities for researchers, students, or citizens for CS. Based on the responses, Cyprus demonstrates the most favourable situation, while Bosnia and Herzegovina exhibits the least favourable circumstances.

One specific issue highlighted by the respondents is the absence of a CS strategy at various levels. A significant majority of the respondents indicated that there is no national-level strategy for CS (80%). Furthermore, a majority of respondents also reported the absence of strategies at the university level (86%) and the library level (90%).

In the countries represented by the respondents, the situation is characterised by isolated instances rather than comprehensive strategies for CS. While there are a few individual cases where CS strategies have been implemented at the university and library level, these cases are not widespread or coordinated across the entire country.

Despite the absence of a CS policy at the national, university, and library levels, the respondents hold the belief that there are generally no significant obstacles to the introduction of policies and strategies

at these levels. A majority of respondents (52% at the national level, 57% at the university level, and 58% at the library level) expressed this viewpoint.

However, it is worth noting that respondents from Bulgaria, Greece, Serbia, and Cyprus specifically emphasised the existence of barriers to the implementation of the aforementioned policies. This suggests that while respondents, on average, perceive no major hindrances to policy introduction, there are localised challenges in these particular countries that may impede the effective implementation of CS policies.

The responders indicated following barriers (Graph 9):
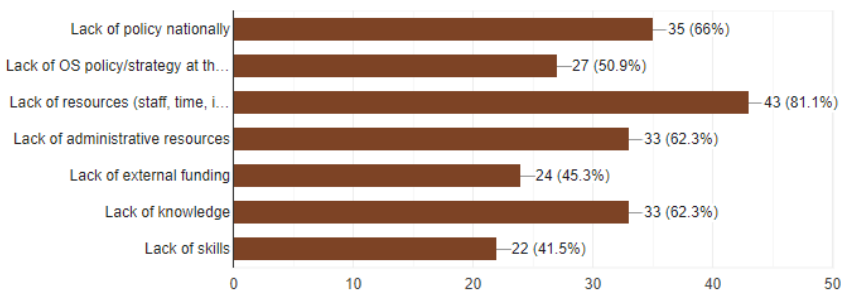
Graph 9: Barriers for implementation CS policies

1. Lack of policy nationally: A significant majority of the respondents (66%) indicated that the absence of a national policy on CS is a major barrier. This suggests that without a clear framework and guidelines at the national level, the development and implementation of CS initiatives face significant challenges.

2. Lack of CS policy at the university level: Another barrier identified by respondents is the absence of policies specifically tailored to the university level. 59% of respondents highlighted this as a significant hurdle. Without dedicated policies and support from universities, the integration of CS activities within academic institutions becomes more difficult.

3. Lack of resources (staff, time): A significant majority of respondents (81.1%) pointed out the lack of resources, including staff and time, as a barrier to implementing CS projects. This shortage of human resources can hamper the successful planning, execution, and management of Citizen Science initiatives.

4. **Lack of administrative resources:** Respondents also identified a lack of administrative resources (62.3%) as a barrier. Administrative resources involve the necessary infrastructure, funding, and support systems required to facilitate and sustain CS efforts.

5. **Lack of knowledge:** 62.3% of respondents mentioned a lack of knowledge as a barrier. It suggests that there is a need for educational initiatives and awareness campaigns to bridge the knowledge gap and promote the benefits and possibilities of CS.

6. **Lack of skills:** Lastly, 41.5% of respondents cited a lack of skills as a barrier. This may refer to the need for training and capacity building among individuals involved in CS, such as researchers, educators, and volunteers. Enhancing the skills and competencies related to CS can contribute to its successful implementation.

Overall, the identified barriers encompass the absence of policies, resource limitations, administrative challenges, knowledge gaps, and skill deficiencies. Addressing these barriers is crucial to fostering a conducive environment for the development and implementation of CS initiatives.

In the domain of CS advocacy in libraries, implementation problems also arise. In 87% of libraries, not a single librarian is involved in CS advocacy, but 86% of respondents do not see the existence of barriers to the implementation of this activity. Looking at the countries, mainly librarians in Greece, Bulgaria and Serbia highlight certain problems in CS advocacy in libraries.

Based on the provided answers, the barriers can be grouped as follows:

1. Lack of Financial Resources
   - Lack of resources
   - Lack of interest in CS
   - Lack of employee
   - Uninterested science society
2. Lack of Human Resources
   - Lack of human resources - only two librarians at the library, with various responsibilities and activities
   - Lack of staff time, different priorities for the library's and the university's administration
   - Lack of staff

3. Lack of Administrative Support and Policies
- Lack of administrative resources, knowledge, and skills
- Lack of resources, knowledge, and skills
- The institution's policy on this part of OS has not yet been adopted or widely discussed
- Unclear knowledge, lack of policies, promotion.

These answers reflect the recurring themes of resource limitations, both financial and human, as well as a lack of administrative support and policies.

Despite the fact that there are no CS policies and strategies at the mentioned levels, 16.2% of respondents point out that there are Citizen Science projects at the national level and at the university level, especially in Greece, Serbia, Croatia and the Republic of North Macedonia. Respondents gave specific examples:
- Faculty of Biology projects
- Projects regarding local environment, air quality
- CeOS_SE - an Erasmus+ funded project, coordinated by LIBER
- Nautica CBC
- Observing one type of plant and recording the date it bloomed
- Project of University Library Belgrade
- Bridge Project https://mvdsi.seeu.edu.mk/projects/bridge/
- The library has made an open call to students and members of the academic community to participate in volunteering in the AMELib team as another student activity. Volunteers are trained in the production of accessible digital books.

In terms of competencies and skills that libraries can provide in the field of CS, the respondents' feedback indicates both strengths and weaknesses. Here is a more detailed explanation:
- Arranging events: The respondents reported that libraries perform well in arranging events related to CS, with 69% expressing positive responses. This suggests that libraries have the ability to organise and host various activities, such as conferences, workshops that promote CS initiatives.
- Facilitation of workshops: The respondents also noted that libraries excel in facilitating workshops, with 65% providing positive responses. This indicates that libraries possess the necessary skills to coordinate and conduct workshops where participants can learn about CS methodologies, data collection techniques, and other related aspects.

- Project coordination: The survey results indicate that libraries are relatively strong in project coordination, with 54% of respondents expressing positive feedback. This implies that libraries have the capacity to oversee and manage CS projects.
- Publications of FAIR data: However, the respondents' feedback shows a poor performance in terms of publishing FAIR (Findable, Accessible, Interoperable, Reusable) data, with 68% reporting negative responses. This suggests that libraries face challenges in effectively sharing data collected through CS initiatives in a manner that meets the FAIR principles.
- GDPR compliance: Similarly, the survey indicates a low score in terms of compliance with the General Data Protection Regulation (GDPR), with 70% of respondents providing negative responses.
- Teaching, evaluation, communication, research data management: The feedback for teaching, evaluation, communication, and research data management skills in libraries appears to be mixed, with an equal number of positive and negative responses. This indicates that libraries have varying levels of proficiency in these areas, and there is room for improvement.

Also, respondents point out that advocacy, project coordination, arranging events, facilitation of workshops, teaching, research data management should be improved in libraries. As barriers in the use and development of competencies for CS, they point out:

Based on the provided answers, the barriers can be grouped as follows:

1. Lack of Resources
- Lack of resources (staff, time, institutional funding)
- Lack of library staff and finances
- Lack of time on work and lack of funding

2. Lack of Knowledge and Skills
- Lack of knowledge about the concept, lack of skills, lack of technical support.
- I don't have enough knowledge and information about CS.
- Lack of interest at the national, university, and faculty level.

3. Policy and Institutional Barriers
- Education about the policy we have to follow
- Lack of implementing policy
- University's policy
- CS is not an area of our interest

- Right-wing policy, clear tasks, and people trained for such activity
- Not publish data without consent
- Lack of interest at the national, university and faculty level.
- Education about the policy we have to follow
4. Organisational Constraints
  - Already working multiple jobs as a librarian and informatics administrator as the only employee in the library with no substitute for retired librarian in the past.
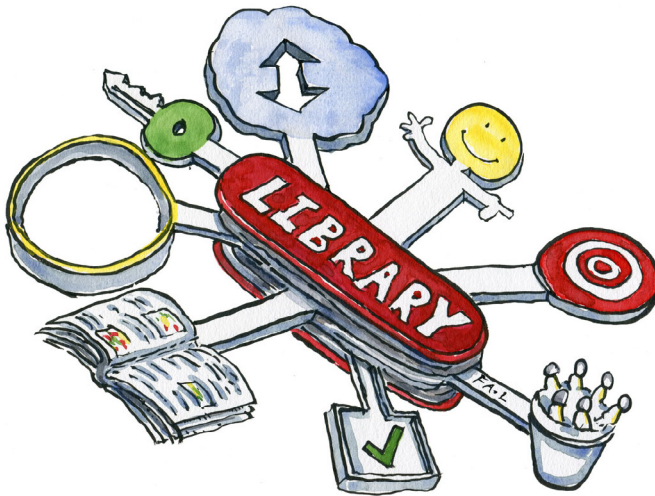
Respondents from all countries gave similar answers and problems are uniform throughout the Balkan region and in Cyprus. They provided several suggestions to enhance the library's capacity to utilise and develop existing competencies and skills in CS:

- Increase the number of workshops and promote them more effectively.
- Organise lectures featuring professionals from diverse fields.
- Conduct workshops specifically focused on CS to understand how the library can contribute and engage in such activities.
- Foster a change in attitude towards the library, emphasising its potential in CS initiatives.
- Address the lack of knowledge and experience by offering a course in CS.
- Initiate CS activities within the local community to encourage participation.

- Arrange accredited workshops and lectures on CS at the National and University library.
- Consider surveying library users on specific principles of CS.
- Promote the concept of research embedded in library work to different citizen groups.
- Provide professional education and guidance on the principles of CS to identify strengths and weaknesses.
- Improve information dissemination to ensure staff members are well-informed about CS.
- Seek collaboration and guidance from higher entities such as universities or scientific institutions to incorporate the library in CS projects and receive training in relevant directions.
- Emphasise the importance of project participation for the library.
- Facilitate cooperative actions and boost information sharing.
- Offer training opportunities to colleagues to enhance their skills in CS.

By implementing these suggestions, the libraries can enhance their effectiveness and contribution in the field of CS.

In the given analysis, the respondents provided feedback regarding their perspectives on various aspects of CS initiatives:
a) Library's expectation of local community initiatives: 44.4% of the respondents expressed a positive outlook, indicating that the library is open and receptive to local community initiatives related to CS.
b) Uncertainty regarding push for CS at universities: 28.3% of the respondents expressed some uncertainty or reservations regarding the promotion or encouragement of CS activities at universities.
c) Initiative to start CS activities in the local community: 27.3% of the respondents indicated a level of uncertainty when it comes to initiating CS activities in the local community.
d) Regional variations: The analysis highlights regional differences in the respondents' perspectives. In Bulgaria, Greece, and Croatia, there is a belief that it is easier to carry out CS activities in collaboration with the local community. On the other hand, in Serbia and Montenegro, the respondents pointed out that it is easier to conduct CS activities in cooperation with universities.

The analysis indicates positive feedback from the respondents regarding library anticipation of local community initiatives in CS.

Furthermore, it is noteworthy that a significant majority of the respondents, specifically 63.6%, expressed agreement, and an additional 32.3% strongly agreed with the notion of engaging academic libraries in CS projects and activities. Only a small proportion of respondents, comprising 4%, expressed disagreement with this idea (Graph 10).

What do you think about the idea of involving academic libraries in citizen science projects and activities?

99 responses

- Strongly agree
- Agree
- Disagree
- Strongly disagree

63.6%

32.3%
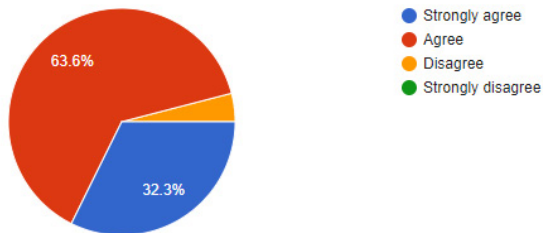
Graph 10: Involving academic libraries
in CS projects and activities

The response "disagree" was recorded in only 4 libraries in Serbia. However, it is important to consider that this data does not reflect the overall opinion, as the survey encompassed a total of 55 libraries from Serbia.

When it comes to external partners, 71.7% of the respondents believe that there are potential partners outside the HEI's in the field of CS. There is a particularly high percentage of those who see public libraries and citizens' associations as partners (71.6%), as well as research funders (51.4%), school libraries (47.3%), NGOs (45.9%). The answers are uniform in the countries where the survey was conducted.

The majority of respondents believe that their library should become more involved in CS projects and activities (85.9%), and a significant percentage feel that library founders support the idea of library involvement in public engagement activities (67.7%). Concerning inclusion in CS projects and activities, the highest level of doubt is expressed in Bulgaria (27.7%), while in other countries, this percentage is negligible. Regarding the support of library founders for involving the library in public engagement activities, it should be noted that in BIH, 57.14% of respondents do not believe they have this kind of support, while in Bulgaria, the figure is 54.5%, and in Serbia, it is 34.5%.

The last question in the survey was about envisaging the future role of academic libraries in your country in CS projects and activities. The respondents gave interesting answers. Based on the provided opinions, here are the groups categorised by subject:

1. The role of libraries as hubs for cooperation between universities, public libraries, and citizens
   - To be the place where research data will arrive
   - The whole concept should be much better promoted as someone who connects science and citizenship
   - Arranging events, promoting the value of science, providing resources, creating joint projects, cooperating with civil societies and different groups and individuals
   - As educators and activity coordinators
   - Academic libraries offer their services to researchers and citizens, so they can be places of meeting, connecting, and cooperation
   - Like hubs offering conditions for learning and development
   - Being involved in strategies and projects regarding CS

2. Promoting awareness and education in CS
   - We still have no clear image, but we are eager to participate in CS activities
   - A full presentation of CS and familiarisation with its significance and purpose is essential
   - I hope that academic libraries will have more education and seminars about this topic so we will be able to do more projects and activities in CS
   - Academic libraries staff will be familiar with CS and better educated, as well as more active in its advocacy
   - Greater openness by involving and animating young people. This can be achieved by organising workshops, interesting lectures, and media support
   - I see them used in a wide range of areas of study, capable of improving the scientific community's capacity
   - Like an important place of connection between science and citizens
   - Being involved in strategies and projects regarding CS

3. Challenges and uncertainties
  - No clear view on the topic
  - It needs work
  - I have no suggestion
  - I have not yet formed an opinion on this matter
  - It has to be decided if this role will be attributed to academic libraries or to public libraries
  - Collaboration and cooperation among libraries:
  - More open for new skills in cooperation with academic libraries from other countries
  - Academic libraries should contribute to each other
4. Specific activities and support:
  - To be a place where citizens will not only learn about the principles of CS but also be involved in concrete projects and actions
  - Already an OS project for all employees of the University of Novi Sad
  - More books in CS, more meetings
  - Engaging communities, providing information, assisting learning processes
  - I agree academic libraries could contribute in CS, supporting citizens to conduct research
  - Academic libraries should contribute to each other.

In Greece, respondents were the most optimistic, while in Serbia and Bosnia and Herzegovina, over 50% of them did not have a clear vision of the future role of academic libraries in their country in CS projects and activities.

5.6. Conclusion

Upon careful examination and analysis of the survey responses, numerous distinct conclusions can be derived. The diverse array of answers provided by the participants offers valuable insights that allow us to draw meaningful and well-supported inferences. These conclusions are based on the collective data and patterns identified through the survey, enabling us to establish a solid foundation for understanding the topic at hand. By systematically assessing

the responses and identifying recurring themes or trends, we can confidently draw clear and definitive conclusions that shed light on the subject under investigation:

- Those countries that have a clear strategy on OS at the national, university and library level are much better placed in terms of implementing CS activities in their environments or in terms of plans for CS implementation.

- In those countries where CS projects exist, there is greater confidence that the founders will support new activities of this type (Greece, Cyprus).

- In some EU countries, the respondents believe that it is easier to realise CS projects in cooperation with the local community, while in Serbia and Montenegro for example, they believe that everything is easier through institutional support, especially universities.

- Librarians in all countries are mainly interested in the application of the concept of CS, activities and projects related to it, and insufficient human and other resources, insufficient knowledge and skills and insufficient support from institutions are cited as the main shortcomings.

- Libraries agree that they have organisational skills, that they know how to write projects, that they want to participate in education, to hold workshops and lectures dedicated to CS.

- It is noticeable that standards such as the principles of FAIR or GDPR are insufficiently applied in libraries, especially in the Western Balkans. Serbia maintains a connection with EU countries, while the situation is significantly worse in Montenegro, Bosnia and Herzegovina and the Republic of North Macedonia.

- When taking into account the entire coverage of the survey, it can be concluded that CS is well-founded in Greece and Cyprus, that it is in quite stable positions in Bulgaria and Croatia, that the situation has improved significantly in Serbia lately, thanks to the CeOS project, but that we still need to do a lot of work and motivate librarians in Bosnia and Herzegovina, Montenegro and the Republic of North Macedonia.

6. Overstepping the Challenges ▶

In addressing the challenges encountered during the implementation of Citizen Science in South East European countries, several potential solutions can be considered. These solutions aim to overcome the specific obstacles and create an environment conducive to successful CS initiatives in the region:

1. **Insufficient funding:**
   - Seek grants and funding opportunities: Encourage organisations and CS initiatives to actively pursue grants and funding opportunities at the national, regional, and international levels. Establish partnerships with funding agencies and seek collaborations with private sector entities interested in supporting CS projects.
   - Crowdfunding and public engagement: Explore crowdfunding platforms and engage with the public to raise funds for specific CS initiatives. Promote the value and impact of CS to encourage individuals and communities to contribute financially.
2. **Language barriers:**
   - Multilingual platforms and resources: Develop multilingual platforms, data collection tools, and resources that cater to the diverse language needs of participants. Provide translation services for project materials, data analysis, and communication to ensure inclusivity and accessibility.
   - Language training and exchange programs: Offer language training programs for CS volunteers and practitioners. Foster language exchange initiatives that facilitate collaboration among participants speaking different languages.
3. **Lack of professional skills related to OS and CS in HEIs:**
   - Strengthen curriculum: Collaborate with HEIs to update and enhance their curriculum to include courses on OS and CS, with a focus on CS methodologies and practices.
   - Capacity-building programs: Organise training programs, workshops, and online courses to develop the necessary professional skills related to OS and CS among CS practitioners, researchers, and volunteers.
   - Collaboration with industry and experts: Foster partnerships between HEIs and industry professionals

to provide real-world experience, mentorship, and internships for students pursuing CS related fields.

4. Lack of recommendations:

- Establish CS networks and communities of practice: Facilitate the exchange of knowledge, experiences, and best practices among practitioners, researchers, and stakeholders through online platforms, conferences, workshops, and seminars.
- Develop regional guidelines and standards: Collaborate with experts and stakeholders to create region-specific guidelines and standards for implementing CS projects. These resources can provide recommendations on project design, data collection, ethics, and quality assurance.

5. Lack of belief in the benefits of engaging with stakeholders outside of their immediate environment:

- Awareness campaigns and success stories: Highlight successful CS initiatives from South East European countries and beyond to showcase the tangible benefits and impacts of engaging with stakeholders outside the immediate environment. Use various media channels to disseminate success stories and promote the value of cross-border collaboration.
- Stakeholder engagement events: Organise networking events, conferences, and workshops that bring together CS practitioners, researchers, policymakers, and community representatives from different countries to foster connections, knowledge exchange, and mutual understanding.

Overall, addressing these obstacles requires a collaborative approach involving government agencies, HEIs, non-governmental organisations, private sector entities, and local communities. By providing adequate funding, enhancing language inclusivity, promoting professional skills development, sharing recommendations, and fostering a belief in the benefits of engaging with stakeholders beyond immediate environments, South East European countries can successfully implement CS initiatives and harness the power of public participation in scientific research.

By taking into account all the aforementioned data, which encompasses the thorough examination of the survey findings as well as the concerns and challenges highlighted by the participants, we can represent the fundamental elements that characterise a prosperous

CS project and the valuable insights we have gained from it using the Graph 11. This graphical representation will encapsulate the key components necessary for achieving success in CS initiatives, while also highlighting the significant lessons we have learned throughout the process.
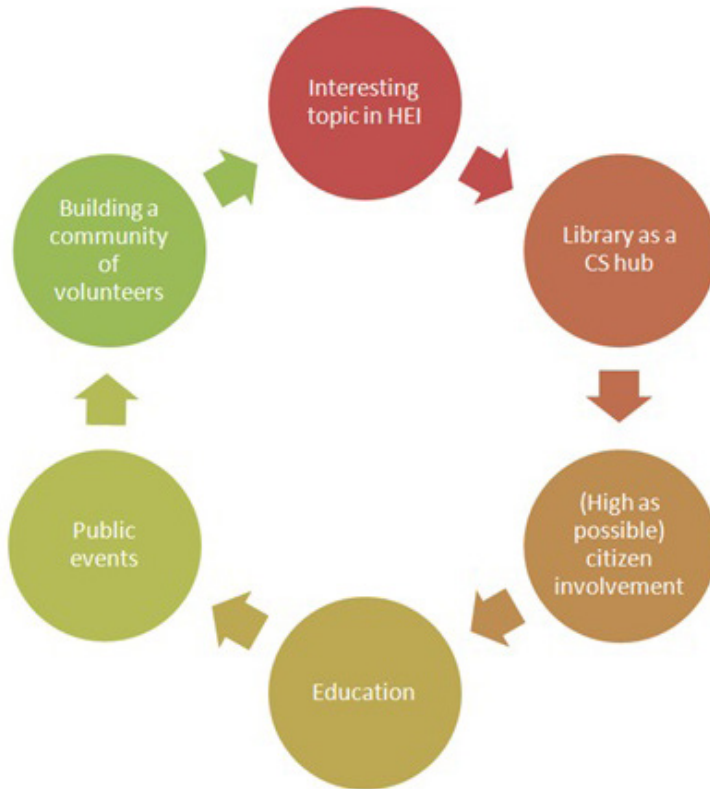
Graph 11: Lessons learned

Moving forward, this Roadmap will serve as a foundational resource to inspire and guide future CS initiatives in Balkan region and beyond. It sets the stage for the development of a vibrant and inclusive CS ecosystem that harnesses the collective power and expertise of citizens to advance scientific knowledge, address local and global challenges, and promote public engagement in the scientific process.

6.1. Key Recommendations for Librarians in Citizen Science

The key recommendations we present are built upon a foundation of research conducted by the LIBER Citizen Science Working Group. This group undertakes extensive studies and publishes a series of informative publications known as "Citizen Science for Research Libraries — A Guide." For these specific recommendations, the LIBER's document on skills for library staff, researchers, and the public has been particularly beneficial[45].

In addition to the LIBER publications, we have also drawn upon the insights gained from a thorough analysis of the conducted survey. This comprehensive examination has provided us with a deep understanding of the challenges, requirements, and opportunities involved in librarians' engagement in CS projects.

By combining the expertise and findings from the LIBER Citizen Science Working Group research and the survey analysis, we have identified several key recommendations concerning the skills that librarians should possess when actively participating in CS initiatives:

1. Communication Skills

Communication skills are of utmost importance in CS projects. In CS, data is communicated, shared, and discussed among various stakeholders. Librarians need to possess effective communication skills to facilitate collaboration, convey project goals, and engage participants.

2. Analytical Skills

Librarians should have strong analytical skills, particularly during the initial stages of a CS project. This involves identifying the project topic, potential stakeholders, and possible partners. The recommendation emphasises the need for a structured approach rather than relying solely on individual interactions with citizens, recognising that collaboration and partnerships play a crucial role in successful CS initiatives.

---

[45] LIBER. Citizen Science Working Group. "Citizen Science Skilling for Library Staff, Researchers, and the Public." In *Citizen Science for Research Libraries — A Guide, Series 1,* https://libereurope.eu/wp-content/uploads/2021/11/guide.pdf

3. Educational Skills

Librarians should possess educational skills to organise and conduct trainings, workshops, and lectures for both fellow librarians and community members. These educational opportunities can help enhance the understanding of CS principles, methodologies, and data collection techniques, fostering active participation.

4. Social Media Skills

With the prevalence of social media platforms, librarians should have proficiency in creating and managing social media profiles. Utilising social media channels can aid in the dissemination of information about CS projects, reaching a wider audience, and encouraging participation from diverse community members.

By focusing on these recommendations, librarians can effectively leverage their skills to enhance their engagement in CS projects, strengthen collaboration, and facilitate the successful implementation of such initiatives in their library, university and community.

6.2. Key Recommendations for Research Libraries

Following a survey involving 125 participants and a detailed follow-up survey of 29 research libraries conducted as part of the CeOS_SE project, an article was released by project partners from SDU in 2023[46]. It highlights the existing status and possibilities of citizen-enhanced open science within European research libraries. It also puts forth strategic and operational considerations for the future.

A) Strategic Reflections for Research Libraries:

1. Partnerships: Seek partnerships and engage in existing working groups, organisations, networks, or initiate new ones. Map stakeholders, have dialogues with relevant stakeholders, engage in OS and CS working groups, and explore national and international funding opportunities.

---

[46] Thomas Kaarsted, Blake, Oliver, Nielsen, Kristian Hvidtfelt, Alving, Berit, Rasmussen, Lotte Thing, Overgaard, Anne Kathrine and Hansen, Sebrina Maj-Britt. "How European Research Libraries Can Support Citizen-Enhanced Open Science" *Open Information Science* 7, no. 1 (2023): 20220146, https://doi.org/10.1515/opis-2022-0146

2. Institutionalisation: Develop a stronger institutional framework for CS based on the BESPOC (Broad Engagement in Science, Point of Contact) model[47], which supports OS principles and involves various actors.

3. Prioritisation: Clearly communicate and prioritise tasks related to CS both internally and externally to address challenges in capacity building and prioritisation.

4. Policy and Strategy: Collaborate with relevant stakeholders to set the agenda, advocate for funding and resources, and push for policy changes from university management, national research councils, and policy makers.

   B) Operational Actions for Research Libraries:

1. Mapping of Researchers and Projects: Perform a mapping exercise to build relationships with researchers, research groups, institutes, and faculties. Address the role and internal organisation of the library, offer existing services to new audiences, and explore new services.

2. Utilisation of Competences: Identify and utilise existing skills while focusing on developing competences in areas that are lacking, such as project management, data stewardship, communication, evaluation, and grant writing.

3. Utilise or Expand Existing Infrastructure or Services: Support CS through OS services, ensuring access to digital object identifiers, data licences, publication in open databases, and engaging in dialogue with researchers on FAIR data principles. Allocate funds for data management, promote green OA for CS project publications, and participate in international knowledge-building on FAIR data and OA.

4. Teaching Citizen Science: Integrate CS methods into university courses, particularly at the doctoral level, and teach responsible research practices and socially responsible research and innovation. Focus on structuring courses, defining learning outcomes, and incorporating collaborative learning activities.

---

[47]   Tiberius Ignat and Paul Ayris. "Built to Last! Embedding Open Science Principles and Practice into European Universities". *Insights: The UKSG Journal* 33, 1 (2020): 9, https://doi.org/10.1629/uksg.501

6.3. Final Thoughts

We firmly believe that the implementation of the proposed roadmap and the organisation of a multiplier event[48] will have a significant positive impact on the current situation in the ex-Yugoslavia countries (Serbia, Croatia, Slovenia, Bosnia and Herzegovina, Montenegro, North Macedonia). This initiative will play a crucial role in establishing CS as a recognized and valued practice among librarians, researchers, and citizens in the Balkan region.

The roadmap serves as a comprehensive and strategic guide, outlining the necessary steps and actions required to promote and integrate CS effectively. By providing a clear framework and set of recommendations, the roadmap will assist stakeholders in navigating the complexities of CS implementation, overcoming challenges, and maximising opportunities for success.

Image: CeOS_SE Multiplier Event held in Belgrade, Serbia, 12.06.2023.

Additionally, the multiplier event will serve as a catalyst for knowledge exchange, collaboration, and networking among professionals in the region. Bringing together librarians, researchers, and citizens, this event will create a platform for sharing experiences, best practices, and innovative approaches related to CS. Such interactions will foster a sense of community and collective learning, facilitating the growth and development of CS initiatives in the Balkan region.

---

[48]   First CeOS Multiplier Event was held in Belgrade on June 12, 2023. More at: https://ceosse-project.eu/first-ceos-multiplier-event-in-belgrade/

Through the implementation of the roadmap and the multiplier event, several positive outcomes can be expected. Firstly, awareness and understanding of CS will be significantly enhanced. Librarians, researchers, and citizens will gain a deeper appreciation of the benefits, methodologies, and applications of CS, leading to increased engagement and participation. Moreover, the roadmap and multiplier event will contribute to building capacity and expertise in CS within the Balkan region. Librarians and researchers will acquire the necessary skills, knowledge, and resources to effectively plan, implement, and evaluate CS projects. This enhanced capacity will empower individuals and institutions to take a more active role in shaping the CS landscape in their respective countries.

Furthermore, the promotion of CS in the Balkan region will foster a culture of collaboration and inclusivity. Librarians, researchers, and citizens will come together to address local challenges, generate meaningful data, and contribute to scientific knowledge. This collaborative approach will not only strengthen the scientific community but also have positive societal impacts, promoting environmental awareness, community engagement, and evidence-based decision-making.

In conclusion, the roadmap and multiplier event have the potential to revolutionise the status of CS in the ex-Yugoslavia countries. By fostering awareness, building capacity, and fostering collaboration, CS will rightfully assume its place among librarians, researchers, and citizens in the Balkan region. This transformative shift will lead to advancements in scientific research, community empowerment, and sustainable development in the region.

Fritz Ahlefeldt

7. Anex: Inspiration - Citizen Science Champions

7.1. Bulgaria

In Bulgaria, CS projects are still in their early stages, resulting in limited available outcomes and performance evaluations. However, two initiatives have emerged as highly promising examples of CS in the country.

The first initiative led by the University of Library Studies and Information Technologies (ULSIT) focuses on the application of mixed reality for training and promoting cultural heritage within the university information environment[49]. This project aims to showcase the potential of virtual and augmented reality, specifically mixed reality, in training and promoting historical-cultural heritage. The project also focuses on creating virtual sites of historical-cultural heritage. It utilises two main technologies for generating 3D information: photopanoramas and three-dimensional virtual models. The intention is to create an ancient city and establish a repository of procedural rules for modelling Greek and Roman cities. One notable component of this project is the Master class and exhibition titled "The cultural heritage of Old Plovdiv through the lens of the Gen Z generation". In this initiative, students and citizens participate in a day and evening photo tour of Old Plovdiv, capturing images in various genres such as landscapes, architecture, still life, and reportage using natural lighting. Subsequently, the exhibition provides a platform for discussing the techniques employed and the outcomes achieved during the photo tour[50]. While still in progress, this initiative holds significant promise for leveraging mixed reality and citizen engagement to explore and showcase cultural heritage.

The second initiative is an annual campaign organised by the Bulgarian Society for the Protection of Birds (BSPB) called "We count sparrows"[51]. This campaign mobilises many citizens to participate in sparrow counting activities. The initiative is part of two broader projects: "Citizen science for the benefit of local communities and nature"

---

[49] Original title of the project is: Приложение на смесената реалност в обучението и популяризирането на КИН в университетска информационна среда. More at: https://mixedreality.unibit.bg/en/%d0%bf%d1%80%d0%be%d0%b5%d0%ba%d1%82/

[50] More at: https://www.facebook.com/unibit.bg/posts/pfbid0noFEzGBk4F4sUnfLJf4ubpT5BroZ1uigWnA4yrHnG9AzuMQCXFmqcm8FdecThs48l

[51] More at: https://www.vrabcheta.bg/bg/za-kampaniyata/za-broneto.html

supported by the Active Citizens Bulgaria Fund, and "Implementation of the scheme for monitoring common bird species, as part of the National Biodiversity Monitoring System" financed by the Enterprise for the Management of Environmental Protection Activities. Each year, citizens select their preferred counting locations and mark them on an interactive map. They then record the number of sparrows observed, their species, and note the characteristics of the counting place, such as a park, inter-block space, boulevard, or country street. This annual campaign, held at the same date and time, provides valuable data for monitoring bird populations and contributes to biodiversity research and conservation efforts in Bulgaria.

Images from the *We count sparrows* webpage,
https://www.vrabcheta.bg

These initiatives, although in their early stages, show significant promise in engaging citizens and promoting scientific participation in Bulgaria. As these initiatives continue to develop and expand, they are expected to generate meaningful outcomes and contribute to the overall growth of CS in Bulgaria.

It is important to note that emerging CS projects often lack substantial outcomes and performance evaluations. Building the necessary infrastructure, involving diverse participants, and gathering sufficient data for evaluating the effectiveness and impact of these projects require time and effort. While comprehensive evaluation mechanisms may currently be lacking in Bulgaria, the initiation of CS projects reflects a rising interest in engaging citizens in scientific pursuits.

As these initiatives progress, Bulgaria will accumulate valuable data, establish partnerships, and enhance its capacity in CS. Over time, the outcomes and performance of these projects can be assessed, contributing to the advancement of CS in Bulgaria and benefiting the broader scientific community.

Images from the *Mixed reality* webpage, https://mixedreality.unibit.bg/

7. 2. Croatia

7.2.1. Project: Digital Libraries for Local Development

IRIM (Institute for Youth Development and Innovativity[52]) is a Croatia-based non-profit organisation (private foundation), which has developed and implements the largest extracurricular program in EU – the Croatian Makers movement[53], reaching now over 300,000 children in Croatia.

The association's goal is to strengthen children's digital and scientific literacy, as well as knowledge and competencies in STEM fields, in order for them to become equal citizens of the 21st century. In collaboration with numerous Croatian and international institutions, IRIM has implemented several major national projects, some of which have also involved CS and included Croatian libraries. The list of projects can be found on the official IRIM website (https://croatianmakers. hr/en/home/). The Digital Libraries for Local Development project is particularly notable among the various projects. IRIM carried out this project from 2020 to 2021 as part of the Swiss-Croatian Cooperation Program, involving 100 Croatian libraries (mostly public libraries) and 5 Swiss libraries that were donated equipment. The equipment included micro:bits and accessories for them, as well as sets for conducting CS projects. The project aimed to empower local libraries with STEM equipment and educate librarians and library users in the use of new technologies. Through the CS sets, libraries participated in collecting meteorological data, and library users independently assembled and programmed equipment (atmospheric sensors) and measured atmospheric variables: temperature, relative humidity, and atmospheric pressure. Library users collected over a million meteorological data points, which were recorded on the IRIM platform. The collected data were analysed by experts, and based on them, a scientific research study was written and published[54]. The project emphasised digital creativity, raising public awareness of atmospheric pollution, contributing to sustainable development of the local community, and promoting collaboration.

---

[52]   Original title of the organisation is: Institut za razvoj i inovativnost mladih - IRIM
[53]   More at: https://croatianmakers.hr/en/home/
[54]   Document available at: http://innovabridge.org/Upload/Pdf/Prijevod%20 Merlo%20et%20al.%202021_Citizen%20Science_final%20(SM)_pdf.pdf
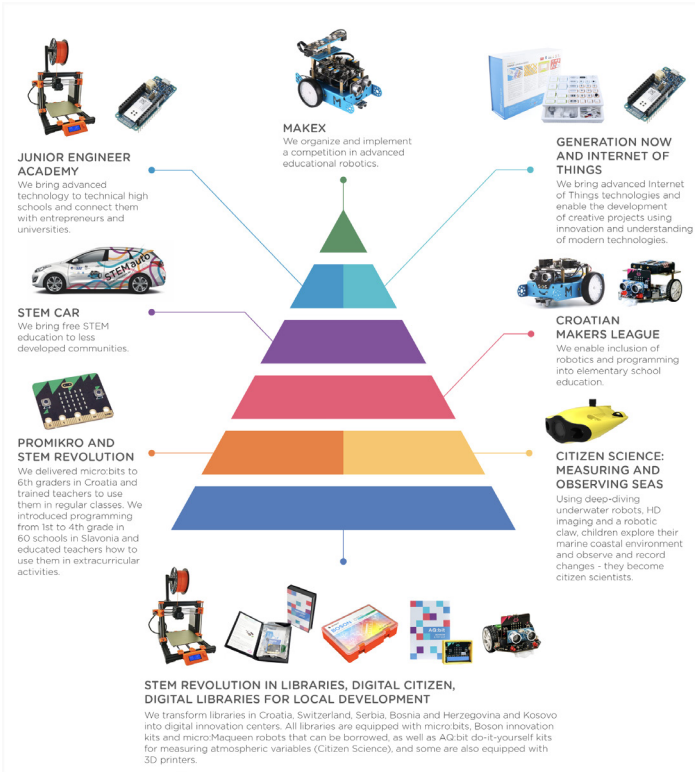
Images from the *IRIM* webpage,
https://croatianmakers.hr/

7.2.2. Project Dendroteka

The Graphic Collection[55] of the National and University Library in Zagreb possesses a series of old and valuable postcards that have been digitised and made available to the public on the Digital Collection portal of the National and University Library (digitalna.nsk.hr). Besides cultural and historical landmarks, various tree species can be observed on postcards depicting Croatian cities, primarily Zagreb. This sparked the idea of focusing on trees in the digitised postcards and identifying specific species. Additionally, it was noticed that some of these tree species are still present today, while new ones have also emerged. The

---

[55] More at: https://www.nsk.hr/en/print-collection/

project involved Gymnasium students working alongside Croatian experts in dendrology. The activities consisted of three parts:

1. Visiting postcard locations and recreating (photographing) the postcards: just before the Science Festival, the students visited the locations depicted on the postcards and took photographs to recreate the appearance of the old postcards. They also used the PlantNet mobile application on-site to identify tree species and input the collected data.
2. Education and tree species identification at the Faculty of Forestry (students, experts + National and University Library): University Library staff provided an introduction to CS, while the experts shared their work and methods for identifying tree species. The students were divided into pairs and, with the guidance of the experts, used computers to analyse and annotate tree species on both the old postcards and the recreated photographs. Preliminary results showed the prevalence of certain tree species in the past and present, as well as those that have survived to this day. Notably, species like cypress, maple, mahonia, thuja, yew, and plane trees were found in both the old postcards and the new photographs, while exotic species like banana, agave, and yucca were no longer present.
3. Creation of the Dendroteka portal: the development of a portal showcasing before-and-after postcards, with tree species clearly highlighted. The final version of Dendroteka can be found at: http://virtualna.nsk.hr/dendroteka/. This interactive platform will allow users to compare tree species at the same locations and provide descriptions of the trees sourced from enciklopedija.hr.

The project aimed to foster collaboration between the general public and experts in conducting scientific research, engage young people in studying tree species historically planted in Zagreb, and review the most prevalent species, comparing them with the present situation. The National and University Library also sought to increase the visibility of digitised works from the Graphic Collection, promote the utilisation of printed and electronic sources, and advocate for sustainable development and green librarianship goals. Additionally, the cataloguing records were enhanced to include the tree species present on the postcards. The activity was also shown in the national television (HRT) and article about the activity was published in the national newspapers Večernji list: https://www.vecernji.hr/zagreb/tomislavac-su-nekoc-krasile-agave-a-na-zrinjevcu-se-moglo-naici-

i-na-bananu-1680233. Both online (premium content) and printed version.

Images from the *Dendroteka* webpage, http://virtualna.nsk.hr/dendroteka/

7.3. Cyprus

7.3.1. Project: CovTracer-EN: The official Contact tracing Mobile App of the Republic of Cyprus

The CovTracer - Exposure Notification (CovTracer-EN) project in Cyprus has a clear objective of developing a contact tracing mobile app to aid the Epidemiological Surveillance and Control Unit of the Cyprus Ministry of Health in curbing the transmission of COVID-19 within the Cypriot community. This project actively involves citizens and aims to provide a warning system to app users who may have come into contact with someone who has reported a positive COVID-19 test result[56].

The functionality of the CovTracer-EN app relies on Bluetooth proximity technology, which allows it to detect and record close interactions between app users. By utilising this technology, the app can identify individuals who have been in proximity to someone who later reports a positive COVID-19 diagnosis. Once a user indicates a positive test result in the app, an anonymous notification is sent to other app

---

[56] More at: https://www.kios.ucy.ac.cy/projects_kios/covtracer-en-the-official-contact-tracing-mobile-app-of-the-republic-of-cyprus/

users who were in close contact with them during the specified period.

It is essential to emphasise that the CovTracer-EN project maintains strict confidentiality regarding user data. The privacy and security of app users are upheld, ensuring that all personal information and contact data remain confidential. This approach instils trust among users and encourages broader participation in the contact tracing efforts, ultimately supporting the overall goal of limiting the spread of COVID-19 in Cyprus.

Through the CovTracer-EN project, Cyprus leverages technology and citizen involvement to enhance its contact tracing capabilities. By providing timely warnings and promoting proactive measures, the app plays a crucial role in the country's ongoing efforts to combat the COVID-19 pandemic and safeguard public health.

7.3.2. Project: Fix Cyprus: A Platform and Mobile App to improve the Cyprus Road Network Infrastructure and Road Safety

Fix Cyprus is an application for mobile phones that collects and manages crowdsourced data related to problems in the road network of Cyprus with the aim to improve the Cyprus road network infrastructure as well as the road safety[57].

Through the Fix Cyprus app, any citizen can submit reports highlighting problems they encounter in the road network. These reports can include supporting details such as photos, location information, and comments. Once a report is submitted, it is automatically forwarded to the corresponding district office of the Public Works Department (PWD) based on its geographic location. The district offices of the PWD utilise a web portal to evaluate the reports. They assess whether the reports meet the application's terms

---

[57] More at: https://www.kios.ucy.ac.cy/fixcyprus-a-platform-and-mobile-app-to-improve-the-cyprus-road-network-infrastructure-and-road-safety/

and conditions and then assign them to the appropriate authorities responsible for addressing the reported problems. The authorities are notified through the web portal and are tasked with carrying out the necessary repairs or improvements.

App users can track the progress of their reports through the Fix Cyprus app's report history feature, enabling them to stay informed about the status of their submissions.

Images from the *Fix Cyprus* webpage, https://fixcyprus.cy/

By encouraging citizen participation and leveraging crowdsourced data, the Fix Cyprus mobile application reduces the need for regular road network inspections. It facilitates faster identification of problems within the road network and strengthens communication between the authorities and citizens. Ultimately, the application aims to improve road safety by enabling prompt and efficient resolution of reported issues, leading to a more reliable and well-maintained road infrastructure in Cyprus.

7.4. Greece

7.4.1. Project: Ornithopolis

The Ornithopolis project[58] in Patras aims to foster collaboration between citizens and scientists from the University of Patras. Through a series of small seminars and "bird walks" within the urban area of Patras, the project focuses on educating citizens about bird species found in the city and how to scientifically record their presence. By working together, scientists and citizens contribute to the study of bird diversity in Patras while simultaneously enhancing their quality of life and deepening their connection to the natural world.

Images from the *Ornithopolis* webpage,
http://zmup.upatras.gr/en/content/what-ornithopolis

The project has two primary objectives:

1. Enhancing Knowledge and Protecting Biodiversity: By familiarising citizens with the birds in their city, including their calls and behaviour, Ornithopolis aims to raise awareness and promote the protection of biodiversity. Through a deeper understanding of the birds' needs within the urban environment, citizens can take proactive measures to improve the city's ecological conditions, benefiting both the bird species and human residents.

---

58   More at: http://zmup.upatras.gr/en/content/what-ornithopolis

2. Collecting Scientific Data for Environmental Study: Ornithopolis seeks to gather scientific data that enables researchers to better study and comprehend the environmental factors that influence and disrupt bird species in an urban setting. This data can inform city planning efforts, leading to more informed decisions that benefit all inhabitants, including humans, animals, and plants. By understanding the impact of environmental factors on bird populations, the project contributes to creating more sustainable and harmonious urban environments.

Through the joint efforts of citizens and scientists, Ornithopolis aims to create a mutually beneficial relationship. Citizens gain knowledge and a sense of connection to the natural world, while scientists gain valuable data to advance their understanding of urban ecosystems. Ultimately, this collaborative approach promotes a greater appreciation for nature, fosters biodiversity conservation, and encourages informed urban planning for the benefit of all inhabitants.

7.4.2. Project: COMPAIR

COMPAIR[59] is an innovative CS project at the early planning stage, aiming to address gaps in air quality monitoring and collaboratively create impactful social actions to influence city policies. One of the participating cities in this project is Athens, and individuals can still express their interest and register to get involved.

In the Athens experiments, the project focuses on engaging people and encouraging behaviour changes that contribute to reducing carbon footprints and improving air quality. This will be facilitated through the development of a CO_2 Simulation Dashboard, which will be accessible to all participants and distributed alongside air quality sensors.

Participants will contribute data to the CO_2 dashboard, providing information about their environmental habits and lifestyle choices. For instance, individuals can input data related to the quantity, type, and energy consumption of household appliances, waste management and recycling practices, energy consumption patterns in their households, smoke and vapour emissions, heating methods (such as wood burning), and more. Using this data, the Dashboard will calculate the carbon footprint of each user and offer personalised interventions and recommendations to help them achieve lower emissions at a household level.

---

[59]   More at: https://www.wecompair.eu/athens

The overarching goal of COMPAIR is to empower citizens by providing them with actionable insights about their carbon footprint and air quality impact. By actively involving individuals in the monitoring and decision-making process, the project aims to foster a sense of ownership and responsibility in tackling air pollution and driving positive change. The CO2 Simulation Dashboard acts as a tool to raise awareness, inspire behaviour modifications, and contribute to a collective effort in improving air quality and creating sustainable urban environments.

Images from the *COMPAIR* webpage, https://www.wecompair.eu/athens

7.5. Serbia

7.5.1. Project: Obtectus Finders

The CS project Obtectus Finders aims to capture seed beetles from various locations in order to analyse the genetic diversity of their populations. The young project team consists of researchers from the Institute for Biological Research "Siniša Stanković" and the Faculty of Biology, University of Belgrade. Scientists can collect beetles from several natural populations, but there are too few scientists to sample them from enough places. This project gives people of all ages and backgrounds the chance to participate in real scientific research. Many have joined by sending samples, which are visible on the map[60]. The samples that are collected will directly contribute to seed beetle

---

[60]   Map is available at: https://www.opasuljise.rs/en/map/

genetic research and help detect the distribution of this pest insect. This project is supported by the Center for the Promotion of Science and the grant "Start Up For Science." More about project is available at: https://www.opasuljise.rs/en/

The seed beetle, also known as the bean weevil (*Acanthoscelides obtectus*), is small in size but a great world traveller. Like many other species, this beetle thrives in conditions shaped by human activities.

The main goal of the CS project Obtectus Finders is to analyse the genetic variability of natural populations of those seed beetles. Additionally, the results of this project will contribute to the development of new biocontrol techniques, which will improve the field of agriculture.

To achieve this aim, scientists are partnering with the public to collect beetles from a large number of different locations. The involvement of volunteers in collecting beetles helps uncover the distribution of this pest insect on a broad geographic scale and understand its population genetic structure.

Images from the *Obtectus Finders* webpage, https://www.opasuljise.rs/

Today, Obtectus Finders is attracting more and more public attention, thanks in part to the media's role in popularising this project. Many citizens have learned about it through the media. The number of interested citizens is growing, as well as the number of collected and sent samples of seed beetles, which can be tracked on the map. The map of collected samples indicates the places from which the samples have been sent so far.

7.5.2. Project: Monitoring the Spread of sculptured Resin Bee (*Megachile sculpturalis*) in Southeast Europe

The sculptured resin bee (*Megachile sculpturalis*) is originally from East Asia and is found in temperate and subtropical regions such as Japan, China, and Korea. It was first observed outside of its natural range in North Carolina, eastern North America, in 1994. Since then, it has successfully expanded across the continent and can now be found in almost all states in the eastern half of the United States, as well as in southern Canada.
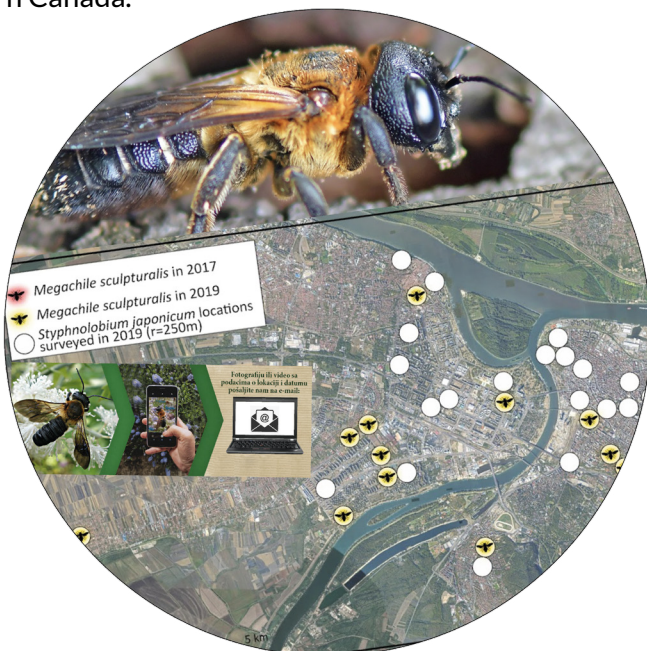
Images from the *Megachile sculpturalis* webpage,
https://srbee.bio.bg.ac.rs/english

In Europe, the bee was first discovered in southern France in 2008, followed by detections in Italy in 2009 and Switzerland in 2010. However, the exact origin of this second introduction is still unknown, whether it came from Asia or America. Since then, the bee has spread to thirteen more European countries, including Liechtenstein, Spain, Andorra, Germany, Austria, Slovenia, Croatia, Hungary, Serbia, Bosnia and Herzegovina, Montenegro, Romania, Bulgaria and the Crimea. In Serbia, the sculptured resin bee was first recorded in 2017 in the centre of Belgrade. Monitoring efforts have confirmed that the species has successfully established itself in Serbia as of the summer of 2019. Currently, it has been detected primarily in the wider area of Belgrade, but in significant numbers.

The study of the presence and population status of the sculptured resin bee in different parts of Serbia and its expansion in the Balkans is an important task. Previous data indicate that the bee thrives in urban areas, primarily due to the availability of exotic plants whose pollen forms the basis of its offspring's diet. The impact of various plant species on the success and invasiveness of the bee in newly inhabited areas in North America and Europe is still unclear. Therefore, it is scientifically significant to investigate how different plants and habitat types contribute to the bee's spread in Serbia and other newly invaded regions.

To gather the necessary data, the Centre for Bee Research at the Faculty of Biology, University of Belgrade has initiated a CS project. Since the summer of 2020, efforts have been made to monitor the occurrence of the bee not only in urban areas but also in rural, semi-natural, and natural habitats throughout the country. Citizens have been actively involved in the project by providing photos or video recordings along with date and location information.

The main goals of the project include determining the bee species' presence and monitoring its spread in Serbia and the region, studying its population dynamics, documenting and quantifying interactions with both exotic and native plants, and evaluating the nature and potential effects of these interactions such as pollination and propagation. Additionally, the project aims to investigate the bee's interactions with other wild and managed bee species on an individual and community level, assessing both negative and positive effects. Genetic analysis methods will be utilised to examine the population history, demographics, and trophic interactions with plants. More information about this project can be found at: https://srbee.bio.bg.ac.rs/english.
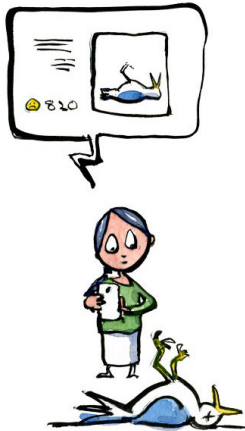
Worrying　　　Sharing　　　Helping solve

Frits Ahlefeldt

8. Summaries ▶

8.1. Summary: Roadmap on CeOS in the Balkans

Open Science (OS) and Citizen Science (CS) are two distinct but related concepts that can significantly improve the quality of scientific and innovation outputs, whilst also promoting public engagement with science and technology, openness, and active citizenship.

By promoting transparency and collaboration, OS can help to reduce bias and improve the quality of scientific research outputs. It can also lead to a more efficient and effective use of research resources and increase the relevance and impact of scientific research to society.

Citizen Science, on the other hand, involves the active participation of members of the public in scientific research projects. CS can take many forms, including collecting data, conducting experiments, or analysing data, among others. It provides an opportunity for individuals and communities to engage with scientific research, contribute to scientific discovery, and develop a better understanding of scientific issues. CS can also help to democratise scientific research by involving people who may not have formal or informal scientific training or access to any research resources. By involving a broader range of participants in scientific research, it can generate new ideas and perspectives, thus promoting innovation.

Together, OS and CS can complement each other and lead to a more inclusive, transparent, and collaborative scientific research ecosystem. They can also promote public engagement with science and technology, which are essential for building a more sustainable and equitable society.

This roadmap is designed to assist Higher Education Institutions (HEIs) and research libraries in enhancing the educational, scientific, innovative, and social impact of their OS/CS activities. It provides guidance on how to organise and facilitate these activities effectively, including identifying the right participants, setting clear goals, and selecting appropriate tools and resources. The roadmap also includes information on how to measure and evaluate the impact of these activities, as well as best practices for promoting and sustaining engagement among participants. It is also of interest to independent initiatives that are organising OS/CS activities.

In addition, the identification of essential skills for librarians engaged in Citizen Science initiatives includes communication, analytical, educational, and social media skills. Looking ahead, strategic reflections for research libraries encompass partnerships, institutionalisation, prioritisation, policy and strategy. In terms of operational actions, research libraries are advised to conduct mappings of researchers and projects, identify and utilise existing competences, expand infrastructure and services, and incorporate Citizen Science into the educational process.

Overall, the roadmap provides a valuable resource for any organisation or individual looking to promote and engage in OS and CS activities. Also, by following the guidance provided in the roadmap, independent initiatives can enhance activity impact and participant engagement.

8.2. Резюме: Пътна карта за CeOS на Балканите[61]

Отворената наука (ОН) и гражданската наука (ГН) са две различни, но свързани концепции, които могат значително да подобрят качеството на науката и иновациите, като в същото време насърчават активното участие на обществото в генерирането на научни и технологични резултати, чрез отвореност и активна гражданственост.

Като насърчава прозрачността и сътрудничеството, ОН може да подпомогне намаляването на предразсъдъците и подобряване качеството на резултатите от научните изследвания. Това може да доведе и до по-ефективна употреба на ресурсите за научни изследвания и да увеличи тяхната релевантност и въздействие върху обществото.

Гражданската наука, от друга страна, включва активно участие на гражданското общество в научноизследователски проекти. ГН може да бъде осъществена под много и различни форми, включително събиране на данни, провеждане на експерименти, анализиране на данни и още много други. Тя дава възможност на отделни лица и общности да се ангажират с научни изследвания, да допринесат за научни открития и да работят в посока на по-добро разбиране на научните проблеми. Също така, ГН може да помогне за демократизиране на научните изследвания чрез включване на хора, които нямат формално или неформално образование в съответната

---

[61]   Translated by the ULSIT Project Team

научна област или достъп до каквито и да е изследователски ресурси. Чрез включването на по-широк кръг от участници в научни изследвания, ГН може да генерира нови идеи и перспективи, като по този начин насърчава иновациите.

ОН и ГН могат да се допълват взаимно и да доведат до по-приобщаваща, прозрачна и съвместна научноизследователска екосистема. Те могат да стимулират общественото ангажиране с науката и технологиите, които са от съществено значение за изграждането на по-устойчиво и справедливо общество.

Тази пътна карта е предназначена да подпомогне висшите училища (ВУ) и изследователските библиотеки в подобряването на образователното, научното, иновативното и социалното въздействие на техните дейности, свързани с ОН/ГН . Тя предоставя насоки как да организирате и подпомогнете провеждането на тези дейности, включително идентифициране на правилните участници, поставяне на ясни цели и избор на подходящи инструменти и ресурси. Пътната карта включва и информация за това как да се измери и оцени въздействието на тези дейности, както и най-добри практики за насърчаване и поддържане на ангажираността сред участниците. Представлява интерес и за независими инициативи, които организират ОН/ГН дейности.

В допълнение идентифицирането на основни умения за библиотекарите, ангажирани с инициативи за гражданска наука, включват комуникационни, аналитични и образователни умения, както и такива за работа със социалните медии и мрежи. По-задълбочено внимание заслужават и стратегическите цели на изследователските библиотеки, включващи партньорства, институционализация, приоритизиране, политика и стратегия. По отношение на оперативните действия, на изследователските библиотеки се препоръчва да извършват картографиране на изследователи и проекти, да идентифицират и използват съществуващите компетенции, да разширяват инфраструктурата и услугите и да включват гражданската наука в образователния процес.

Като цяло пътната карта представлява ценен ресурс за всяка организация или индивид, който иска да популяризира и да се включи в дейностите на ОН и ГН. Освен това, следвайки насоките, предоставени в пътната карта, независимите инициативи могат да подобрят въздействието на дейността и ангажираността на участниците.

8.3. Sažetak: Smjernice za primjenu CeOS principa u zemljama Zapadnog Balkana[62]

Otvorena znanost (OS) i građanska znanost (CS) dva su različita, ali povezana koncepta koji mogu značajno poboljšati kvalitetu znanstvenih i inovacijskih rezultata, istovremeno promičući angažman javnosti u znanosti i tehnologiji, otvorenost i aktivno građanstvo.

Promicanjem transparentnosti i suradnje, OS može pomoći u smanjenju pristranosti i poboljšanju kvalitete rezultata znanstvenog istraživanja. Također može dovesti do učinkovitijeg i djelotvornijeg korištenja istraživačkih resursa i povećati utjecaj i važnost znanstvenog istraživanja za društvo.

Građanska znanost, s druge strane, uključuje aktivno sudjelovanje javnosti u znanstveno-istraživačkim projektima. CS može imati mnoge oblike, uključujući prikupljanje podataka, provođenje eksperimenata ili analizu podataka, između ostalog. Pruža priliku pojedincima i zajednicama da se uključe u znanstveno istraživanje, pridonesu znanstvenim otkrićima te razviju bolje razumijevanje znanstvenih pitanja. CS također može pomoći u demokratizaciji znanstvenog istraživanja uključivanjem ljudi koji možda nemaju formalnu znanstvenu obuku ili pristup tradicionalnim istraživačkim resursima. Uključivanjem šireg kruga sudionika u znanstvena istraživanja može generirati nove ideje i perspektive te promicati inovacije.

Zajedno, OS i CS mogu se nadopunjavati i dovesti do inkluzivnijeg, transparentnijeg i suradničkog ekosustava znanstvenog istraživanja. Oni također mogu promicati javni angažman u znanosti i tehnologiji, otvorenost i aktivno građanstvo, koji su ključni za izgradnju održivije i pravednijeg društva.

Ovaj je plan osmišljen kako bi pomogao institucijama visokog obrazovanja (HEI) i znanstvenim knjižnicama u poboljšanju obrazovnog, znanstvenog, inovacijskog i društvenog utjecaja njihovih OS/CS aktivnosti. Pruža smjernice o tome kako učinkovito organizirati i omogućiti te aktivnosti, uključujući identificiranje pravih sudionika, postavljanje jasnih ciljeva i odabir odgovarajućih alata i resursa. Plan također uključuje informacije o tome kako izmjeriti i evaluirati učinak ovih aktivnosti, kao i najbolje prakse za promicanje i održavanje angažmana među sudionicima. Zanimljiva je i nezavisnim inicijativama koje organiziraju aktivnosti OS/CS.

---

[62] Translated by the NSK Project Team

Identifikacija bitnih vještina za knjižničare uključene u inicijative građanske znanosti uključuje komunikacijske vještine, analitičke vještine, obrazovne vještine i vještine društvenih medija. Gledajući unaprijed, strateška razmišljanja za znanstvene knjižnice obuhvaćaju partnerstva, institucionalizaciju, određivanje prioriteta, politiku i strategiju. Što se tiče operativnih aktivnosti, znanstvenim se knjižnicama savjetuje da provedu mapiranje istraživača i projekata, iskoriste postojeće kompetencije, prošire infrastrukturu i usluge te uključe građansku znanost u nastavu.

Slijedeći smjernice navedene u planu, neovisne inicijative mogu povećati učinak svojih aktivnosti i promicati veći angažman među sudionicima. Općenito, plan pruža vrijedan resurs za svaku organizaciju ili pojedinca koji želi promovirati i uključiti se u OS i CS aktivnosti.

8.4. Resumé: Køreplan for CeOS på Balkan[63]

Open Science (OS) og Citizen Science (CS) er to forskellige, men beslægtede begreber, der kan forbedre kvaliteten af videnskabelige og banebrydende resultater betydeligt og samtidig fremme offentlighedens engagement i videnskab og teknologi, åbenhed og aktivt medborgerskab.

Ved at fremme gennemsigtighed og samarbejde kan OS bidrage til at reducere partiskhed og forbedre kvaliteten af videnskabelige forskningsresultater. OS kan også føre til en bedre og mere effektiv anvendelse af forskningsressourcer og øge den videnskabelige forsknings relevans og gennemslagskraft for samfundet.

Citizen Science involverer derimod offentlighedens aktive deltagelse i videnskabelige forskningsprojekter. CS kan antage mange former, herunder indsamling af data, udførelse af eksperimenter eller analyse af data. Det giver enkeltpersoner og samfund mulighed for at deltage i videnskabelig forskning, bidrage til videnskabelige opdagelser og opnå en bedre forståelse af videnskabelige spørgsmål. CS kan også bidrage til at demokratisere videnskabelig forskning ved at inddrage personer, der måske hverken har en formel eller uformel videnskabelig uddannelse eller adgang til forskningsressourcer. Ved at inddrage en bredere vifte af deltagere i videnskabelig forskning kan der opstå nye idéer og perspektiver, hvilket fremmer innovation.

Sammen kan OS og CS supplere hinanden og føre til et mere inkluderende, gennemsigtigt og samarbejdende videnskabeligt forskningsøkosystem. De kan også fremme offentlighedens

---

engagement i videnskab og teknologi, som er afgørende for opbygningen af et mere bæredygtigt og retfærdigt samfund.

Denne køreplan er udformet med henblik på at hjælpe videregående uddannelsesinstitutioner og forskningsbiblioteker med at forbedre de uddannelsesmæssige, videnskabelige, innovative og sociale virkninger af deres OS-/CS-aktiviteter. Den giver vejledning i, hvordan disse aktiviteter effektivt kan organiseres og gøres lettere, herunder at identificere de rette deltagere, fastsætte klare mål og udvælge passende værktøjer og ressourcer. Køreplanen indeholder også oplysninger om, hvordan man måler og evaluerer virkningen af disse aktiviteter, samt hvordan man bedst kan fremme og opretholde deltagernes engagement. Køreplanen er også af interesse for uafhængige initiativer, der organiserer OS/CS-aktiviteter.

Derudover identificeres væsentlige færdigheder for bibliotekarer, der er involveret i Citizen Science-initiativer, såsom kommunikations-, analytiske, uddannelsesmæssige og sociale mediefærdigheder. Fremadrettet omfatter strategiske overvejelser for forskningsbibliotekerne partnerskaber, institutionalisering, prioritering, politik og strategi. Med hensyn til operationelle handlinger rådes forskningsbiblioteker til at foretage kortlægninger af forskere og projekter, identificere og udnytte eksisterende kompetencer, udvide infrastruktur og tjenester og indarbejde Citizen Science i uddannelsesprocessen.

Samlet set udgør køreplanen en værdifuld ressource for enhver organisation eller person, der ønsker at fremme og engagere sig i OS- og CS-aktiviteter. Ved at følge vejledningen i køreplanen kan uafhængige initiativer også øge aktivitetens gennemslagskraft og deltagernes engagement.

8.5. Samenvatting: Routekaart voor het versterken van CeOS in de Balkan[64]

Open Science (OS) en Citizen Science (CS) zijn twee verschillende maar gerelateerde concepten die aanzienlijk kunnen bijdragen aan verbetering van de kwaliteit van wetenschappelijke en innovatie-resultaten. Ze bevorderen ook de betrokkenheid van het publiek bij wetenschap en technologie, openheid en actief burgerschap.

Door transparantie en samenwerking te bevorderen, kan Open Science helpen om vooringenomenheid (bias) in onderzoek te verminderen en de kwaliteit van wetenschappelijke

---

[64]   Translated by the LIBER Project Team

onderzoeksresultaten te verbeteren. Het kan ook leiden tot een efficiënter en effectiever gebruik van onderzoeksmiddelen en het kan de relevantie en impact van wetenschappelijk onderzoek voor de samenleving vergroten.

Aan de andere kant omvat Citizen Science de actieve deelname van het publiek aan wetenschappelijke onderzoeksprojecten. CS kan vele vormen aannemen, zoals het verzamelen van gegevens, het uitvoeren van experimenten of het analyseren van gegevens. Het biedt individuen en gemeenschappen de kans om deel te nemen aan wetenschappelijk onderzoek, bij te dragen aan wetenschappelijke ontdekkingen en een beter begrip te ontwikkelen van wetenschappelijke vraagstukken. CS kan ook bijdragen aan de democratisering van wetenschappelijk onderzoek door mensen te betrekken die geen formele of informele wetenschappelijke opleiding hebben genoten of geen toegang hebben tot onderzoeksmiddelen. Door een breder scala aan deelnemers te betrekken, kunnen nieuwe ideeën en perspectieven ontstaan, wat innovatie bevordert.

Samen kunnen OS en CS elkaar aanvullen en leiden tot een meer inclusief, transparant en samenwerkingsgericht ecosysteem voor wetenschappelijk onderzoek. Ze kunnen ook de betrokkenheid van het publiek bij wetenschap en technologie bevorderen, wat essentieel is voor het opbouwen van een duurzamere en rechtvaardigere samenleving.

Deze routekaart is bedoeld om instellingen voor hoger onderwijs (HEI's) en onderzoeksbibliotheken te helpen de educatieve, wetenschappelijke, innovatieve en sociale impact van hun OS/CS-activiteiten te vergroten. Het biedt richtlijnen voor het effectief organiseren en faciliteren van deze activiteiten, inclusief het identificeren van de juiste deelnemers, het stellen van duidelijke doelen en het selecteren van geschikte instrumenten en middelen. De routekaart bevat ook informatie over het meten en evalueren van de impact van deze activiteiten, evenals best practices voor het bevorderen en behouden van de betrokkenheid van deelnemers. Het is ook relevant voor onafhankelijke initiatieven die OS/CS-activiteiten organiseren.

Daarnaast omvat de identificatie van essentiële vaardigheden voor bibliothecarissen die zich bezighouden met Citizen Science-initiatieven, vaardigheden op het gebied van communicatie, analyse, educatie en sociale media. Vooruitkijkend omvatten de strategische overwegingen voor onderzoeksbibliotheken partnerschappen, institutionalisering, prioritering, beleid en strategie. In termen van operationele acties

wordt onderzoeksbibliotheken geadviseerd om onderzoekers en projecten in kaart te brengen, bestaande competenties te identificeren en te benutten, infrastructuur en diensten uit te breiden en Citizen Science in het onderwijsproces te integreren.

In het algemeen biedt de routekaart een waardevol hulpmiddel voor elke organisatie of persoon die OS- en CS-activiteiten wil bevorderen en zich ermee wil bezighouden. Door de richtlijnen in de routekaart te volgen, kunnen onafhankelijke initiatieven de impact van activiteiten en de betrokkenheid van deelnemers vergroten.

Kortom biedt de routekaart een waardevol hulpmiddel voor elke organisatie of persoon die OS- en CS-activiteiten wil bevorderen en erbij betrokken wil zijn. Door de richtlijnen in de routekaart te volgen, kunnen onafhankelijke initiatieven de impact van hun activiteiten vergroten en de betrokkenheid van deelnemers bevorderen.

8.6. Περίληψη: Οδικός χάρτης του CeOS στα Βαλκάνια[65]

Η Ανοικτή Επιστήμη (ΑΕ) και η Επιστήμη των Πολιτών (ΕτΠ) είναι δύο διακριτές αλλά συναφείς έννοιες που μπορούν να βελτιώσουν σημαντικά την ποιότητα των αποτελεσμάτων της επιστήμης και της καινοτομίας, ενώ προάγουν επίσης τη συμμετοχή και ενεργή εμπλοκή πολιτών στην επιστήμη, την τεχνολογία και την ανοικτότητα.

Με την προώθηση της διαφάνειας και της συνεργασίας, η ΑΕ μπορεί να συμβάλει στη μείωση της μεροληψίας και στη βελτίωση της ποιότητας των αποτελεσμάτων της επιστημονικής έρευνας. Μπορεί επίσης να οδηγήσει σε πιο αποδοτική και αποτελεσματική χρήση των ερευνητικών πόρων και να αυξήσει τον αντίκτυπο και τη συνάφεια της επιστημονικής έρευνας στην κοινωνία.

Η Επιστήμη των Πολιτών, από την άλλη, περιλαμβάνει την ενεργό συμμετοχή των μελών του κοινού σε επιστημονικά ερευνητικά έργα. Η ΕτΠ μπορεί να πάρει πολλές μορφές, συμπεριλαμβανομένης της συλλογής δεδομένων, της διεξαγωγής πειραμάτων ή της ανάλυσης δεδομένων, μεταξύ άλλων. Παρέχει την ευκαιρία σε άτομα και κοινότητες να ασχοληθούν με την επιστημονική έρευνα, να συμβάλουν στην επιστημονική ανακάλυψη και να κατανοήσουν καλύτερα τα επιστημονικά ζητήματα. Η ΕτΠ μπορεί επίσης να βοηθήσει στον εκδημοκρατισμό της επιστημονικής έρευνας με τη συμμετοχή ατόμων που ενδέχεται να μην έχουν επίσημη ή ανεπίσημη επιστημονική κατάρτιση ή πρόσβαση σε οποιουσδήποτε ερευνητικούς πόρους. Με τη συμμετοχή ενός ευρύτερου φάσματος συμμετεχόντων στην

---

[65]   Translated by the UC Project Team

επιστημονική έρευνα, μπορούν να δημιουργηθούν νέες ιδέες και προοπτικές και να προωθηθεί η καινοτομία.

Μαζί, η ΑΕ και η ΕτΠ μπορούν να αλληλοσυμπληρώνονται και να οδηγήσουν σε ένα πιο περιεκτικό, διαφανές και συνεργατικό οικοσύστημα επιστημονικής έρευνας. Μπορούν επίσης να προωθήσουν τη δημόσια δέσμευση με την επιστήμη και την τεχνολογία, οι οποίες είναι απαραίτητες για την οικοδόμηση μιας πιο βιώσιμης και δίκαιης κοινωνίας.

Αυτός ο οδικός χάρτης έχει σχεδιαστεί για να βοηθήσει τα Ιδρύματα Ανώτατης Εκπαίδευσης (ΑΕΙ) και τις ερευνητικές βιβλιοθήκες να ενισχύσουν τον εκπαιδευτικό, επιστημονικό, καινοτόμο και κοινωνικό αντίκτυπο των δραστηριοτήτων τους σε σχέση με την ΑΕ/ΕτΠ. Παρέχει καθοδήγηση σχετικά με τον αποτελεσματικό τρόπο οργάνωσης και διευκόλυνσης αυτών των δραστηριοτήτων, συμπεριλαμβανομένου του εντοπισμού των κατάλληλων συμμετεχόντων, του καθορισμού σαφών στόχων και της επιλογής των κατάλληλων εργαλείων και πόρων. Ο οδικός χάρτης περιλαμβάνει επίσης πληροφορίες σχετικά με τον τρόπο μέτρησης και αξιολόγησης του αντίκτυπου αυτών των δραστηριοτήτων, καθώς και βέλτιστες πρακτικές για την προώθηση τους αλλά και τη διατήρηση της δέσμευσης μεταξύ των συμμετεχόντων σε αυτές. Είναι επίσης ενδιαφέρον για ανεξάρτητες πρωτοβουλίες που οργανώνουν δραστηριότητες ΑΕ/ΕτΠ.

Επιπλέον, ο προσδιορισμός βασικών δεξιοτήτων για τους βιβλιοθηκονόμους που ασχολούνται με πρωτοβουλίες επιστήμης των πολιτών περιλαμβάνει δεξιότητες επικοινωνίας, ανάλυσης, εκπαίδευσης και μέσων κοινωνικής δικτύωσης. Κοιτάζοντας το μέλλον, οι στρατηγικοί προβληματισμοί για τις ερευνητικές βιβλιοθήκες περιλαμβάνουν συνεργασίες, θεσμοθέτηση, ιεράρχηση προτεραιοτήτων, πολιτική και στρατηγική. Όσον αφορά τις λειτουργικές δράσεις, συνιστάται στις ερευνητικές βιβλιοθήκες να πραγματοποιούν χαρτογραφήσεις ερευνητών και έργων, να εντοπίζουν και να χρησιμοποιούν υπάρχουσες δεξιότητες, να επεκτείνουν τις υποδομές και τις υπηρεσίες τους και να ενσωματώνουν την επιστήμη των πολιτών στην εκπαιδευτική τους διαδικασία.

Συνολικά, ο οδικός χάρτης αποτελεί μια πολύτιμη πηγή για κάθε οργανισμό ή άτομο που θέλει να προωθήσει και να συμμετάσχει σε δραστηριότητες ΑΕ και ΕτΠ. Παράλληλα, ακολουθώντας τις οδηγίες που παρέχονται στον οδικό χάρτη, οι ανεξάρτητες πρωτοβουλίες μπορούν να ενισχύσουν τον αντίκτυπο των δραστηριοτήτων τους και να προωθήσουν μεγαλύτερη δέσμευση μεταξύ των συμμετεχόντων.

8.7. Riassunto: CeOS Roadmap nei Balcani [66]

L'Open Science (OS) e la Citizen Science (CS) sono due concetti distinti ma correlati che possono migliorare significativamente la qualità dei risultati scientifici e dell'innovazione, promuovendo al contempo il coinvolgimento del pubblico nella ricerca scientifica, favorendo l'apertura e la cittadinanza attiva.

Promuovendo la trasparenza e la collaborazione, la OS può contribuire a ridurre i pregiudizi e a migliorare la qualità dei risultati della ricerca scientifica. Può anche portare a un uso più efficiente ed efficace delle risorse impiegate nella ricerca. Aumenta così la rilevanza e l'impatto della ricerca scientifica sulla società.

La Citizen Science, invece, prevede la partecipazione attiva del pubblico a progetti di ricerca scientifica. La CS può assumere diverse forme, tra cui la raccolta di dati, la conduzione di esperimenti o l'analisi di dati. Offre ai singoli e alle comunità l'opportunità di impegnarsi nella ricerca scientifica, di contribuire alla scoperta scientifica e di sviluppare una migliore comprensione delle questioni attinenti alla scienza. La CS può anche contribuire a democratizzare la ricerca scientifica, coinvolgendo persone che potrebbero non avere una formazione scientifica formale o informale o l'accesso a risorse di ricerca. Coinvolgendo una gamma più ampia di partecipanti alla ricerca scientifica, la CS può generare nuove idee e prospettive, promuovendo così l'innovazione.

Insieme, OS e CS possono completarsi a vicenda e portare a un ecosistema di ricerca scientifica più inclusivo, trasparente e collaborativo. Possono anche promuovere l'impegno del pubblico nei confronti della scienza e della tecnologia, che sono essenziali per costruire una società più sostenibile ed equa.

Questa roadmap è stata concepita per aiutare gli istituti di istruzione superiore (IIS) e le biblioteche di ricerca a migliorare l'impatto educativo, scientifico, innovativo e sociale delle loro attività di OS/CS. Fornisce indicazioni su come organizzare e facilitare queste attività in modo efficace, tra cui l'identificazione dei partecipanti, la definizione di obiettivi chiari e la selezione di strumenti e risorse adeguati. La roadmap include anche informazioni su come misurare e valutare l'impatto di queste attività, nonché le migliori pratiche per promuovere e sostenere l'impegno dei partecipanti. È uno strumento utile anche per le iniziative indipendenti che organizzano attività di OS/CS.

---

[66]   Translated by the UNITO Project Team

La roadmap identifica anche le competenze essenziali per i bibliotecari impegnati in iniziative di Citizen Science includendo capacità di comunicazione, di analisi, formazione e utilizzo dei social media. In prospettiva, le riflessioni strategiche per le biblioteche di ricerca che si vogliano impegnare nel sostegno alla CS riguardano le partnerships, l'istituzionalizzazione delle attività di public engagement, la definizione delle priorità, le politiche e le strategie. In termini di azioni operative, si consiglia alle biblioteche di ricerca di condurre una mappatura dei ricercatori e dei progetti, di identificare e utilizzare le competenze esistenti, di espandere le infrastrutture e i servizi e di incorporare la Citizen Science nel processo educativo.

Nel complesso, la roadmap rappresenta una risorsa preziosa per qualsiasi organizzazione o individuo che voglia promuovere e impegnarsi in attività di OS e CS. Inoltre, seguendo le indicazioni fornite nella roadmap, le organizzazioni (o gli individui) possono migliorare l'impatto delle attività svolte e favorire il coinvolgimento dei partecipanti.

8.8. Сажетак: Смернице за примену CeOS принципа у земљама Западног Балкана[67]

Отворена наука (Open Science - OS) и грађанска наука (Citizen Science - CS) су два различита, али повезана концепта која могу значајно унапредити квалитет научних и иновативних резултата, истовремено промовишући ангажовање јавности у научним и технолошким истраживањима, отвореност у датим процесима, као и активно учешће грађана.

Промовисањем транспарентности и сарадње, OS може помоћи у смањењу пристрасности и унапређењу квалитета научностраживачких резултата. Такође, може довести до ефикаснијег и делотворнијег коришћења истраживачких ресурса и повећати утицај и релевантност научних истраживања у друштву.

Са друге стране, грађанска наука подразумева активно учешће јавности у научноистраживачким пројектима. Она може имати много облика, укључујући прикупљање података, спровођење експеримената или анализу података. Омогућава појединцима и заједницама да учествују у научним истраживањима, допринесу научним открићима и боље разумеју научне проблеме. CS такође

---

[67] Translated by the UNILIB Project Team

може помоћи у демократизацији научних истраживања укључујући грађане који немају ни формалну ни неформалну обуку за спровођење научних истраживања или приступ истраживачким ресурсима. Укључивањем ширег круга учесника у научна истраживања, могу се генерисати нове идеје и перспективе, те промовисати иновативни приступи.

Заједно, OS и CS могу се међусобно допуњавати и довести до инклузивног, транспарентног и колаборативног научноистраживачког екосистема. Такође могу промовисати ангажовање јавности у научним и технолошким истраживањима, што је од суштинског значаја за изградњу одрживијег и праведнијег друштва.

Ове смернице су осмишљене како би помогле високошколским установама и истраживачким библиотекама у унапређивању образовног, научног, иновативног и друштвеног утицаја њихових активности у области OS и CS. Садржи препоруке о томе како организовати и спровести ове активности на ефикасан начин, укључујући идентификацију одговарајућих учесника, постављање јасних циљева и одабир сврсисходних алата и ресурса. Смернице садрже и информације о томе како мерити и процењивати утицај ових активности. Додатно, дати су и примери добре праксе у региону у циљу промовисања активности и одржавања интересовања међу учесницима, а корисне су и за независне иницијативе које се односе на активности у области OS и CS.

Кључне вештине за библиотекаре који се баве грађанском науком обухватају комуникацијске, аналитичке, образовне и вештине управљања друштвеним медијима. Када је реч о стратешким разматрањима за истраживачке библиотеке, она обухватају партнерства, институционализацију, као и одређивање приоритета, политике и стратегије. У погледу оперативних активности, истраживачким библиотекама се саветује да спроведу мапирање истраживача и пројеката, идентификују и користе постојеће компетенције, прошире инфраструктуру и услуге и интегришу грађанску науку у образовни процес.

Уопштено, Смернице представљају вредан ресурс за сваку организацију или појединца који жели да промовише и се укључи у активности у области OS и CS. А следећи пружене Смернице, независне иницијативе могу унапредити утицај својих активности и подстаћи веће ангажовање међу својим учесницима.

9. Bibliography

Athanasiou, Spiros et al. *National Plan for Open Science*. 2020, Retrieved 10.04.2023, https://zenodo.org/record/4656150#. YoIpCqhBw2x

Berlin declaration (on Serbian). *Berlinska deklaracija o slobodnom pristupu naučnom znanju*. Retrieved 10.04.2023, http://www.bg.ac.rs/ files/sr/nauka/Berlinska_deklaracija.pdf

Blagaić Kišiček, Mihaela. "Research libraries, researchers & the EOSC: how do they interact? Southern European Landscape". Zenodo, March 31, 2021. Retrieved 14.05.2023, https://doi.org/10.5281/ zenodo.4744819

B'lgarsko druzhestvo za zashchita na pticite. "*Vrabcheta*." Kak da broim. Retrieved 05.06.2023, https://www.vrabcheta.bg/bg/za-kampaniyata/za-broeneto.html

Cassella, Maria, and Elena Giglia."Assessment Report on CeOS_SE Activities at Partner Institutions". Retrieved 07.06.2023, https:// ceosse-project.eu/wp-content/uploads/2023/05/CeOS-Document-Report-PR3A2.pdf

Cavalier, D., C. Nickerson, D. Stanton. eds. *The Library and Community Guide to Citizen Science: Understanding, Planning, and Sustaining Ongoing Engagement in Citizen Science at Your Library*. Scistarter; Arizona State University. 2019. Retrieved 14.05.2023, https://orrery-media.s3-us-west-2.amazonaws.com/curated/LibraryGuideFebruary.pdf

Centar za stalno stručno usavršavanje knjižničara u RH. "II.15. Građanska Znanost u Knjižnicama" Retrieved 11.05.2023, http://cssu. nsk.hr/tecajevi/gradanska-znanost-u-knjiznicama/

COMPAIR project. "*COMPAIR: Join a Citizen Science Experiment in: Athens, Berlin, Flanders, Plovdiv, Sofia.*" Retrieved 05.06.2023, https:// www.wecompair.eu/athens

CoNOSC (The Council for National Open Science Coordination). Retrieved 10.04.2023, https://conosc.org/#page-content

Code of Ethics for Scientific Research in Belgium. Belgian Federal Science Policy Office, 2019, Retrieved 16.05.2023, https://www.kuleuven.be/english/research/integrity/practices/belspo-code

Česká republika, Úřad vlády. *Národní strategie otevřeného přístupu čr k vědeckým informacím na léta 2017 2020,* (2017). Retrieved 16.05.2023, https://www.vyzkum.cz/FrontClanek.aspx?idsekce=876326&ad=1&attid=876341

Dinić, Bojana, Selka Sadiković, Milan Oljača, Ilija Milovanović i Snežana Smederevac. *Vodič za građansku nauku.* Novi Sad; Univerzitet u Novom Sadu, Filozofski fakultet, 2022. Retrieved 07.06.2023, http://star.ff.uns.ac.rs/genius/vodic_za_gradjansku_nauku.pdf

ECSA (European Citizen Science Association). *Ten Principles of Citizen Science.* Berlin: ECSA, 2015, Retrieved 12.04.2023, https://doi.org/10.17605/OSF.IO/XPR2N

European Commission. *General Model Grant Agreement, Horizon Europe (HORIZON): Euratom Research and Training Programme (EURATOM),* April 2022. Retrieved 16.05.2023, https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/common/agr-contr/general-mga_horizoneuratom_en.pdf

European Commission. *Horizon Europe.* Retrieved 10.04.2023, https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe_en

European Commission. *Horizon Europe - Investing to shape our future,* March 19, 2021, Retrieved 10.04.2023, https://research-and-innovation.ec.europa.eu/system/files/2022-06/ec_rtd_he-investing-to-shape-our-future_0.pdf

European Commission. *Horizon Europe: the next research and innovation framework programme.* Retrieved 18.04.2023, https://ec.europa.eu/info/horizon-europe-next-research-and-innovation-framework-programme_en

European Commission. *Open Research Europe.* Retrieved 18.04.2023, https://open-research-europe.ec.europa.eu/

European Union, EUR Lex. *EU Directive on Open Data and the Re-use of Public Sector Information (PSI Directive,* Retrieved 10.04.2023, https://eurlex.europa.eu/legal-content/EN/TXT/?qid=1561563110433&uri=CELEX:32019L1024

Gobierno de Espana. *Plan estatal de investigación científica y técnica y de innovación,* 2018. Retrieved 16.05.2023, http://www.ciencia.gob.es/stfls/MICINN/Prensa/FICHEROS/2018/PlanEstatalIDI.pdf

Government of Ireland. *National Framework on the Transition to an Open Research Environment.* Ireland's Strategy for Research and Development, Science and Technology, 2019. Retrieved 16.05.2023, http://norf-ireland.net/wp-content/uploads/2019/07/NORF_Framework_10_July_2019-2.pdf

Hameau, Thérèse. "National Plan for Open Science, 4th July 2018." *Ouvrir La Science* (blog). (November 17, 2018). Retrieved 16.05.2023, https://www.ouvrirlascience.fr/national-plan-for-open-science-4th-july-2018

Hampson, Glenn, Mel DeSart, Jason Steinhauer, Elizabeth Gadd, Lisa Janicke Hinchliffe, Michael Vandegrift, Chris Erdmann, and Rob Johnson. "Open Science Roadmap." *Open Scholarship Initiative Proceedings*, December 18, (2020). Retrieved 16.05.2023, https://doi.org/10.13021/OSI2020.2735

Hand, Eric. "Citizen science: People power". *Nature* 466 (2010): 685–687, Retrieved 12.04.2023, https://doi.org/10.1038/466685a

IBISS (Institute for Biological Research "Siniša Stanković", Belgrade). *Project Obtectus Finders*. Opasulji se. Retrieved 05.06.2023, 2023. URL: https://www.opasuljise.rs/en/

Ignat, Tiberius, and Paul Ayris. "Built to Last! Embedding Open Science Principles and Practice into European Universities". *Insights: The UKSG Journal* 33, 1 (2020): 9. Retrieved 07.06.2023, https://doi.org/10.1629/uksg.501

IRIM (Institute for Youth Development and Innovativity, Zagreb). *Croatian Makers*. Retrieved 05.06.2023, https://croatianmakers.hr/en/home/

Kaarsted, Thomas, Blake, Oliver, Nielsen, Kristian Hvidtfelt, Alving, Berit, Rasmussen, Lotte Thing, Overgaard, Anne Kathrine and Hansen, Sebrina Maj-Britt. "How European Research Libraries Can Support Citizen-Enhanced Open Science" *Open Information Science* 7, no. 1 (2023): 20220146, Retrieved 15.06.2023, https://doi.org/10.1515/opis-2022-0146

Kaarsted, Thomas, Oliver Blake and Kristian Hvidtfelt Nielsen. "*Recommendations for academic and research libraries within Citizen-enhanced Open Science." LIBER. CeOS project*. Retrieved 07.06.2023, https://ceosse-project.eu/wp-content/uploads/2022/04/CeOS_SE_PR1A3-Recommendations-Report.pdf

Kingdom of Norway, Ministry of Education and Research. *National strategy on access to and sharing of research data*, Retrieved 09.04.2023, https://www.regjeringen.no/contentassets/3a0ceeaa1c9b4611a1b86fc5616abde7/en-gb/pdfs/national-strategy-on-access_summary.pdf

Knoth, P, and N Pontika. *Open Science Taxonomy*, (2015). Retrieved 16.05.2023, doi: 10.6084/m9.figshare.1508606.v3

Kullenberg, Christopher and Dick Kasperowski. "What Is Citizen Science? – A Scientometric Meta-Analysis." *PLoS ONE* 11, no. 1 (2016), Retrieved 07.06.2023, https://doi.org/10.1371/journal.pone.0147152

LIBER. Citizen Science Working Group. "Citizen Science Skilling for Library Staff, Researchers, and the Public." In *Citizen Science for Research Libraries — A Guide, Series 1.* Retrieved 15.06.2023, https://libereurope.eu/wp-content/uploads/2021/11/guide.pdf

LIBER (Europe's Research Library Network). "LIBER Open Science Roadmap". LIBER, 2018. Retrieved 07.06.2023, https://doi.org/10.5281/zenodo.1303002

Ministero dell'Università e della Ricerca. *LOI n° 2016-1321 du 7 octobre 2016 pour une République numérique , 2016-1321*. Pubblicato il Piano nazionale della scienza aperta, 2016. Retrieved 16.05.2023, https://www.mur.gov.it/it/news/lunedi-20062022/pubblicato-il-piano-nazionale-della-scienza-aperta

Mithans, Gašper. "Youth Labour Brigades in Yugoslavia and Representations of Volunteerism: A Study of Participation in Restored Federal Labour Actions by the People's Youth in the District of Koper." *Annals for Istrian & Mediterranean Studies / Annales: Series Historia et Sociologia* 32, 4(2022): 603–618, Retrieved 10.06.2023, doi:10.19233/ ASHS.2022.38

Mumelaš, Dolores, Alisa Martek, and Dorja Mučnjak. "*Upscaling collaboration between academic and public libraries for CeOS in SE Europe: Study.*" *LIBER. CeOS project.* Retrieved 07.06.2023, https://ceosse-project.eu/wp-content/uploads/2022/04/CeOS_SE_PR2A3_Study_ FINAL_version-1.pdf

Nacionalna i sveučilišna knjižnica, Zagreb. *Dendroteka: stabla u Zagrebu nekad i sad.* Retrieved 05.06.2023, http://virtualna.nsk.hr/ dendroteka/.

NPOS. *Open Science 2030 in the Netherlands: NPOS2030 Ambition Document and Rolling Agenda.* 2022. Retrieved 23.05.2023, https://doi. org/10.5281/ZENODO.7433767.

Open Science and data : Action Programme for the Finnish Scholarly Community. Universities Finland UNIFI, 2018. Retrieved 16.05.2023, http://www.doria.fi/bitstream/handle/10024/164174/UNIFI_Open_ Science_and_Data_Action_Programme.pdf?sequence=1&isAllowed=y

"Open Science Definition". FOSTER. Retrieved 16.05.2023, https:// www.fosteropenscience.eu/taxonomy/term/100

Oxford English Dictionary. *New words list June 2014.* Oxford: Oxford University Press, 2014. Retrieved 11.05.2023, https://www.oed.com/

Programma nazionale per la ricerca 2021-2027. Roma: Ministero dell'Università e della Ricerca, 2020. Retrieved 16.05.2023, https:// www.mur.gov.it/it/news/lunedi-20062022/pubblicato-il-piano-nazionale-della-scienza-aperta

Republic of Cyprus. *National Policy of the Republic of Cyprus for Open Science Practices.* 2016, Retrieved 16.05.2023, http://opensciencecy. ucy.ac.cy/wp-content/uploads/2019/09/FINAL-EN-National-Policy-for-Open-Access-to-Scientific-Information.pdf

Republic of Lithuania. *Law on Higher Education and Research, No XI-242*. Vilnius, 2009. Retrieved 16.05.2023, https://e-seimas.lrs.lt/portal/legalAct/lt/TAD/548a2a30ead611e59b76f36d7fa634f8?jfwid=rp9xf47k7

Republic of Slovenia. Government of the Republic of Slovenia. *National Strategy of Open Access to Scientific Publications and Research Data in Slovenia 2015-2020*, Retrieved 09.04.2023, https://www.gov.si/assets/ministrstva/MIZS/Dokumenti/ZNANOST/Strategije/National-strategy-of-open-access-to-scientific-publications-and-research-data-in-Slovenia-2015-2020.pdf

Republika Crna Gora. Program ostvarivanja principa „Otvorena nauka" u Crnoj Gori s Akcionim planom (2020-2022). Retrieved 15.6.2023, https://wapi.gov.me/download-preview/4314c441-9ba1-48a4-a398-d49b50ad2cd0?version=1.0

Republika Hrvatska, Ministarstvo znanosti i obrazovanja. *Plan za europski istraživački prostor: plan implementacije Republike Hrvatske za razdoblje 2016. - 2020.* Retrieved 10-04-2023, https://mzo.gov.hr/UserDocsImages/dokumenti/Znanost/EIstrazivackiProstor/Plan%20implementacije%20Republike%20Hrvatske%20za%20razdoblje%202016.%20-%202020..pdf#page=16&zoom=100,90,114

Republika Srbija, Ministarstvo prosvete, nauke i tehnološkog razvoja. *Platforma za otvorenu nauku*, Retrieved 10.04.2023, https://prosveta.gov.rs/wp-content/uploads/2018/07/Platforma-za-otvorenu-nauku.pdf

Republika Srbija, Ministarstvo prosvete, nauke i tehnološkog razvoja. *Zakon o nauci i istraživanjima*, Retrieved 10.04.2023, https://prosveta.gov.rs/wp-content/uploads/2019/07/Zakon-o-nauci.pdf

Republika Srbija, Vlada RS. *Strategija naučnog i tehnološkog razvoja Republike Srbije za period od 2021. do 2025. godine "Moć znanja"*. Retrieved 15.06.2023, https://prosveta.gov.rs/wp-content/uploads/2021/12/Strategija-nauc-tehnol-razvoj-RS-Moc-znanja.pdf

Slovak Republic, Office of the Plenipotentiary of the Government for the Development of Civil Society . *Open Government Partnership National Action Plan of the Slovak Republic 2020 – 2021.* Bratislava, 2019. Retrieved 23.05.2023, https://www.opengovpartnership.org/wp-content/uploads/2019/12/Slovakia_Action-Plan_2019-2021_EN.pdf

Sveinsdottir, Thordis, Davidson, Joy, and Proudman, Vanessa. "An Analysis of Open Science Policies in Europe, V7". Zenodo, April 28, 2021. Retrieved 14.05.2023, https://doi.org/10.5281/zenodo.4725817

Swiss Confederation, Rector's conference of the Swiss universities. *White Paper for a Swiss Information Provisioning and Processing Infrastructure 2020,* Retrieved 09.04.2023, https://www.swissuniversities.ch/fileadmin/swissuniversities/Dokumente/Organisation/SUK-P/SUK_P-2/WhitePaper_V1.1-EN.pdf

 "[Theme in Focus] Promoting Open Science and Collaborative Research within the Western Balkans" (September 2018). Retrieved 14.05.2023, https://wbc-rti.info/object/document/19625

Trtovac, Aleksandra and Nataša Dakić. "First CeOS Multiplier Event in Belgrade – CeOS_SE." Retrieved 02.08.2023, https://ceosse-project.eu/first-ceos-multiplier-event-in-belgrade/

UCL (University College London). *8 Pillars of Open Science.* Retrieved 12.04.2023, https://www.ucl.ac.uk/library/open-science-research-support/open-science/8-pillars-open-science

United Kingdom. *Concordat on Open Research Data (Policy of a UK multi-stakeholder group, including research funders and higher education associations).* Retrieved 09.04.2023, https://www.ukri.org/wp-content/uploads/2020/10/UKRI-020920-ConcordatonOpenResearchData.pdf

University of Belgrade, Faculty of Biology, Centre for Bee Research. *Project: Monitoring the spread of sculptured resin bee (Megachile sculpturalis) in Southeast Europe.* Retrieved 05.06.2023, https://srbee.bio.bg.ac.rs/english

University of Cyprus. *"*CovTracer-EN: The official contact tracing mobile app of the Republic of Cyprus." *KIOS 15*. Retrieved 05.06.2023, https://www.kios.ucy.ac.cy/projects_kios/covtracer-en-the-official-contact-tracing-mobile-app-of-the-republic-of-cyprus/

University of Cyprus. "FixCyprus: A platform and mobile app to improve the Cyprus road network infrastructure and road safety." *KIOS 15*. Retrieved 05.06.2023, http://zmup.upatras.gr/en/content/what-ornithopolis

University of Library Studies and Information Technologies, Sofia. *Project 'Application of the mixed reality in the training and promotion of the cultural heritage for the purposes of the in the university information environment'*. Retrieved 05.06.2023, https://mixedreality.unibit.bg/en/proekt/

University of Patras, Zoological Museum. *Project 'Ornithopolis: studying urban biodiversity together with citizens*. Ornithopolis. Retrieved 05.06.2023, http://zmup.upatras.gr/en/content/what-ornithopolis

University of Zagreb, University Computing Service - SRCE. *Inicijativa za Hrvatski oblak za otvorenu znanost (HR-OOZ)*. Retrieved 10.04.2023, https://www.srce.unizg.hr/en/node/470

Zourou, Katerina, and Ziku, Mariana. "Citizen Enhanced Open Science in Cultural Heritage - Review and Analysis of Practices in Higher Education". Zenodo, July 21, 2022. Retrieved 14.05.2023, https://doi.org/10.5281/zenodo.6875126

10. Plates Infographics[68] ▶
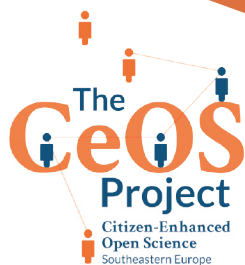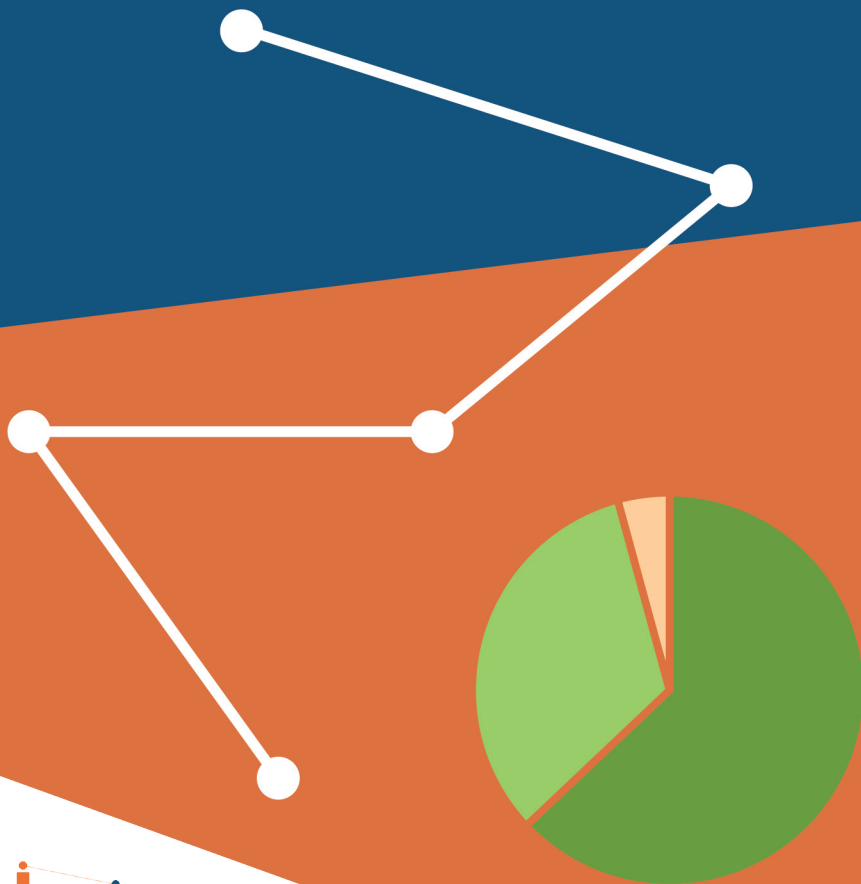
Roadmap on Citizen enhanced Open Science in the Balkans

Why

Open Science and Citizen Science are both characterized by cross-border interactions that are transparent, accessible, shareable, and open to participation. This roadmap is designed to assist Higher Education Institutes and libraries in enhancing the educational, scientific, innovation, and social impact of their OS/CS activities.

Insights

This Roadmap draws upon the experiences of several countries in the Western Balkans and their application of Open and Citizen Science. It encompasses insights from eight countries: Serbia, Croatia, Greece, Bulgaria, Bosnia and Herzegovina, the Republic of North Macedonia, Montenegro, and Cyprus, which, although not part of the Balkans, is included in the analysis of the 99 responses to our survey questionnaire.

Barriers

Lack of skills
Lack of knowledge
Lack of national policy
Lack of resources (staff, time)
Lack of administrative resources
Lack of CS policy at the university level

- 4% disagree
- 33% agree
- 63% strongly agree

Involving academic libraries in CS projects and activities

Industry	33
Policy makers	35
Civil society	66
Researchers	81
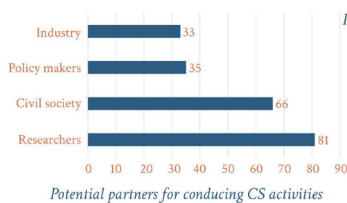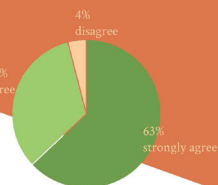
Potential partners for conducing CS activities

Roadmap

Insufficient funding
- Seek grants and funding opportunities
- Crowdfunding and public engagement

Language barriers
- Multilingual platforms and resources
- Language training and exchange programs

Lack of recommendations
- Establish CS networks & communities of practice
- Develop regional guidelines & standards

Lack of professional skills
- Strengthen curriculum
- Capacity-building programs
- Collaboration with industry & experts

Lack of engagement
- Awareness campaigns and success stories
- Stakeholder engagement events

117

Пътна карта на подсилената от граждани отворена наука на Балканите

Защо

Отворената наука и гражданската наука се характеризират с трансгранични взаимодействия, които са прозрачни, достъпни, споделяеми и отворени за участие. Тази пътна карта цели да подпомогне висшите училища (ВУ) и изследователските библиотеки в подобряването на образователното, научното, иновативното и социалното въздействие на техните дейности, свързани с ОН/ГН.

Прозрения

Тази пътна карта се основава на опита на няколко страни от Западните Балкани и тяхното прилагане на отворена и гражданска наука. Той обхваща прозрения от осем държави: Сърбия, Хърватия, Гърция, България, Босна и Херцеговина, Република Северна Македония, Черна гора и Кипър, който, въпреки че не е част от Балканите, е включен в анализа.

Бариери

Липса на умения
Липса на знания
Липса на национална политика
Липса на ресурси (персонал, време)
Липса на административни ресурси
Липса на ГН политика на университетско ниво

4%
Не съм съгласен

33%
Съгласен

63%
Напълно съгласен

Включване на университески библиотеки в ГН проекти и дейности

Индустрия	33
Създатели на политики	35
Гражданско общество	66
Изследователи	81

0 10 20 30 40 50 60 70 80 90

Потенциални партьори за провеждане на ГН дейности

Недостатъчно финансиране

- Търсете безвъзмездни средства и възможности за финансиране
- Групово финансиране и обществена ангажираност

Езикови бариери

- Многоезични платформи и ресурси
- Езиково обучение и програми за обмен

Липса на препоръки

- Създаване на ГН мрежи и общности от практики
- Разработване на регионални насоки и стандарти

Липса на професионални умения

- Усъвършенстване на учебната програма
- Програми за изграждане на капацитет
- Сътрудничество с индустрията и експерти

Липса на ангажираност

- Кампании за повишаване на информираността и добри практики
- Събития за ангажиране на заинтересованите страни

118

Smjernice za primjenu načela CeOS-a u zemljama Zapadnog Balkana

Zašto

Otvorenu znanost i građansku znanost odlikuju međunarodne aktivnosti koje su transparentne, dostupne, razmjenjive i otvorene za sudjelovanje. Osmišljeni su kako bi poboljšali obrazovni, znanstveni, inovativni i društveni učinak aktivnosti otvorene/građanske znanosti koje provode ustanove visokog obrazovanja i knjižnice.

Zapažanja

Smjernice se temelje na iskustvima zemalja Zapadnog Balkana i njihovom pristupu primjeni otvorene i građanske znanosti. Uključuju iskustva iz osam zemalja: Srbije, Hrvatske, Grčke, Bugarske, Bosne i Hercegovine, Sjeverne Makedonije, Crne Gore i Cipra, koji je uključen u analizu iako nije dio Balkana.

Prepreke

Nedostatak vještina
Nedostatak znanja
Nedostatak nacionalne politike
Nedostatak resursa (osoblja, vremena)
Nedostatak administrativnih resursa
Nedostatak CS politike na razini sveučilišta

4%
Ne slažem se

33%
Slažem se

63%
U potpunosti se slažem

Uključivanje akademskih knjižnica u projekte i aktivnosti građanske znanosti

Industrija	33
Kreatori politike	35
Udruge građana	66
Istraživači	81

0 10 20 30 40 50 60 70 80 90

Potencijalni partneri za provedbu građanskih znanstvenih aktivnosti

Nedostatak odgovarajućeg financiranja
- Traženje bespovratnih sredstava i mogućnosti financiranja
- Zajedničko financiranje i javni angažman

Jezične barijere
- Višejezične platforme i resursi
- Jezična obuka i programi razmjene

Nedostatak preporuka
- Uspostavljanje mreža i zajednice prakse u području građanske znanosti
- Razvoj regionalnih smjernica i standarda

Nedostatak profesionalnih vještina
- Ojačati nastavni plan i program
- Programi izgradnje kapaciteta
- Suradnja s industrijom i stručnjacima

Nedostatak angažmana
- Kampanje za podizanje svijesti i uspješni primjeri
- Događaji za uključivanje dionika

119

Køreplan for borgerforbedret Open Science på Balkan

Derfor

Open Science og Citizen Science er begge kendetegnet ved trans-disciplinære interaktioner, der er transparente, tilgængelige, delbare og åbne for deltagelse. Køreplanen er udarbejdet for at hjælpe højere læreanstalter og biblioteker med at forbedre deres OS/CS-aktiviteters uddannelsesmæssige, videnskabelige, innovationsmæssige og sociale gennemslagskraft.

Indsigt

Køreplanen trækker på erfaringerne fra flere lande på det vestlige Balkan og deres anvendelse af Open Science og Citizen Science. Den omfatter indsigt fra otte lande: Serbien, Kroatien, Grækenland, Bulgarien, Bosnien-Hercegovina, Republikken Nordmakedonien, Montenegro og Cypern, som er inkluderet i analysen, selvom de ikke er en del af Balkan.

Barrierer

Manglende kompetencer
Manglende viden
Manglende national politik
Manglende ressourcer (personale, tid)
Manglende administrative ressourcer
Manglende CS-politik på universitetsniveau

4% Uenig
33% Enig
63% Meget enig
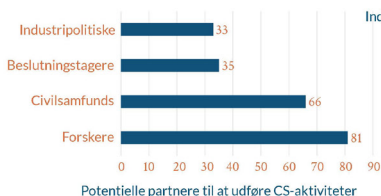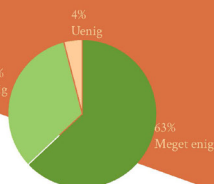
Inddragelse af akademiske biblioteker i CS-projekter og -aktiviteter

Industripolitiske	33
Beslutningstagere	35
Civilsamfunds	66
Forskere	81

Potentielle partnere til at udføre CS-aktiviteter

Utilstrækkelig finansiering
- Søg tilskud og finansieringsmuligheder
- Crowdfunding og offentligt engagement

Sprogbarrierer
- Flersprogede platforme og ressourcer
- Sprogtræning og udvekslingsprogrammer

Mangel på anbefalinger
- Etablere CS-netværk og praksisfællesskaber
- Udvikle regionale retningslinjer og standarder

Mangel på faglige færdigheder
- Styrk læseplanen
- Kapacitetsopbyggende programmer
- Samarbejde med erhvervslivet og eksperter

Manglende engagement
- Oplysningskampagner og succeshistorier
- Begivenheder, der styrker engagementet hos interessenter

120

Routekaart voor het versterken van publieke betrokkenheid bij Open Science in de Balkan

Waarom

Open Science en Citizen Science worden beide gekenmerkt door een wisselwerking die transparant, toegankelijk, te delen en open voor participatie zijn. Deze routekaart is ontworpen om instellingen voor hoger onderwijs (HEI's) en bibliotheken te helpen de educatieve, wetenschappelijke, innovatieve en sociale impact van hun OS/CS-activiteiten te vergroten.

Inzichten

Deze Routekaart is gebaseerd op de ervaringen van verschillende landen in de Westelijke Balkan en hun toepassing van open en citizen science. Het bevat inzichten uit acht landen: Servië, Kroatië, Griekenland, Bulgarije, Bosnië en Herzegovina, de Republiek Noord-Macedonië, Montenegro en ook Cyprus, dat weliswaar geen deel uitmaakt van de Balkan, maar wel in de analyse is opgenomen.

Barrières

Gebrek aan vaardigheden
Gebrek aan kennis
Gebrek aan nationaal beleid
Gebrek aan middelen (personeel, tijd)
Gebrek aan administratieve middelen
Gebrek aan CS-beleid op universitair niveau

4%
Oneens

33%
Eens

63%
Heel erg mee eens
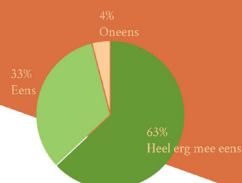
Universiteitsbibliotheken betrekken bij CS-projecten en -activiteiten

Sector	33
Beleidsmakers	35
Civil society	66
Onderzoekers	81

0 10 20 30 40 50 60 70 80 90

Potentiële partners voor het uitvoeren van CS-activiteiten

Onvoldoende financiering
- Het zoeken van subsidies en financieringsmogelijkheden
- Crowdfunding en publieke betrokkenheid

Taalbarrières
- Meertalige platforms en hulpmiddelen
- Taaltraining en uitwisselingsprogramma's

Gebrek aan aanbevelingen
- CS-netwerken en communities of practice (praktijkgemeenschappen) opzetten
- Regionale richtlijnen en normen ontwikkelen

Gebrek aan professionele vaardigheden
- Versterken van het curriculum
- Programma's voor capaciteitsopbouw
- Samenwerking met de sector en met experts

Gebrek aan betrokkenheid
- Bewustmakingscampagnes en succesverhalen
- Betrokkenheidsevenementen voor belanghebbenden

https://ceosse-project.eu
https://www.facebook.com/CeOSSEProject / https://twitter.com/CeOS_SE

Οδικός Χάρτης του CeOS για την Επιστήμη των Πολιτών στα Βαλκάνια

CeOS Project
Citizen-Enhanced Open Science
Southeastern Europe

The CeOS Project

Γιατί

Η Ανοικτή Επιστήμη και η Επιστήμη των πολιτών χαρακτηρίζονται και οι δύο από διασυνοριακές αλληλεπιδράσεις που είναι διαφανείς, προσβάσιμες, κοινοποιήσιμες και ανοιχτές στη συμμετοχή. Αυτός ο οδικός χάρτης σχεδιάστηκε για να βοηθήσει τα ΑΕΙ και τις βιβλιοθήκες να ενισχύσουν τον εκπαιδευτικό, επιστημονικό, καινοτόμο και κοινωνικό αντίκτυπο των δραστηριοτήτων τους στην Ανοικτή Επιστήμη/Επιστήμη των πολιτών.

Πληροφορίες

Αυτός ο οδικός χάρτης βασίζεται στις εμπειρίες πολλών χωρών στα Δυτικά Βαλκάνια και στην εφαρμογή της ανοικτής επιστήμης και της επιστήμης των πολιτών. Περιλαμβάνει πληροφορίες από οκτώ χώρες: Σερβία, Κροατία, Ελλάδα, Βουλγαρία, Βοσνία-Ερζεγοβίνη, Δημοκρατία της Βόρειας Μακεδονίας, Μαυροβούνιο και Κύπρο, η οποία, αν και δεν ανήκει στα Βαλκάνια, περιλαμβάνεται στην ανάλυση.

Εμπόδια

Έλλειψη δεξιοτήτων
Έλλειψη γνώσεων
Έλλειψη εθνικής πολιτικής
Έλλειψη πόρων (προσωπικό, χρόνος)
Έλλειψη διοικητικών πόρων
Έλλειψη πολιτικής Επιστήμης των Πολιτών
σε πανεπιστημιακό επίπεδο

- 4% Διαφωνώ
- 33% Συμφωνώ
- 63% Συμφωνώ απόλυτα
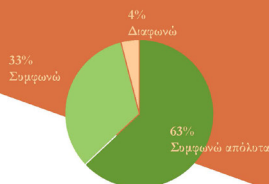
Συμμετοχή ακαδημαϊκών βιβλιοθηκών σε έργα και δραστηριότητες της Επιστήμης των πολιτών

Βιομηχανία	33
Φορείς χάραξης πολιτικής	35
Κοινωνία των πολιτών	66
Ερευνητές	81

Πιθανοί εταίροι για τη διεξαγωγή δραστηριοτήτων Επιστήμης των πολιτών

Ανεπαρκής χρηματοδότηση
- Αναζήτηση επιχορηγήσεων και ευκαιριών χρηματοδότησης
- Συμμετοχική χρηματοδότηση και δημόσια συμμετοχή

Γλωσσικοί φραγμοί
- Πολυγλωσσικές πλατφόρμες και πόροι
- Προγράμματα γλωσσικής κατάρτισης και ανταλλαγής

Έλλειψη συστάσεων
- Δημιουργία δικτύων Επιστήμης των Πολιτών και κοινοτήτων πρακτικής
- Ανάπτυξη περιφερειακών κατευθυντήριων γραμμών και προτύπων

Έλλειψη επαγγελματικών δεξιοτήτων
- Ενίσχυση προγραμμάτων σπουδών
- Προγράμματα ανάπτυξης ικανοτήτων
- Συνεργασία με τον κλάδο και ειδικούς

Έλλειψη δέσμευσης
- Εκστρατείες ευαισθητοποίησης και περιπτώσεις/ιστορίες επιτυχίας
- Εκδηλώσεις εμπλοκής των ενδιαφερομένων

https://ceosse-project.eu
https://www.facebook.com/CeOSSEProject / https://twitter.com/-

Roadmap verso la scienza aperta e partecipata nei Balcani

Perché

La Scienza aperta e la Scienza partecipata sono entrambe caratterizzate da interazioni transfrontaliere che sono trasparenti, accessibili, condivise e aperte alla partecipazione. Questa roadmap è stata concepita per aiutare le università e le biblioteche a migliorare l'impatto educativo, scientifico, innovativo e sociale delle loro attività di OS/CS.

Approfondimenti

Questa Roadmap si basa sulle esperienze di diversi Paesi dei Balcani occidentali e sulle loro attività di scienza aperta e scienza partecipata. Comprende le esperienze di otto Paesi: Serbia, Croazia, Grecia, Bulgaria, Bosnia-Erzegovina, Repubblica di Macedonia del Nord, Montenegro e Cipro che, pur non facendo parte dei Balcani, è inclusa nell'analisi.

Barriere

Mancanza di competenze conoscenze
Mancanza di una policy nazionale
Mancanza di risorse (personale, tempo
Mancanza di risorse amministrative
Mancanza di una policy di CS a livello universitario

4%
Non d'accordo

33%
D'accordo

63%
Fortemente d'accordo
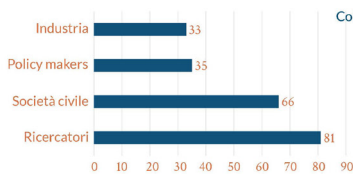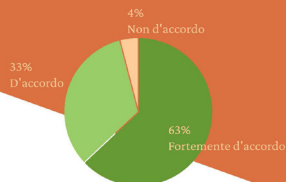
Coinvolgere le biblioteche accademiche in progetti e attività di CS

Industria	33
Policy makers	35
Società civile	66
Ricercatori	81

0 10 20 30 40 50 60 70 80 90

Potenziali partner per la realizzazione di attività di CS

Fondi insufficienti

- Ricerca di sovvenzioni e opportunità di finanziamento
- Crowdfunding e coinvolgimento dei pubblici (public engagement)

Barriere linguistiche

- Piattaforme e risorse multilingue
- Programmi di formazione e scambio sulle lingue

Mancanza di linee guida

- Creare reti di CS e comunità di pratica
- Sviluppare linee guida e standard regionali

Mancanza di competenze professional

- Potenziare i curriculum
- Lavorare sul rafforzamento delle capacità (capacity-building)
- Collaborare con l'industria e con gli esperti

Mancanza di impegno

- Campagne di sensibilizzazione e storie di successo
- Eventi di coinvolgimento degli stakeholders (portatori di interessi)

Смернице за примену CeOS принципа у земљама Западног Балкана

Зашто

Отворену науку и грађанску науку карактеришу међународне активности које су транспарентне, доступне, размењиве и отворене за учешће. Осмишљене су како би унапредиле образовни, научни, иновативни и друштвени утицај активности у вези са отвореном/грађанском науком које спроводе високошколске установе и библиотеке.

Запажања

Смернице се заснивају на искуствима земаља Западног Балкана и њиховог приступа примени отворене и грађанске науке. Обухватају искуства из осам земаља: Србије, Хрватске, Грчке, Бугарске, Босне и Херцеговине, Северне Македоније, Црне Горе и Кипра, који је укључен у анализу иако није део Балкана.

Препреке

Недостатак вештина
Недостатак знања
Недостатак националне политике
Недостатак ресурса (особље, време)
Недостатак административних ресурса
Недостатак политике грађанске науке на нивоу универзитета.

4%
не слажем се

33%
слажем се

63%
потпуно се слажем

Укључивање академских библиотека у пројекте и активности грађанске науке

Индустрија	33
Креатори политике	35
Удружења грађана	66
Истраживачи	81

Потенцијални партнери за спровођење активности грађанске науке

Недостатак адекватног финансирања
– Тражење грантова и могућности финансирања
– Колективно финансирање и јавни ангажман

Језичке баријере
– Вишејезичне платформе и ресурси
– Курсеви језика и програми размене

Недостатак препорука
– Успостављање сарадње и заједничке праксе у домену грађанске науке
– Развијање регионалних смерница и стандарда

Недостатак професионалних вештина
– Унапређење наставног плана и програма
– Програми развоја капацитета
– Сарадња са индустријом и стручњацима

Недостатак ангажованости
– Кампање за подизање свести и успешни примери
– Догађаји у циљу ангажовања заинтересованих страна

Table of Contents ▶

List of Graphs

List of Tables