

# D8.2 Interim Report on Impact Pathways

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Abstract	This deliverable provides insights into the outputs, outcomes and impacts generated by the ECS project at the end of the second year. It provides key lessons learned from first evaluation activities and highlights important impact pathways taken across the six impact

	areas.
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## List of Abbreviations

Abbreviation	Expansion
CS	Citizen Science
CSI	Citizen Science Initiative
CSO	Civil Society Organisation
CSR(P)	Corporate Social Responsibility (Plans)
ECR	Early Career Researchers
ECS	European Citizen Science (project acronym)
ECSA	European Citizen Science Association
EOSC	European Open Science Cloud
KPIs	Key Performance Indicators
MCAA	Marie Curie Alumni Association
NGO	Non-Governmental Organisation
OA	Open Access
OS	Open Science
PIs	Principal Investigators
R&I	Research and Innovation
RRI	Responsible Research and Innovation
SDGs	Sustainable Development Goals
STEAM	Science, Technology, Engineering, Arts and Mathematics (the “A” is sometimes also used to mean agriculture, architecture, or applied mathematics)
UN	United Nations

UNECE	United Nations Economic Commission for Europe
UNESCO	United Nations Educational, Scientific and Cultural Organization
WP	Work Package

## Executive Summary

ECS is a four-year project funded by the European Commission to strengthen and widen the European citizen science community. Building on the predecessor project eu-citizen.science, 21 partners from 16 European countries work together to design and implement a variety of activities that serve to build capacity, raise awareness and establish sustainable regional, national and EU-wide networks. Besides the creation of a European Citizen Science Academy, the establishment of a network of ECS ambassadors, and the implementation of high-level policy events, project activities also entail the provision of FAIR, open data and tools to the citizen science community as well as engaging new stakeholder groups, including excellent researchers, businesses, and groups currently underrepresented in citizen science.

In work package eight (WP8) of ECS, we investigate the impact pathways of the project and its wider citizen science context, collect evidence for its outcomes, and learn how we can generate contributions at a wider societal level. The first deliverable of WP8, *D8.1. Impact Assessment Plan* outlined how we would approach and implement impact assessment throughout the four years of the project.

The present deliverable serves as a first progress report. It is based on a rich collection of quantitative and qualitative evaluation data that aim to demonstrate outputs, outcomes and first

contributions to the achieved impacts across six impact areas: social/societal, political, scientific, institutional, technological, and economic. The data have been collected in close collaboration with all project partners, the affiliated entities and ECS ambassadors.

An overview of ECS Key Performance Indicators (KPIs) shows that the project has delivered or is on a clear path to deliver pre-defined, measurable outputs across all six impact areas. These KPIs demonstrate an impressive number of people involved in a variety of impactful activities, including co-design workshops, training sessions, Datathons, and high-level policy events. For example, more than 1.500 newcomers to Citizen Science have already been reached, over 470 young researchers have participated in awareness raising activities and the ECS portal is accessed by over 4.500 registered users. The KPIs are further expanded by a vast number of conferences, training events, meetings, mass media contributions, strategic papers etc. generated by the 28 ECS ambassadors. A summary of the ambassador reports, original statements of the ambassadors, as well as impact stories provide insights into this highly efficient impact pathway that helped to drive citizen science especially in those countries where it has so far been less present. Our impact stories from affiliated entities show how citizen science can be fostered especially amongst policy makers.

Concerning the **social/societal impact** of ECS, the project interventions are geared mostly towards supporting and widening the citizen science community which in turn is expected to increase the number of European citizen science projects addressing societal needs. A special focus of the ECS project is the involvement of underrepresented groups. To this end, we present four out of seven inclusive pilots via impact stories and provide rich lessons learned on how to include “easy to ignore”<sup>1</sup> groups in citizen science. We show important benefits brought on by the pilot activities and suggest extending impact metrics by important social aspects like the feeling of being valued and heard. From the ambassador activities we see first structural approaches to support CS initiated, a strengthened CS community in 28 EU countries and an increased collaboration and new CS initiatives. The mutual learning activities led to the creation of an interested community of CS researchers and practitioners around the IA topic, which generates insights into the key questions related to IA and good practices in CS.

The **policy impact** of ECS is geared towards raising awareness and generating support for citizen science among relevant decision makers. Policy advocacy activities, including high-level policy events, raise the profile of citizen science and increase the understanding among policy makers at all levels. They also generate policy-relevant data and contribute to the development of best practice standards and quality criteria. A concrete outcome has e.g.,

<sup>1</sup> <https://pos.sissa.it/393/017/pdf>

been a better understanding of how the CoARA Agreement can be used to support CS and vice-versa.

The **scientific impact** area summarises the outcomes related to creating a network of citizen science trainers and a network of citizen science researchers, who benefited from first ECS training events and occasions for mutual exchange, as well as the created training material. The increased awareness of CS amongst institutions and researchers, including young researchers, the creation of specific trainings and new collaborations are evidence of this impact.

The **institutional impact** highlights the important impact pathway of anchoring citizen science in institutions such as libraries, which were involved in citizen science training and networking to support citizen science and foster activities with citizen groups that have not been involved in citizen science before. We already see first institutional changes in participating libraries. By involving a wide range of stakeholders, including universities, research institutions, and governmental bodies, in ECS activities a network of institutions committed to the advancement of citizen science has been established and many have started to apply the self-assessment tool for institutional change.

The **technological impact** area outlines the effects of co-creating further features of the eu-citizen.science platform and collaborating with the citizen science community on the open source code of the platform, resulting in 2



countries (Brazil and Portugal) having already built their national citizens science platforms using the eu-citizen.science architecture and one country (Spain) planning to use the open source code. Via an API, connections were made to the Swedish national platform, VERA, CS-Track and will be made to the French and Danish national CS platforms. Through this, ECS contributes to a sustainable citizen science infrastructure that is adapted to the needs of the community and shared between community members. This also includes lessons learned about the uptake of digital tools for the involvement of hard-to-reach groups.

Finally, **economic impact** has mainly been addressed by the work on the ECS exploitation plan and business model. The strong involvement of project partners and ECSA stakeholders resulted in 6 avenues for value creation that will be further developed in the second half of the project. An economic impact survey was elaborated, and the collected data will be included in the final impact report which is due at the end of the ECS project.

Since impacts need time to unfold, often beyond the timespan of a four-year project, our evaluation focused so far primarily on collecting evidence on ECS outputs and outcomes. These, in turn, are expected to contribute to broader impacts in the long term – as defined in our logic models. Still, these impacts are inevitably affected by factors outside the ECS sphere of influence. The evaluation work will continue throughout the second half of the project in collaboration with all project partners who

support the project's overall collection and analysis of impact data. The analysis of all data and a summary of the overall impacts achieved by the project will be presented in *D8.3 Final Report on Impact Pathways* in month 46.

While writing this deliverable we started to work on an impact story booklet, where the impact stories found in D8.2. will be presented in an appealing way to those who want to learn more about ECS.

# 1. Introduction

## 1.1. ECS Background

ECS is a four-year Horizon-funded coordination and support action aimed at widening and strengthening the European citizen science community. The project builds on the extensive work of its predecessor eu-citizen.science, with many partners returning and providing their rich experiences to continue the efforts initiated half a decade ago. This background and continuous involvement in supporting citizen science in Europe allows for a broader contextualisation of the impacts European citizen science initiatives might achieve if properly nurtured and allowed to grow over time while supported by an international network of similarly aligned projects and institutions.

The present deliverable showcases the work done in the second year of the project, building on the initial approach to impact pathway assessment and looking at efforts extended by various project partners both within and beyond the actions of the project. Drawing on evidence collected from project beneficiaries and affiliated entities, as well as ECS ambassadors and institutions recruited to implement pilot activities, the following chapters report on the achieved outputs, first outcomes and anticipated impacts produced with regard to the ECS project. As outlined in *D8.1 Impact Pathways Assessment Plan & Metrics*, we focused our inquiries on six different impact areas each represented in its complexity by an elaborate logic model, co-created with relevant stakeholders to connect project actions and goals in clear pathways to impact. This is shortly reiterated below to provide a baseline understanding of our approach before reporting in detail the efforts and first results of the project in each impact area.

Chapter 2 gives a general overview of the outputs, outcomes, and impacts of the ECS projects, including the progress made on project KPIs. Here, the spotlight is also put on the efforts of the ECS ambassadors and affiliated entities. Chapter 3 dives into each impact area individually, outlining the activities undertaken that contribute to the respective impact area and first lessons learnt before closing each chapter with an outlook towards the second half of the project. The deliverable closes with a summary, conclusion and general outlook in Chapter 4.

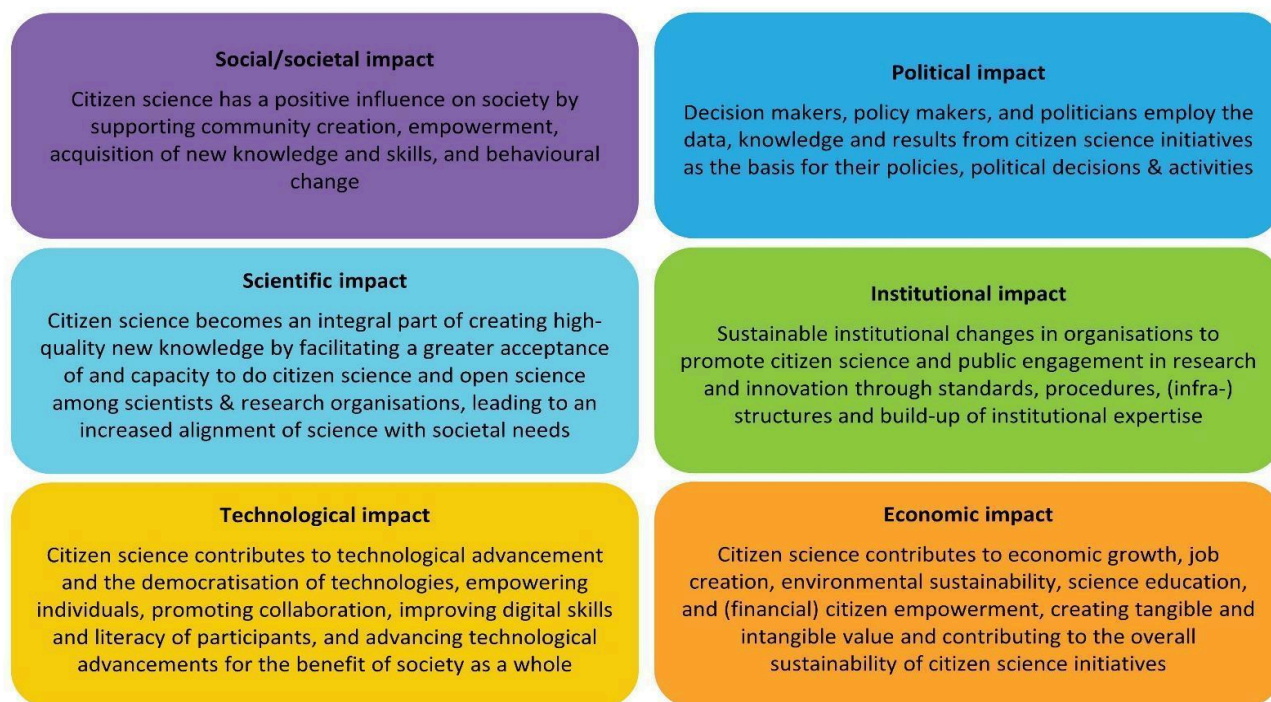
## 1.2. ECS Impact Areas and logic models

As mentioned above, ECS defines six core impact areas. While this introduction serves as a broad framing, chapter 4 will dive more deeply into each of the areas:

**Social/societal impact** covers both smaller-scale changes on a more individual level and larger-scale changes through which citizen science might affect society. This includes for instance the creation and



strengthening of communities, individual and collective empowerment, effecting changes in behaviour and attitudes, and supporting the acquisition of new knowledge and skills.



*Figure 1: The six impact areas of ECS*

**Political impact** refers to changes brought about on a policy and decision-making level which among others entails the use of datasets, knowledge or other outputs developed by citizen science initiatives as an evidence-base to develop policies, to make policy decisions or to implement activities on that level.

**Scientific impact** focuses on the academic sphere and entails adaptations that allow for citizen science to thrive, integrating it into the processes of scientific innovation and knowledge production to create new and high-quality results in better alignment with societal needs. It is about engaging scientists and research organisations to achieve a greater acceptance of, but also a greater capacity to do citizen science and Open Science. Through this, human capital in R&I is strengthened and the diffusion of knowledge and Open Science is fostered.

**Institutional impact** is about sustainable changes within organisations to enable and promote citizen science and public engagement in science and technology. It entails setting up clear procedures, structures and regulations that allow for the consistent implementation of citizen science processes at a high level of quality. It also implies building up the necessary institutional expertise to do so.

**Technological impact** focuses on understanding technological improvements to respond to data gathering, analysis and dissemination of citizen science initiatives. It entails the involvement of citizens in technology development and enabling them to make meaningful contributions, ensuring that technology is better aligned with societal needs and is accessible to a wider range of users. The impact of citizen science on technology is multifaceted, could empower individuals, promote collaboration, improve digital skills and literacy of participants, and advance technological developments for the benefit of society.

**Economic impact** is centred around understanding the distribution of direct and indirect benefits that the implementation of citizen science can bring to organisations, communities, science, and society. This encompasses the examination of how citizen science initiatives contribute to economic growth, job creation, environmental sustainability, science education, and citizen empowerment. The analysis of the economic aspects of citizen science brings insights into the tangible and intangible value it generates, both in terms of financial outcomes and broader societal benefits.

As an instrument to link project activities to outputs, outcomes and impacts of the six impact areas, ECS developed **logic models** that serve the evaluation team as a working tool. As we are dealing with a complex project that aims to achieve a broad spectrum of impacts, we decided to create a logic model for each impact area and, based on these, identify overlaps and interaction between them.

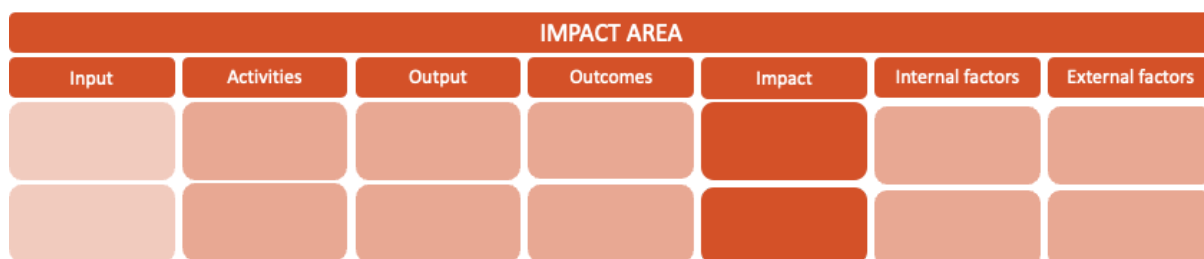


Figure 2: ECS logic model structure for each impact area

We expect that our project activities lead to outputs, which have an effect on our involved target groups in the form of project outcomes. These categories are the ones that we can assess in the frame of a three-four years project. In the longer term we expect that the project outputs contribute to broader impacts.

In *D8.1 Impact Pathways Assessment Plan & Metrics*, we created logic models for each of our six impact areas and will show the impact pathways through these models in Chapter 3. But before going into detail on each impact area, Chapter 2 provides an overview of outcomes achieved by ECS partners, affiliated entities and ambassadors spanning across all the 6 areas.

## 2. Overview of ECS outputs, outcomes and impacts

Following the logic model approach, this chapter starts with the presentation of the project KPIs – in terms of numbers and measurable output generated by the ECS partners, affiliated entities and ambassadors by the time of writing this deliverable. **The collection of KPIs is organised together with the management report - thus the most actual numbers will be presented in the ECS management report of year 2 in M24.**

Following the overview on KPIs this chapter will introduce an overview of outcomes and impacts which are actually the results of the created outputs. A focus for this interim report is put on the presentation of results of the ECS Ambassador program that span across the 6 impact areas. The work of affiliated entities is presented via ECS impact stories that aim to provide an understanding of the different pathways followed to reach positive change on a social, political, scientific, institutional, economic and technological scale.

In Table 1, the quantitative key performance indicators (KPIs) are outlined. The most updated KPIs will be collected from all partners at the end of M24 (project year 2), when writing the new management report. The last column of the table outlines the impact areas each KPI affects.

*Table 1: Overview ECS Key Performance Indicators and impact areas*

Measurable Outputs	Contributions (M24)	Impact Area
<b>Achieved:</b> 400 young researchers taking part in awareness raising events on CS through MCAA	<p>54 people registered for the event and 34 attended the ECS Webinar on the basic principles of CS (Nov 2023).  <b>159</b> researchers registered to attend the ECS themed-Workshop (MCAA Annual Conference, March, 2024),            &gt; <b>100</b> researchers for the CS-Panel Discussions (same conference).  <b>161</b> young researchers are members of the Network of Researchers for Citizen Science</p> <p>In total, the MCAA events led to an <b>increase of over 470 young researchers taking part in awareness raising events on CS by the end of Y2</b></p>	Scientific, institutional
25 companies join the	This task is currently in the preparation phase, going into	Economic,



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eu-citizen.science community, with 3 large corporations undergoing <b>pilots</b> to embed CS in their innovation departments and corporate social responsibility strategies	action from July 2024. Tangible effects will be achieved in the second half of the project	institutional, scientific
<b>Achieved:</b> More than 2500 accounts registered on eu-citizen.science	4737 registered accounts on eu-citizen.science by the end of Y2, of which 2723 joined after the start of ECS	All impact areas
<b>Achieved:</b> 28 new <b>Ambassadors</b> in Europe for CS promoting CS amongst research organisations nationally	28 Ambassadors have been selected and are currently active for the ECS project	All impact areas
15 <b>co-design workshops</b> taking place throughout the lifetime of ECS with CS and non-CS practitioners and other types of researchers	6 co-design workshops were organised to develop new eu-citizen.science services in WP2 4 co-design workshop took place across WP4 1 co-design activity took place in T5.1 1 co-design activity took place in T7.2 1 co-design activity took place in WP5 for the inclusive BioBlitz of MfN 1 co-design activity took place in WP5 for the AGORA project  <b>14 out of the 15 co-design workshops were organised by the end of Y2</b>	All impact areas
12 <b>dedicated training modules</b> and guides or training guides for the integration of CS	<b>7 trainings have been delivered so far</b> (as part of WP4): 1 public library training; 1 module for library researchers; 1 RPO training building on Time4CS; 4 trainings to the network of researchers (on public engagement, participatory mapping, the relevance of CS for different steps of the research process, and the ethics of public engagement)  <b>8 further trainings are already in the pipeline:</b> 1 guide for the use of Minka Platform; 3 introductions to Pandas, NumPy, Python, Jupyter notebook and visualisation in Python; 1 training on ethical engagement practices building on PRO-Ethics; 3 further trainings to the network of researchers on publishing in CS, data quality in CS, and impact	All impact areas







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	evaluation in CS.	
1000 <b>researchers</b> and 400 <b>other 5-H stakeholders</b> getting trained in various aspects of CS	640 researchers were trained in total, including MSc students, PhD, public libraries, network meeting, research libraries, undergraduate students. 20 5-H stakeholders were trained, including high-school teachers.	All impact areas
<b>Achieved:</b> 50 <b>universities and RPOs</b> are part of the network of excellent science support for CS	Completed by the creation of the network of researchers together with MCAA, where more than 50 universities are represented	Scientific, institutional
At least 10 <b>new excellence science projects</b> embed CS in their research activities.	3 new excellence science projects were supported in the application process: 2 ERC StG (2022, 2024) (delivered) 1 PhD at UPCite (delivered)	Scientific, institutional
30 <b>open source</b> collaborative projects and training <b>materials</b> are made accessible through EOSC	Materials are currently in the making to share via EOSC	Scientific, institutional, social/societal, political
<b>Achieved:</b> 200 <b>users/developers</b> (with at least 40% women) participating in co-design/co-development communities	85 platform users participated in co-design activities of WP2 so far (50% female participants) 120 participants in co-design and development of the ECS Academy  33 people signed up for a workshop to co-design a policy brief	Social/societal, political, technological
<b>Achieved:</b> 2 (online) <b>Hackathons and Datathons</b> will take place gathering 200 <b>additional users/developers</b>	2 data acquisition Datathons organised engaging 257 participants. 1 Sci-Art Hackathon organised with 17 participants.	Social/societal, political, technological
<b>Achieved:</b> 1 <b>Best Practices Report</b> for Collaborative Development of CS Data Infrastructures	Successfully submitted in July 2023	Social/societal, technological
3 <b>dedicated training sessions</b> for the integration of CS in STEAM disciplines	Will come in the second half of the project	Social/societal, political, technological, scientific
<b>Achieved:</b> 6 <b>international CS</b>	CS was presented in 7 international events and	Political,



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<p><b>associations</b> are invited to workshops and networking events and are disseminating project results throughout their networks.</p>	<p>promoted through the social media channels. Details can be found in <i>D6.2 Report on the project's communication and dissemination activities - Years 1 and 2</i></p>	<p>social/societal, scientific, institutional</p>
<p><b>Achieved:</b> 1200 newcomers become familiar with CS</p>	<p><b>In total, we have reached more than 1500 newcomers to citizen science so far:</b>  17: from community engagement events  30: librarians who participated in the onboarding meeting  25: Chile summer school  50: PPI in Neurotechnologies workshop  20: Introduction to citizen science to public library - webinar  40: Teaching Citizen Science for Social Sciences at the University of Siena  70: Presentation to HUMETAV-CC summer school Mexico  20: Seminar and visit to LISER, Luxembourg  80: Class on citizen science for certificate in sustainability, Luxembourg  17: Foundation of citizen science course, UCL  9: Introduction to citizen science and scientific crowdsourcing course, UCL  10: Designing and managing citizen science course, UCL  20: Teaching students in life science communication for biologists course on citizen science, UCL  30: Teaching students in natural science course, UCL  29: of those who registered for the first high-level policy event reported that they had no previous experience with citizen science  15: Platform presentation, ECSA and Ibercivis  6: ERA sister projects  28: Aperitive with IMPETUS  5: Norwegian CS network meeting  50: Community engagement event, 27.02.2024  60: MCAA conference session  15: students at UPC Biodiversité course  900 newcomers to CS included in the inclusive pilots with libraries</p>	<p>All impact areas</p>
<p><b>Achieved:</b> More than 1000 people from <b>underrepresented groups</b> participating in CS projects</p>	<p><b>From our inclusive pilots in WP5:</b>  113 people included in the applied pilots by ECS partners by end of Y2:  <ul style="list-style-type: none"> <li>25 vulnerable citizens aged 16-24 years old with low socio-economic background and affected by heatwave included in Adaptation Agora project</li> </ul> </p>	<p>Social/societal, political</p>



	<ul style="list-style-type: none"> <li>• 30 Deaf and Hard of Hearing individuals involved in 4 workshops on CS</li> <li>• 20 young people with disadvantaged socio-economic background involved in a BioBlitz</li> <li>• 30 older people involved in the discussion and usage of the Odour Collect app</li> <li>• 8 fishermen involved in using the Marine Ranger app</li> </ul> <p>In the inclusive pilots with libraries, we had 900 people included by end of Y2 - all of which are also newcomers to citizen science and thus listed above</p>	
6 <b>policy events</b> in support of the uptake of ECS policy recommendations as key pillar of open science	2 high level policy events (HLPE) organised by WP7 plus 2 policy peer learning meetings with Research Funding Agencies Around 20 meetings with policy makers and funders organised by ECS ambassadors	Political, social/societal, institutional
500 <b>participants</b> from 25 different countries will be invited to attend the project's <b>final event</b>	To come at the end of the project	Social/societal, political, scientific, institutional
More than 450 <b>policy makers are directly trained or informed</b> about CS	70 policy makers informed on CS in the HLPE Training for policy makers will come in the second half of the project	Political, social/societal
At least <b>40% female participation</b> will be ensured in all ECS activities	ECS activities are marked by a higher female than male participation	Social/societal, political

## 2.1. Outputs and outcomes of the Ambassador programme

One key element to foster the wider uptake of CS across Europe was the establishment of the ECS Ambassador programme.

The network of 28 Citizen Science Ambassadors (EU-27 + the UK) was successfully launched by ECS to support the activities in the project, raise awareness about citizen science and spread and strengthen citizen science across Europe. The selected ambassadors were introduced to the ECS project, the eu-citizen.science platform and their roles and responsibilities in an introductory meeting. From there, they came together in monthly meetings to share their experiences and activities. In addition, their efforts were collected by means of a reporting template that also collected the main

target groups of activities and the benefits they aimed to achieve. In the following chapter, a summary of these reports is presented.

The 28 ambassadors have made an impressive effort to

- create links with and between the local citizen science actors (e.g., researchers, NGOs, educators, policy makers),
- strengthen the ties between the local CS community members and the European CS community,
- organise workshops, conference sessions, trainings, and meetings to talk about (different types of) citizen science and its potentials, good practices, infrastructures and requirements for structural support, as well as ECS, the eu-citizen.science platform and potentials to benefits from the project in the different EU member states.

In total, the ambassadors participated in or organised more than **20 conferences**, more than **100 meetings with other researchers and potential collaboration partners**, held more than **30 CS lectures or trainings**, organised more than **70 CS workshops, BioBlitzes and data collection events**, worked on **13 articles or book chapters** on citizen science, organised around **20 meetings with funders and policy makers**, and **15 contributions in mass media** like TV, radio, and newspapers. There are two strategy documents in elaboration in Bulgaria and Malta, one national platform on citizen science has been launched in Romania, the Irish Ambassador created an Ambassador Website, there is the UK Citizen Science network site established, and a Facebook site was initiated on citizen science in Latvia. In Austria, an Open Science Forum in a rural area is under development, in Denmark researchers are brainstorming on a Citizen Science University Forum, and in the Netherlands the ambassador is involved in designing a Citizen Science Journal.

All ambassadors reached out to other researchers and to students to drive citizen science: either amongst those researchers who are not so familiar to the CS concept, or to those actively involved in CS inviting them to bundle forces and sustainably support the participatory research approach. We also see strong links established to new communities, like the STEAM community, makerspaces and fablabs.

In the following, we will provide some highlights from the manifold ECS ambassador activities. Very impressive was the work of the **ambassadors in those countries where citizen science is not so well known yet**:

The **Romanian ambassador, Lucrina Stefanescu**, has successfully planned and launched the first Romanian CS platform (<https://citizenscience.openscience.ubbcluj.ro/home>) together with her co-researchers in June 2024. The launch was accompanied by a presentation of CS on Romanian



TV. Lucrina reported that her work as an ambassador strengthened her position in this endeavour and provided her with contacts to the European CS community.

The **Maltese ambassador, Simone Cutajar**, started to work on the national strategy for biodiversity data with citizen science together with other Maltese researchers and in conversation with the national Environmental Resource Authority ERA. Simone is also writing a paper mapping the citizen science ecosystem on the Maltese Islands. Please find the full impact story in our Impact Booklet in the [Annex of this document](#).

The **Irish ambassador, Oscar Diaz**, launched an ambassador website and a mapping via the Ireland's CS Landscape Survey. He reached out to CS projects and researchers in Ireland from other universities as well as to the national funding body, the Science Foundation Ireland. He also launched the first CS Engagement Event in Ireland as a first successful step in establishing a Citizen Science network in the country. In addition, Oscar and his co-researchers applied to the SFI Discovery fund 2024 to implement a citizen science campaign methodology, and reached out to the STEAM community to promote citizen science.

The **Latvian ambassador, Sanita Reinsone**, consulted other researchers on citizen science and the preparation of proposals, reached out to the University of Latvia Library and organised the first Latvian citizen science conference in early spring 2024 with around 100 participants, where she also presented ECS. Sanita also set up a Latvian public science hub, which would meet once a month to initiate the dialogue between fragmented citizen science researchers, activists, and other stakeholders, established the Facebook page *Sabiedriskā zinātne Latvijā*<sup>2</sup> ("Citizen Science in Latvia"), and gave interviews for Latvian radio and television. She reports:

*"The most significant event was the organisation of the first interdisciplinary CS conference in Latvia in cooperation with the University Library of Latvia and its LibOCS project. This conference brought together around 100 stakeholders, including researchers, librarians, cultural heritage specialists, students, citizen scientists and journalists. It provided a platform for discussion on the role of citizen science and current projects, and it promoted the eu-citizen.science platform. The conference fostered valuable networking opportunities, encouraged new collaborations, and created a stronger foundation for the CS community in Latvia. This pivotal event has been crucial in bringing different groups together and in the development of the CS community in the country."*

Furthermore, ambassadors from Slovakia, Greece, and Malta started to map citizen science initiatives in their country as a first step to get those active in the field together. The **Slovakian Ambassador, Zuzana Stožická**, writes:

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<sup>2</sup> <https://www.facebook.com/SabiedriskiZinatne>

*“In previous years, our office inserted mentions of citizen science in various strategic documents. Having now the opportunity to encounter the phenomenon again, see how successful it is in Western Europe, and see that local examples exist, these stakeholders start to understand what it means and that it can bring interesting topics, interested people and positive visibility to the institution.”*

Some ambassadors also had a strong focus on the involvement of **political decision makers and funders**:

The **Slovenian ambassador, Zarja Muršič**, was very active in promoting citizen science amongst researchers, policy makers, NGOs, libraries, but also the press and the general public. As ECS ambassador, she joined a consultation meeting on citizen science organised by the Slovenian Research and Innovation Agency (ARIS). As a result of this consultation, ARIS will prepare new options to fund CS projects. She reports:

*“Together with the start of the Slovenian Citizen Science Network, we managed to bring together researchers from academia and research institutions and The Slovenian Research and Innovation Agency. This initiated the first serious consideration of preparing special funding calls for citizen science projects. At the events in person, researchers from universities and research institutions as well as researchers affiliated with NGOs shared their experiences with securing funding for citizen science projects and exchanged contacts to work closely together and help one another with funding applications.”*

The **Bulgarian ambassador, Stefaniya Kamenova**, initiated the collaborative writing of a 5-pages roadmap for establishing a national strategy for citizen science in Bulgaria. This is only the first step in triggering a more structured approach of supporting CS in Bulgaria, but the involved researchers, the representative of the Natural History Museum and the Ministry of Environment also evoked the idea for a more formal positioning of the Natural History Museum as a “hub” for citizen science. Stefaniya Kamenova states:

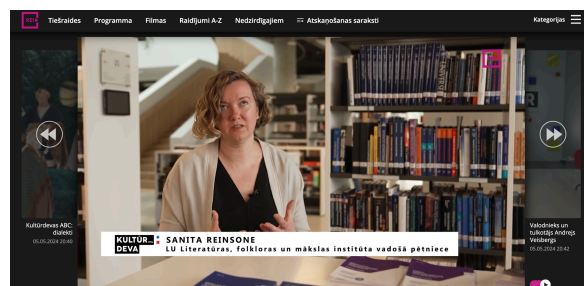
*“The situation in Bulgaria is unfolding relatively slowly, mainly due to the lack of a dedicated workforce as well as the current political instability. The institution most likely to financially support citizen science efforts in Bulgaria has expressed enthusiasm but the actual support at this stage is limited. However, with the establishment of a more structured approach (i.e., National strategy for citizen science with a dedicated board) as well as the high motivation of the National Museum of Natural History to play an active role in driving further developments makes me optimistic.”*

The ambassador of the **Netherlands, Diana Wildschut**, participated in regular meetings with policy makers to discuss how citizen science might benefit them. The **Czech ambassador, Michael Lažan**, organised meetings with local policy makers to discuss CS campaigns related to air quality, and the **Italian ambassador, Gaia Agnello**, had meetings with political decision makers of the

Environment Department of the Regional Government in Sicily to introduce CS. And, as mentioned above, the **Maltese ambassador, Simone Cutajar**, has initiated a concerted effort to develop a three-year citizen science strategy for Malta with policy and science stakeholders.

Some Ambassadors have been very successful in **communicating citizen science to the broader public** via mass media contributions:

The **Croatian ambassador, Tea Vukušić Rukavina**, gave an interview at the Croatian radio station *Radio Sljeme* during the show “Sunny side of the street,” where she presented her role as ECS ambassador for Croatia. The **Latvian Ambassador, Sanita Reinsone**, gave an interview to the most popular radio channel in Latvia. The radio broadcast was repeated several times and published on the Public Broadcast Portal [lsm.lv](https://www.lsm.lv)<sup>3</sup>. She also presented citizen science on the largest public TV network in Latvia. Again, the interview was several times repeated and also published on the Public Broadcast Portal [lsm.lv](https://www.lsm.lv)<sup>4</sup>. The **Bulgarian ambassador, Stefaniya Kamenova**, has promoted citizen science in mass media by giving a field report interview for EURONEWS<sup>5</sup> and promoting the CS mobile app during an EcoBlitz event for TVR Cluj<sup>6</sup>. And the **German ambassador, Jasmin Pfeifer**, reported TV appearances on two big TV stations, a contribution to a radio programme and newspaper articles.



<sup>3</sup> <https://lr1.lsm.lv/lv/raksts/zinamais-nezinamaja/sabiedriskā-zinatne-latvija-vairuma-petijumu-ir-svariga-cilveku-a188639>

<sup>4</sup> <https://replay.lsm.lv/lv/ieraksts/ltv/326203/digitalais-projekts-balsu-talka>

<sup>5</sup>

[https://www.euronews.ro/articole/raul-aries-poluat-cu-deseuri-din-plastic-apa-contaminata-se-raspanseste-si-in-alt?fbclid=IwZXh0bgNhZW0CMtAAAR09zhY9x4ZRLT3TOytsPc8UvclPAfYIUQvOnNhkDV2ryyr2aynlubTUOE\\_aem\\_AfOLoCaF8t-v0l08-mrzq4sLBicCnaDU-xJ0JQmkkUU1bEL62HMoXO0Q-QuAtf4D7VI5cvB8zLENGJGxqaz3lm9-](https://www.euronews.ro/articole/raul-aries-poluat-cu-deseuri-din-plastic-apa-contaminata-se-raspanseste-si-in-alt?fbclid=IwZXh0bgNhZW0CMtAAAR09zhY9x4ZRLT3TOytsPc8UvclPAfYIUQvOnNhkDV2ryyr2aynlubTUOE_aem_AfOLoCaF8t-v0l08-mrzq4sLBicCnaDU-xJ0JQmkkUU1bEL62HMoXO0Q-QuAtf4D7VI5cvB8zLENGJGxqaz3lm9-)

<sup>6</sup> <https://www.facebook.com/watch/?v=301761992937382>





### Râul Arieș, poluat cu deșeuri din plastic. Apa contaminată se răspândește și în alte cursuri de apă



Figure 3: Stills from various media appearances by ECS Ambassadors. From top left clockwise: Sanita Reinsone for her podcast interview; Sanita Reinsone for her TV presentation; Stefaniya Kamenova on EURONEWS; Stefaniya Kamenova on TVR Cluj.

### Contributions of the Ambassador Program to impact areas:

As the summary shows, the ECS Ambassador Programme contributed to all 6 impact areas of ECS. Most affected was the societal/social impact area: the activities strongly contributed to supporting and widening the European CS community. There were about 900 researchers introduced to CS and involved in discussions about the benefits of CS for society at large. Around 1000 citizens and 600 pupils were actively involved in learning about CS or doing CS, learning about the topics under investigation and about science projects, more than 350 students and young researchers were introduced to this innovative approach of involving citizens in science. All the outreach activities to more than 100 political players and funders on local and national level strongly supported the political impact, showing how CS can contribute to political decision making and also more structural support for CS in terms of new funding for instance. Scientific impact is reached through an increasing number of scientists generating excellent research outputs together with citizens and institutional impact when research performing organisations start to understand the value of CS and how to best support it. An example of institutional impact, the **Slovakian ambassador Zuzana Stožická** reports:

*"In previous years, our office inserted mentions of citizen science in various strategic documents. Having now the opportunity [with the Ambassador Program] to encounter the phenomenon again, see how successful it is in Western Europe, and see that local examples exist, these stakeholders start to understand what it means and that it can bring interesting topics, interested people and positive visibility to the institution."*

But we also see the work on CS platforms and sensors as well as the link to Fablabs and makerspaces as a contribution to technological impact. Nine ambassadors reported concretely to have

collaborated and initiated new CS proposals. The economic impact of these new CS endeavours in terms of, e.g., generating new jobs might be a result of this and all the work done in the other impact areas.

## 2.2. *Impact stories of ECS affiliated entities*

ECS has nine affiliated entities which support the work of most ECS work packages and the outreach of ECS to different EU member states. For this interim report we have conducted interviews with four affiliated entities who indicated significant achievements in their reports to the consortium, and present the different pathways they take to generate impact via ECS impact stories. For the Final Impact Assessment report (D8.3, M46) we will present the work of the five more ECS affiliated entities and provide an overall summary of the affiliated entities' outputs, outcomes and impacts. Naturally, the initiatives of the affiliated entities are not only due to the ECS project funding, but benefit from cross-fertilization with other funding at EU and national level (like the National Recovery and Resilience Plan of the ECS in the Italian case described below). For a big project like ECS we see it is important to understand important CS impacts and developments not only within the ECS project but also in the bigger European CS community.

The affiliated entities from the Netherlands (Leiden University's Citizen Science Lab) and Italy (Fondazione Grosseto Cultura (FGC)) report about the diversified and very ambitious impact pathways taken in their countries, in not only creating strong citizen science communities but also engaging with policy makers at local, national, European and international level to foster the uptake of CS data in political decision making and trigger structural changes needed to sustainably support CS. Trinity College Dublin (TCD), the affiliated entity from Ireland, reported on several activities organised in strong collaboration with the Irish ECS ambassador, which led to the first CS engagement event in 2024 and an increasingly connected and established CS community in Ireland. As a policy result of this work, a representative of the TCD was approached to provide concrete inputs on how to integrate CS in a new funding scheme. In the following, you will find short teasers for each impact story. Since BWI, the affiliated entity from Croatia, is leading one of the inclusive pilots of the ECS project, involving fishing communities from remote and very local communities in their research on dolphins, whales and sea turtles, their story will be featured in the following chapter on Social Impact. To summarise, their work results in very relevant insights in how to work and establish relationships with this hard to reach group. It also shows the strong effects of this collaboration for society, nature and science alike.

The complete impact stories can be found in [Annex 4](#) in the form of an Impact Story Book, intended as a more attractive and easy to read format of presenting key outcomes of the ECS project.

### **Impact story FGC (Italy)**

FGC has triggered concerted efforts in citizen science and demonstrates a successful model of multi-stakeholder engagement, collaboration, and impact generation. The establishment of the National Citizen Science Association, strategic initiatives under the National Recovery and Resilience Plan, and influential roles in global platforms are collectively driving Italy towards a robust and sustainable citizen science future. Please find the full impact story in our Impact Booklet in the Annex of this document.

### **Impact Story CS Lab (Netherlands)**

The recent developments surrounding CS in the Netherlands represent a significant step forward in integrating science with societal needs and policy frameworks. The continued growth of the national CS network, supported by significant national funding, and policy engagement at various levels, positions the Netherlands as a strong partner in the global CS community. As these efforts continue to evolve, the potential for impactful change and enhanced public engagement with science looks promising, setting a benchmark for other nations in the realm of citizen science. Please find the full impact story in our Impact Booklet in the Annex of this document.

### **Impact Story TCD (Ireland)**

The combined efforts of the Trinity College Dublin (affiliated partner of ECS) and the ECS ambassador for Ireland resulted in a first network meeting of researchers and practitioners involved in CS. Concerted efforts towards policy makers and funders enable a growing recognition of the value of integrating public participation in scientific research and decision making processes, poised to shape the future of science and society in Ireland and beyond. Please find the full impact story in our Impact Booklet in the Annex of this document.

## **3. The Six Impact Areas in the Spotlight**

This chapter is dedicated more specifically to the six impact areas of ECS. It describes activities for each impact area, as well as first generated outputs and outcomes at the end of Y2. While all impact areas have benefitted from the work of ambassadors and affiliated entities described in Chapter 2, we want to look at further activities in this chapter, focusing on each impact area individually to allow for greater depth of reporting.





### 3.1. Social/Societal Impact

Citizen science is expected to bring forward positive change for society at large. As a rapidly emerging mode of research and innovation it is said to contribute to improving science-society literacy, improving the relationship between science and society, and delivering solutions to society's most demanding needs (Fraisl et al., 2020; Edwards et al, 2018; Philips et al., 2018).

*"Social Impact Assessment includes the process of analyzing, monitoring and managing the intended and unintended social consequences, both positive and negative, of planned interventions (policies, programs, plans, projects) and any social change processes invoked by those interventions" (Vanclay 2003).*

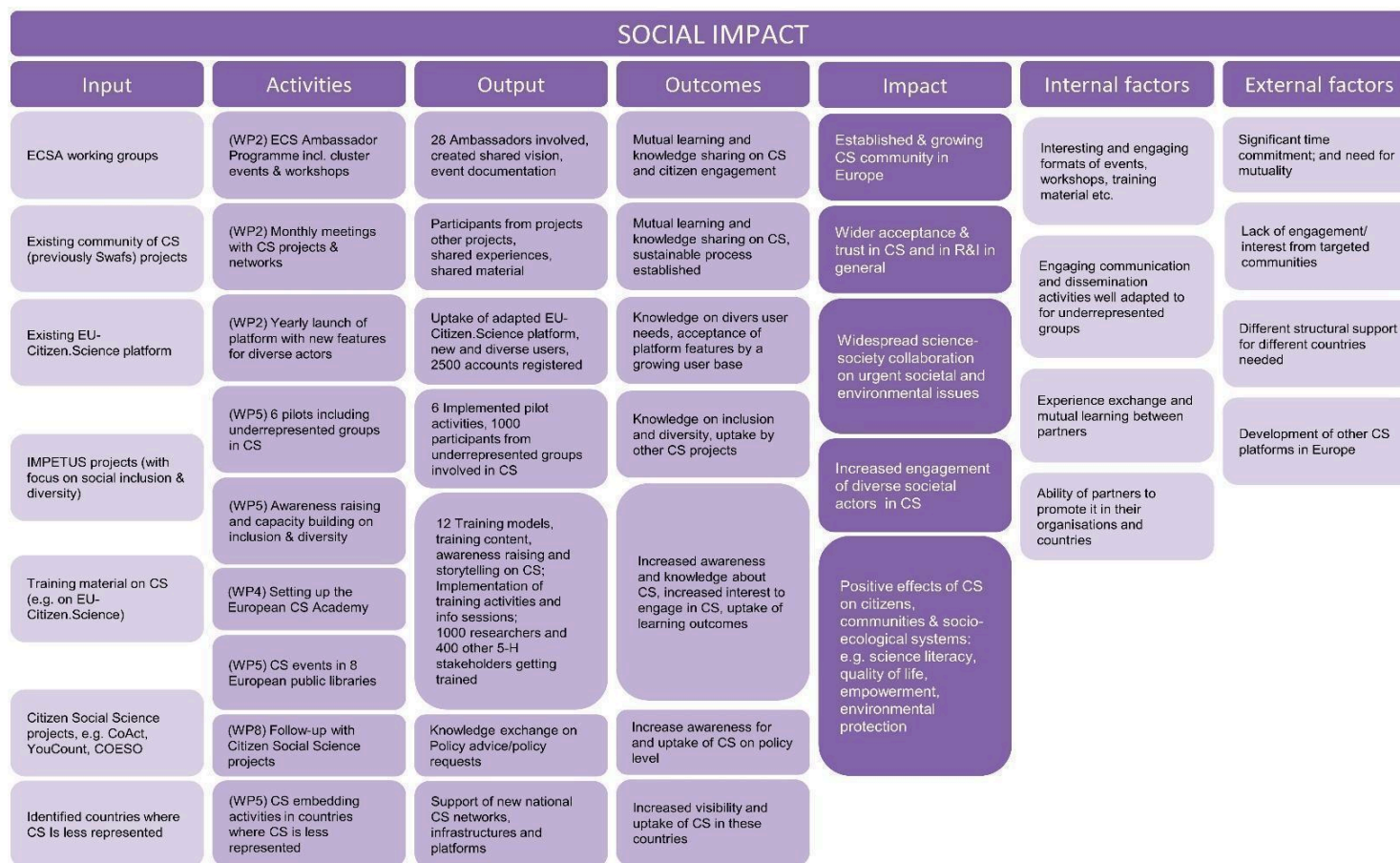


Figure 4: Social/societal impact logic model (represented in more detail in D8.1)



In D8.1, we have presented the ECS logical model for reaching social/societal impact. This logic model links the key activities of the project to expected outputs, outcomes and longer term social impacts.

As the logic model pictured above demonstrates, many project activities are contributing to the generation of social impacts. In this respect, project interventions are geared mostly towards supporting and widening the citizen science community which in turn is expected to increase the number of European citizen science projects addressing societal needs, the number of researchers involved in citizen science activities, and the number of citizens engaged in scientific activities. The social and societal effects of the project therefore mostly affect the citizen science community itself, including for instance the concrete participants we engage, their communities, as well as organisations that represent the interests of specific groups (NGOs, CSOs, etc.). Via the strengthened European citizen science community, we also expect to affect society at large.

In Chapter 2 we have broadly sketched out the activities, outputs and outcomes of the efforts extended by the ECS ambassadors and affiliated entities. Even now, their work has already strongly benefited and strengthened the citizen science community and thus generated impacts in all the six ECS impact areas. Their social and societal impacts as defined by our impact pathways are, however, especially apparent. In part, this is because the social impacts as defined in our impact pathways are also key aims of the ambassador activities and feature large in their task description.

### 3.1.1. Outputs and outcomes of the ECS inclusive pilots

In this chapter we want to focus on the first insights gleaned from the ECS inclusive pilots. One of the declared goals of the ECS project is to boost inclusion and diversity in citizen science, and the seven inclusive pilots planned and implemented as part of the ECS project are key elements to reach these goals. They not only aim to increase the knowledge on inclusion and diversity in CS, but also involve a large number of people who have so far been underrepresented in citizen science in ECS activities. In the inclusive pilots ECS affiliated entities as well as SfC, MfN and Ibercivis work to engage one or more underrepresented groups of their choice in their ongoing CS projects.

To understand the generated impact of the inclusive pilots, we organised interviews with four out of the seven implementing partners for this interim impact assessment report as they have already reported considerable results and lessons learned from their work. You will find a summary of these interviews in this chapter, while the complete impact stories can be found in [Annex 2](#). For the final impact assessment report, interviews with implementing partners of the remaining three inclusive pilots will be organised and results of the pilots presented here will be updated.

It is also important to mention that we are currently working on a collaborative scientific publication on inclusiveness in CS together with the IMPETUS project. This publication will be submitted in the second part of the project and main lessons learned from these pilots will be integrated in the final impact assessment report.

#### 3.1.1.1. Inclusive pilot MfN

ECS partner Museum für Naturkunde Berlin (MfN) in Germany organised a BioBlitz event specifically designed to engage students from marginalised communities. Implemented in close collaboration with teaching staff, a group of thirteen year old students were taken on a field trip which allowed them to engage with their immediate environment while contributing to broader biodiversity monitoring efforts. This event generated important learnings on how to involve this target group and manifold benefits for those involved. Please find the full impact story in our Impact Booklet in the Annex of this document.

#### 3.1.1.2. Inclusive pilot Ibercivis

Spanish ECS partner Ibercivis involved underrepresented groups in focus group discussions aiming to upscale adaptation processes for building a climate resilient Europe. They engaged migrants, women aged 65+, young people and workers (who are traditionally further away from tertiary education and academic contexts) in the discussion of climate change adaptation and how to combat disinformation on climate change. The diversified outcomes of this process show how important the engagement of diversified societal groups is for a comprehensive approach to climate adaptation challenges. Please find the full impact story in our Impact Booklet in the Annex of this document.

#### 3.1.1.3. Inclusive pilot SfC

ECS partner Science for Change, also from Spain, was responsible for the implementation of an inclusive pilot that involved older people in the usage of a CS app for the mapping of odours. 30 older people from three different locations shared their concerns with using a mobile app and brainstormed on solutions to overcome barriers to their involvement in CS projects. The pilot applied an innovative artistic approach to overcome some of the barriers related to technology and has not only generated a comprehensive guide on how to involve older people in science, but also outlines benefits for the people involved. Please find the full impact story in our Impact Booklet in the Annex of this document.

#### 3.1.1.4. Inclusive pilot BWI

Croatian ECS partner Blue Water Institute initiated an inclusive pilot that aimed at bridging the gap between marine scientists and fishing communities, a group traditionally seen as separate from

wildlife conservation efforts. They advanced its 30 year long history of data collection on sightings of large marine vertebrates, like dolphins and sea turtles, via an app named Marine Ranger. The initial challenges for involving this group were significant, requiring for the change of the ingrained practices of fishing communities, who are often wary of new technologies, resistant to altering their routines, and see dolphins rather as competitors and not as an integral part of a healthy marine ecosystem. There are highly relevant lessons learned from this involvement that resulted not only in an enriched collection of research data actively used for policy making that protects the maritime ecosystem, but also cultivated a sense of stewardship among the fishing communities. Please find the full impact story in our Impact Booklet in the Annex of this document.

### **3.1.2. Discussing social impact with the European CS community**

While ECS is a large project of considerable scope that is set to involve representatives from a significant portion of the European citizen science community, we still saw the benefit of looking beyond the margins of ECS. Thus we also included projects and partners outside of the consortium in the WP8 activities to understand the wider impact of citizen science in Europe as well as overall challenges related to the conceptualisation and measurement of impact.

As reported in D8.1, the WP8 team provided an input for the **ECS Collaboration Group** meeting on 07.03.2023, with a focus on the social impact assessment of CS initiatives. 29 initiatives and 35 colleagues took part in this online meeting and the discussions evolved around 4 key questions: 1) How to measure long-term impact within the timeframe of a limited, short-term project; 2) how to initiate the potential for social impact; 3) how to convince public authorities that citizen science data are good for policy decisions; and 4) how to use labels in CS in ethically appropriate ways (see Annex 2).

The WP8 team implemented a second activity with the ECS Collaboration Group on 05.03.2024, where the community was invited to fill an impact landscape and map the different changes they sought to achieve onto a shared Miroboard. Designed by the team at ZSI and Margaret Gold in collaboration with Antonella Passani (IMPETUS project), which yielded additional challenges and tensions with regards to impact assessment, which can also be found in the Annex of this document.

The discussions around these topics were perceived as highly important and enriching to all participants. Albeit complex in nature, the group found good practice examples and recommendations to address all of them to some degree. This stresses the importance of these types of events and led, amongst others, to the design of a day-long focus session on “Rethinking Impact Assessment” during the ECSA Conference 2024 where around 80 participants joined the workshop organised by the WP8 team. A documentation of this event was shared on eu-citizen.science with the whole European

Community:

<https://eu-citizen.science/blog/2024/04/24/rethinking-impact-assessment-in-citizen-science/> As a result, we also grounded the ECSA WG on Impact Assessment in CS in April 2024 to further drive these discussions in a more structured way.

*Table 2: Social/societal impact - outputs and outcomes at end of Y2*

Social impact - key activities	Outputs and initial outcomes at end of Y2	Future means of data gathering
ECS ambassador programme	<p><b>Outputs:</b></p> <ul style="list-style-type: none"> <li>• 28 ambassadors selected and involved</li> <li>• &gt; 20 conferences organised or contributed to</li> <li>• &gt; 100 meetings with CS researchers and partner organisations</li> <li>• &gt; 20 meetings with political decision makers and funders</li> <li>• &gt; 70 CS workshops, BioBlitzes, data collection events organised</li> <li>• &gt; 30 trainings/lectures on CS given</li> <li>• 16 contributions to mass media</li> <li>• 13 articles or book chapter on CS</li> </ul> <p><b>Outcomes:</b></p> <ul style="list-style-type: none"> <li>• Strengthened CS community in 28 EU countries</li> <li>• Increased collaboration and new CS initiatives launched/applied for</li> <li>• Mutual learning and experience sharing amongst practitioners</li> <li>• Increased awareness for CS in RPOs and RFOs</li> <li>• First structural approaches to support CS initiated (e.g. strategy papers, funding schemes, CS national associations and platforms)</li> </ul>	Ambassador reports and selected impact pathway interviews

Inclusive ECS pilots	<p><b>Outputs:</b></p> <ul style="list-style-type: none"> <li>• 20 young people from marginalised communities involved in a BioBlitz</li> <li>• 30 older people involved in the usage of the Odour Collect app</li> <li>• 8 Fisherman involved in CS data collection on dolphins, whales and sea turtles in Croatia</li> <li>• 25 vulnerable citizens aged 16-24 years old with low socio-economic background and affected by heatwave included in Adaptation Agora project</li> </ul> <p><b>Outcomes</b></p> <ul style="list-style-type: none"> <li>• Better understandings of how to adapt CS activities to meet the needs of underrepresented communities</li> <li>• Lessons learned on drivers and barriers of inclusiveness in CS</li> <li>• Feeling of being heard and valued, contributing to important issues of today's society by participants</li> <li>• Positive feelings about the social aspect of getting together with others in the CS activities</li> <li>• Increased understanding of CS amongst participants</li> </ul>	Follow up interviews with remaining inclusive pilots
Fostering mutual learning and exchange	<p><b>Outputs:</b></p> <ul style="list-style-type: none"> <li>• ECS Collaboration Group meeting on social impact assessment organised with 35 colleagues from 29 initiatives taking part.</li> <li>• Day-long focus session on Rethinking Impact Assessment organised during the ECSA Conference 2024 with 80 participants.</li> <li>• ECSA Working Group on Impact Assessment in CS established in April 2024</li> </ul> <p><b>Outcomes</b></p> <ul style="list-style-type: none"> <li>• Mutual learning and experience sharing on social impact assessment amongst CS practitioners and researchers</li> <li>• Insights into the key questions related to IA and good practices as well as solutions</li> <li>• Creation of an interested community of CS researcher and practitioners around the IA topic</li> </ul>	Follow up workshops as part of the ECSA working group or ECS collaboration group meetings, evaluated and documented.

### 3.1.3. First lessons learnt concerning the taken impact pathways

We learned that the different pathways towards impact taken by the project partners and ECS ambassadors have been very effective in growing the CS community and driving citizen science especially in countries where it had so far seen less support. The selected local ambassadors are very knowledgeable in CS and understand the needs and requirements of the different national



communities. Supported by the various training opportunities offered by ECS, as well as the mutual exchange with other ECS ambassadors and the ECS consortium, they could adapt their activities to the contextual specificities of their countries. The success of the programme is evidenced by their reports and the impact stories they were able to tell. In the second half of the project, the work in these fruitful collaborations is going to continue – especially when it comes to promoting the ECS outcomes. This will benefit both the ECS ambassadors in supporting their local CS communities, and the ECS project in reaching out and disseminating the created outputs, thus contributing to the generation of impact.

The work in the inclusive pilots of ECS resulted in some initial, highly interesting lessons learned on how to make CS more inclusive for groups that are usually not involved in any scientific activities. Insights from the pilots show the need to flexibly adapt engagement formats to the respective community, ideally with the help of someone being very knowledgeable about the stakeholders that are to be involved. The pilot activities stress the importance of collaboration with existing networks and personal contacts to the underrepresented communities in order to create links to the groups and most importantly create trust amongst group members – a precondition to dare engaging in scientific activities. We also learned about the motivational aspect of creating more playful and creative ways to engage hard to reach groups and the significance of providing a portfolio of formats to engage.

Especially when it comes to establishing long term relationships between citizens and researchers, the bi-directionality of communication is very important, providing citizens with an understanding of the importance of their contributions and allowing them to become part of the bigger story surrounding their efforts. All these aspects highlight how important the very local and adapted work is when it comes to engaging groups that are “easy to ignore”<sup>7</sup>.

We learned that the social benefits of involvement need to be considered in designing and communicating CS activities for communities farther removed from the science system: the benefits for participants in getting together, in being heard and valued for their contribution in a group of relevant others. These social benefits are especially important motivational drivers and complement aspects like increasing knowledge about a certain topic and supporting research on important social issues. It is interesting to observe in the context of these small pilots that important groups within our society seem to have the feeling that they are not sufficiently heard and involved in innovative conversations on solving pressing issues that affect them directly. Thus, we see potential here for new impact assessment metrics for the assessment of social impact to evolve.

<sup>7</sup> <https://pos.sissa.it/393/017/pdf>



From the exchange with the wider European citizen science community we retrieved some important questions and challenges related to social impact assessment that triggered structured work and mobilised various community members to collaborate on furthering solutions in the context of an ECSA working group on impact assessment.

### **3.1.4. Further evaluation and social impact assessment in second half of the project**

In the second half of the ECS project, we will continue with the collection of outputs, outcomes and impact stories from ECS partners, affiliated entities, and ambassadors. We will collect further insights from the ECS inclusive pilots and will stimulate and document discussions on social impact assessment as part of the ECSA Working Group on Impact Assessment, while seeking further opportunities to collaborate with the European citizen science community.

## **3.2. Political Impact**

The political dimension of citizen science arises from the ways in which it challenges traditional power dynamics and promotes democratic participation in scientific decision-making processes. Citizen science practices allow individuals to actively contribute to policy discussions, influence research agendas, and hold institutions accountable. We can thus expect a political impact of citizen science activities at various levels and for different purposes. For instance, citizen science can contribute to shaping R&I policies and influence specific policy areas, such as social or environmental policies.

Any political impact achieved by citizen science activities is inevitably closely connected to their social or societal impact. Raised awareness and support for CS on a political level is beneficial to the widespread implementation of the society-research collaborations that address urgent societal and environmental issues and thus directly and indirectly affects our society and the way we arrange our governing structures and processes



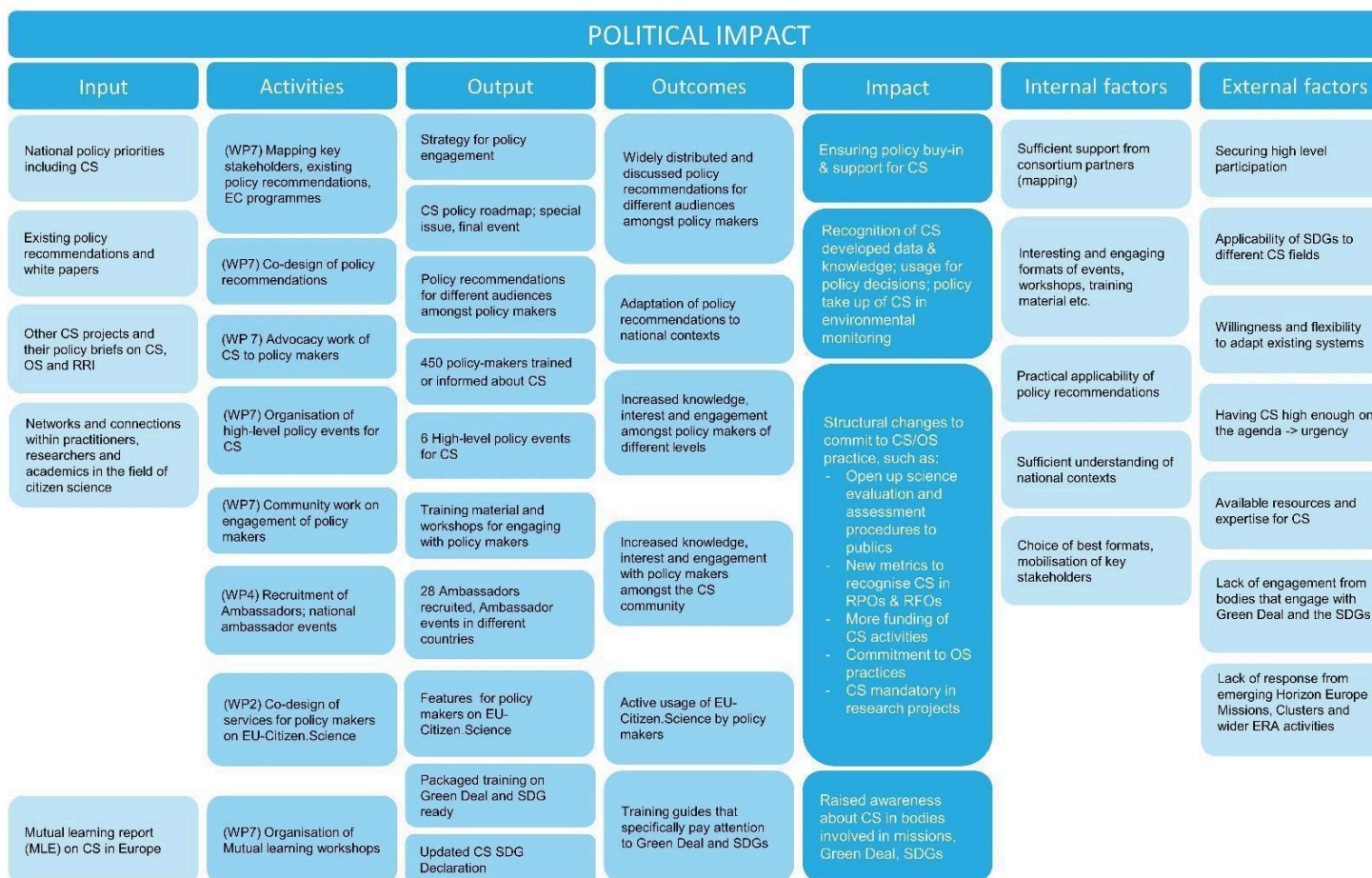


Figure 5: Political impact logic model (represented in more detail in D8.1)

For ECS, it is a core objective to create political impact as we strongly believe in the potential of citizen science to support evidence-based policy making and to contribute to the societal challenges we are facing globally. The specific impacts we aim to contribute to with ECS are outlined in the logic model shown in Figure 5 above.

We aim to:

- ensure the policy buy-in and support for citizen science, as political commitment to and support for citizen science still varies greatly across European countries.
- foster the recognition of CS developed data and knowledge and its usage for policy decisions.
- drive the change of national and European R&I strategies to allow citizen science to prosper, e.g., by embedding citizen science in funding schemes, education/curricula, as well as evaluation processes.
- raise awareness about citizen science in bodies involved in missions, Green Deal, SDGs monitoring.

### 3.2.1. Activities of partners, AEs and ambassadors contributing to the political impact so far

In Chapter 3 we summarised the many activities implemented by ECS partners, affiliated entities and ambassadors. Through this, we could show how meetings with political decision makers and funding agencies at local, national, European and international level positively influence policy awareness and buy-in. The ECS partners are conducting a portfolio of activities that contribute to the political impact of citizen science. Our partners are collaborating with the governmental entities at local and national level, including national and federal ministries, councils and municipalities, to show the importance of citizen involvement in science and the value of citizen generated data for decision making, to highlight the importance of funding, and to get support for national centres or networks for citizen science. In Germany, our partner MfN is involved in implementing the German Citizen Science Strategy 2023, developing a German award for excellent citizen science-based research, fostering networks of decision makers across national borders, and establishing links between citizen science, makerspaces and fablabs. The ECS ambassadors of Bulgaria and Malta are currently involved in developing citizen science strategies for their countries. In total, the various ECS ambassadors have organised around 20 meetings with policy makers and funders to advocate for CS.

Some partners are specifically engaged in assessing the barriers and opportunities for improved policy integration of citizen science for biodiversity at a local, national and EU scale (ECSA), the integration of Danish citizen generated data to the international biodiversity monitoring framework

(NORDECO), the collection of biodiversity data and derived policy recommendations (BWI), or the promotion of citizen science to nature conservation groups (MOFET).

Building on the work of the [PRO-Ethics project](#), ECS has also continued the engagement of research funding organisations (RFOs) in two peer-learning meetings, taking place in March and June 2024, which give them space to exchange on a number of questions regarding the participation of citizens in research and innovation from the perspective of funding agencies, including:

- **Reasons to open R&I to participation:** Why is participation in R&I and within funding agencies worthwhile? What have we learned from the deployment of participatory processes, and what evidence can we offer on its effectiveness? Also, what kind of evidence is needed and how might it be collected?
- **Funding citizen science and participation in R&I:** What are existing experiences and best practices on citizen science funding programs? How should such programs be designed, and which evaluation criteria might be applied for proposals and projects? How can such programs be designed in an accessible manner and disseminated to eligible organisations and entities? How can scientific outcomes of R&I projects be balanced with the needs of low-threshold funding and participation?
- **Specificities of participatory processes:** What are the needs of participatory processes, in terms of resources, flexibility, and expertise, and how much of an additional burden is put on involved stakeholders? How much support is necessary, and who should provide it? How much structure needs to be pre-defined, how much flexibility must be given?
- **Ethics and integrity:** How can research ethics and integrity be effectively embedded into the participatory process? How can it be made inclusive and accessible while participants are neither overburdened nor exploited? How can scientific and financial interests be balanced when it comes to involving third parties? How can different stakeholder needs and interests be balanced, and who is responsible to take care of this?

These meetings have connected a total of 20 RFO representatives from organisations invested in CS funding, who shared best practices and discussed solutions to potential challenges, including the practicalities of setting up an evaluation procedure to accurately assess both scientific and participatory aspects of proposals, and the tension between agency mandates and adapted eligibility criteria needed for opening up science.

In addition to all these efforts, ECS organised two high-level policy events that we want to introduce here:

### 3.2.2. Citizen science and research assessment reform: notes from the first ECS high-level policy event

As part of its policy engagement work, the ECS project organises a series of online policy events with high-level experts and decision-makers from both academia and politics. The first of these events took place on 15 March 2024 under the title *Redefining Excellence: The CoARA Agreement as an Opportunity for the Citizen Science Community*. It was facilitated and moderated by Alan Irwin (Copenhagen Business School), with expert inputs provided by Angelee Pavanee Annasawmy (Marie Curie alumna, French ECS ambassador), Eva Méndez (CoARA Steering Board, Universidad Carlos III de Madrid), Diana Bowler (UK Centre for Ecology & Hydrology), Georgios Papanagnou (EC DG RTD) and Bregt Saenen (Science Europe).

Focus of this session was the role of citizen science in reforming research assessment and redefining scientific excellence, responding to increased calls for a reform of research assessment to move beyond the limitations of quantitative indicators such as the journal impact factor. Following the conversations laid out in both the [Declaration on Research Assessment \(DORA\)](#) and the [CoARA Agreement](#), our high-level policy event focused on how the citizen science community could put citizen science on the CoARA Coalition's radar and, more generally, make its voice heard in the current debate around research assessment reform.

The event aimed to collect input for concrete, actionable policy recommendations and invite participants to join a co-designing process for a policy brief on the topic. The main points made during the panel discussion can be summarised as follows:

- CoARA is a fantastic opportunity to raise awareness and advocate for citizen science among research funders and policy-makers.
- If we want to create a thriving, innovative and impactful citizen science landscape in Europe, we need to set the right incentives. To do that, research assessment reform is essential.
- We need to concretise the place of citizen science in the CoARA Agreement not at the programmatic level, but at the level of operationalisation and implementation.
- The goal is to establish citizen science as one of many practices or approaches that can produce excellent, innovative and impactful research, not to turn citizen science into a box that all researchers, research institutions and research projects need to tick.

The CoARA Agreement is paving the way for a transformative cultural shift towards a more nuanced, holistic and socially responsible system of research assessment – a system that uses a combination of different criteria, indicators and metrics to acknowledge and reward diverse scientific contributions. It is up to us to make sure that these new criteria and indicators also recognize involvement in citizen

science or other forms of public engagement. To do so, we need to build convincing arguments for the benefits (and limitations) of citizen science, provide concrete input for the development of assessment criteria and indicators, and work towards change at the institutional level.

The event provided the ECS project and all participants with a better understanding on how to position and drive CS via the CoARA agreement. The project has created a mailing list of people interested in a follow-up workshop, which might be the first steps towards creating a working group proposal for the next working group call of CoARA.

Please find the full report in the [Annex of this document](#).

### **3.2.3. Securing the future of citizen science in Europe: the ECSA 2024 policy panel**

In early April 2024, hundreds of CS practitioners, researchers and policy-makers gathered in Vienna, Austria, to attend the ECSA Conference 2024. The three-day conference opened with a panel discussion jointly organised by BOKU Vienna/Österreich forscht, the Citizen Science Global Partnership, and the ECS project. Inspired by the conference motto 'Change', Susanne Hecker (ECSA, Museum für Naturkunde Berlin), Barbara Weitgruber (Austrian Federal Ministry of Education, Science and Research, ERAC), Dejan Dvorsek (EC DG Research & Innovation), and Maina Muniafu (CitSci Africa Association, Citizen Science Global Partnership) talked about current trends and the future development of citizen science within and beyond Europe.

What became very clear in the course of the discussion is that the European CS community is at a crossroads. Both the mid-term evaluation of Horizon Europe and the drafting of its successor, Framework Programme 10, are currently underway. The results of the 2024 European elections will likely lead to a shift in political priorities and to personnel changes, including the appointment of a new Commissioner for Innovation, Research, Culture, Education and Youth.

Therefore, continued funding and political support on the scale we have seen in the past few years is not a matter of course. To secure a future for citizen science in Europe, it is thus crucial that we, as a community, actively engage with policy-makers to raise awareness about the benefits and potential of citizen science and showcase its added value for science, society, and policy. The use of CS-generated data in evidence-based policy development is one example of this added value. Good practice in this regard are National Statistics Offices in several African countries that have already begun integrating CS data into official monitoring frameworks and thereby demonstrated its reliability and utility.

During the panel it was stressed that it is essential to decouple the future development of the field from the positions and agendas of individual political actors to ensure the long-term mainstreaming of CS. In other words, the aim should be to institutionalise CS by embedding it into legislation and



strategic political programs, such as national research pacts. To make a case for its relevance and worth within the broader research landscape, linking citizen science to other EU policy priorities, such as research assessment reform or knowledge valorisation, was suggested.

Further underlining the need for timely and concerted advocacy on the part of the CS community, the European Commission is, in the context of its work on Framework Programme 10, actively collecting voices and position papers. It is thus imperative at this junction for the CS community to voice their needs loudly and clearly.

In brief, change is on the horizon, and it is up to us as a community to steer that change in a positive direction for citizen science in Europe.

*Table 3: Political impact - outputs and outcomes from the two high level events at end of Y2*

Political impact - key activities	Outputs and initial outcomes at end of Y2	Future means of data gathering
Panel discussion during the ECSA conference	<b>Outputs:</b> <ul style="list-style-type: none"> <li>Discussion on policy relationships and links of CS with 4 panellists</li> <li>Around 300 participants in the panel discussion</li> </ul> <b>Outcomes:</b> <ul style="list-style-type: none"> <li>Increased understanding of actual needs to improve relationship to policy makers</li> <li>ECSA policy working group drafting a paper/policy brief to further support CS in FP10</li> </ul>	<ul style="list-style-type: none"> <li>Access to policy brief and uptake of recommendations</li> </ul>
High level policy event on CS and the CoARA agreement	<b>Outputs:</b> <ul style="list-style-type: none"> <li>Discussion on the link between CS and the CoARA agreement with 5 panellists</li> <li>137 registered participants</li> <li>71 people joining the actual event</li> <li>33 signed up for a follow-up workshop to co-design a policy brief</li> </ul> <b>Outcomes:</b> <ul style="list-style-type: none"> <li>Better understanding how the CoARA Agreement can be used to support CS and vice-versa, how CS can support the implementation of the CoARA Agreement</li> <li>Follow up workshop to co-design a policy brief</li> <li>Follow up networking activities to operationalise the CoARA implementation in the context of CS</li> </ul>	<ul style="list-style-type: none"> <li>Results of the follow up WG</li> <li>Implemented CS measures that support CoARA Agreement</li> </ul>



Political impact - key activities	Outputs and initial outcomes at end of Y2	Future means of data gathering
ECS ambassador program	<b>Outputs:</b> <ul style="list-style-type: none"> <li>• More than 20 meetings with policy makers</li> <li>• 2 national strategy documents in elaboration</li> </ul> <b>Outcomes:</b> <ul style="list-style-type: none"> <li>• Increased awareness for CS and it's capacity for policy making</li> <li>• Better understanding for required structural support (e.g. CS associations, CS platforms, funding calls) at national level</li> </ul>	<ul style="list-style-type: none"> <li>• Follow up with ECS ambassadors on political advancements</li> </ul>

### 3.2.4. First lessons learnt concerning the taken impact pathways

The high level policy events organised by the ECS project, as well as the meetings with local and national policy makers organised by ECS, its affiliated entities and ambassadors show how important it is for the CS community to increase the understanding of political decision makers at various levels.

To further drive CS in Europe and create a sustainable infrastructure for this science-society collaboration, the community has to actively engage with policy-makers to raise awareness about the benefits and potential of citizen science and showcase its added value for science, society, and policy. To maximise the value of CS, we as a community need to develop and proactively communicate best-practice standards and quality criteria, and bring evidence for the impact CS has on its diverse stakeholders. Suggestions to this end included engaging with policy maker needs to support the embedding of CS into legislation and strategic political programmes, as well as linking CS to other EU policy priorities such as research assessment reform or knowledge valorisation. Thus, the work on strategic documents like the Global Science Forum Citizen Science Working Group of the Organisation for Economic Co-operation and Development (OECD), the Science Communication G7 Working Group, etc. need to be further fostered and enriched by experiences of the whole European CS community.

The CoARA Agreement is one strong opportunity to make a case for CS during its implementation, as it does already contain a clear commitment to public engagement and collaboration with societal actors. This means providing concrete input for the integration of citizen science into new research assessment criteria, indicators and procedures currently being developed at the institutions that have signed the CoARA Agreement.

At the same time, we also see the need to explore new funding opportunities such as social innovation grants, funding from cities, municipalities, and environmental agencies, to address the broader needs

and open up the wider potential of citizen science initiatives beyond the often strict mandate experienced by funding agencies.

### **3.2.5. Further evaluation and political impact assessment in second half of the project**

In the second half of the project, ECS will continue with the collection of evidence for political impact generation from its partners via impact stories and reports. In the same vein, we will follow up with ECS ambassadors and affiliated entities. An important activity will be the evaluation of the work done during the implementation of the CoARA agreement, the remaining 3 high-level policy events, the co-design of policy recommendations, and the planned efforts towards further aligning citizen science activities and the UN Sustainable Development Goals (SDGs). With a plethora of policy interventions still planned until the end of the project, a lot of impact is expected to unfold in the next two years.

## **3.3. Scientific Impact**

Scientific impact was envisioned to result from the following activities from the following various work packages in the ECS project (See table 4). Section 3.3 reports on the activities that were carried out during year one (Y1) and year two (Y2) of the ECS project, and how it has contributed to the goal of scientific impact of the ECS project. Moreover, the project is at its halfway point, therefore this Section 3.3 moreover elaborates on how it seeks to achieve its objectives by the end of Y3 and Y4.



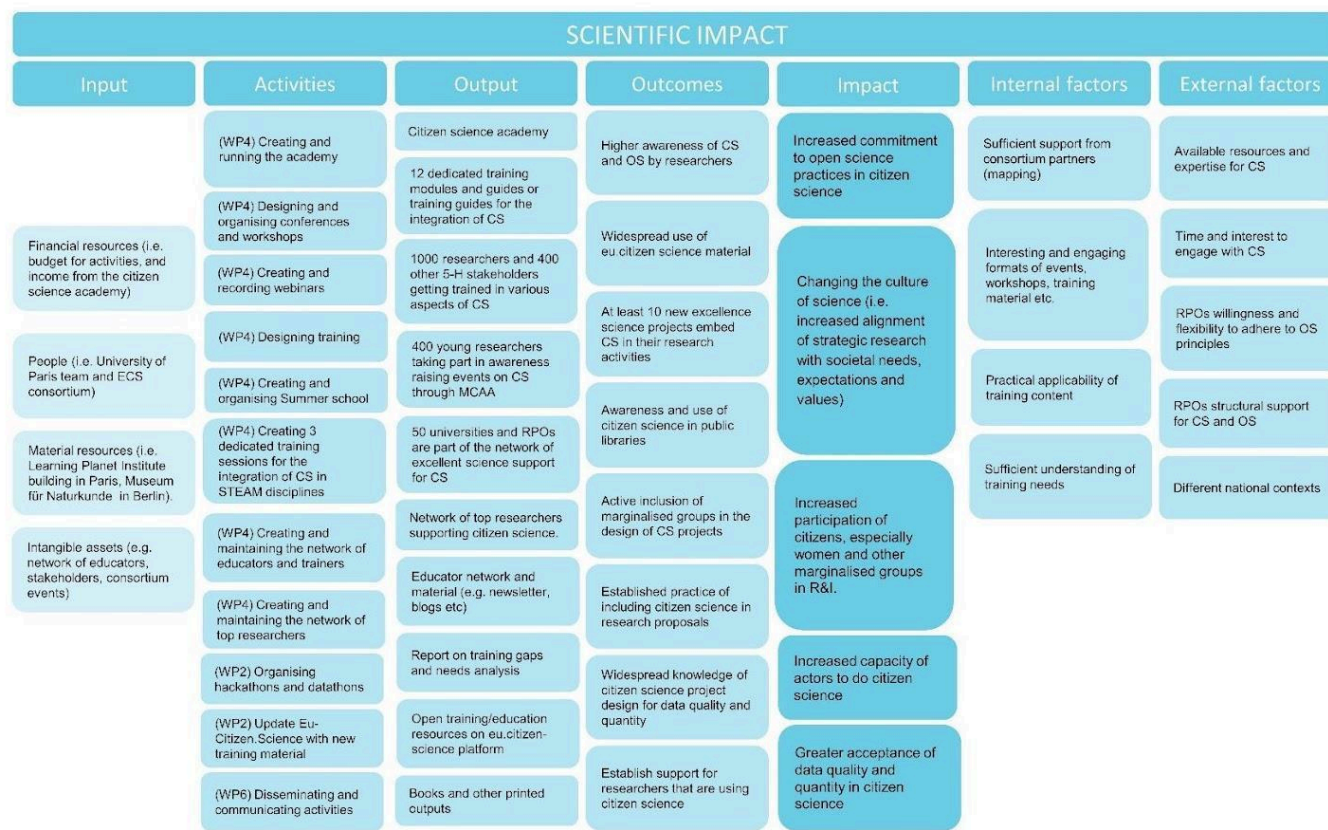


Figure 6: Scientific impact logic model (represented in more detail in D8.1)

*Table 4: Activities planned of the logic model to achieve scientific impact*

Activities	Work Packages
<ul style="list-style-type: none"> <li>- Creating and running the academy</li> <li>- Designing and organising conferences and workshops</li> <li>- Creating and recording webinars</li> <li>- Designing training</li> <li>- Creating and organising summer schools</li> <li>- Creating 3 dedicated training sessions for the integration of CS in STEAM disciplines</li> <li>- Creating and maintaining the network of educators and trainers</li> <li>- Creating and maintaining the network of top researchers</li> </ul>	Work Package 4 - European citizen science academy
<ul style="list-style-type: none"> <li>- Organising hackathons and datathons</li> <li>- Update eu-citizen.science with new training material</li> </ul>	Work Package 2 - Strengthening links and collaboration
<ul style="list-style-type: none"> <li>- Disseminating and communicating activities</li> </ul>	Work Package 6 - Communication and outreach for the global citizen science community

In Y1 and Y2 the ECS project worked on the following activities believed to contribute to scientific impact: Creating and recording webinars; designing training; creating and organising summer schools; creating and maintaining the network of educators and trainers; creating and maintaining the network of top researchers; organising hackathons; and disseminating and communicating activities. The following subsections (3.3.1, 3.3.2, 3.3.3) report on these activities and their contribution to scientific impact.

### 3.3.1. Training & Events

Over the course of Y1 and Y2 the ECS Academy carried out a range of training activities that were aimed at two aspects of increasing scientific impact. First, there is a need to increase awareness of citizen science among scientists. For many scientists at R1 (See [Research profiles descriptors | EURAXES](#)), creating a citizen science project is beyond their capacities and time scale. However, at this stage they should learn about the potential of the methodology and when it should be deployed.

This will mean that participatory approaches are potentially selected for future projects. The second aim of training is the provision of skills and improved capacities to run citizen science. This will be relevant to researchers at all levels - for an R1 that joins a citizen science project, it can provide new skills such as community engagement, while for an experienced researcher at R3, it can provide a resource to improve their competencies or to train a research assistant.

In this section, we first report on training that was offered and given to the ECS network of researchers for citizen science, a joint collaboration between MCAA and UPCité/LPI. These trainings contribute to raising awareness of citizen science. Second, training events carried out as part of the ECS Academy are highlighted that contribute to both raising awareness and provision of skills and improved capacities to run citizen science. Third, events that contribute to raising awareness about citizen science to communities of researchers are highlighted.

### ECS network researchers for citizen science training meetings

As part of T4.3 a network of researchers that used citizen science as a research methodology or were interested to do so was created. This was done via a survey that was sent in July, 2023. A total of 173 responses were received. This was a joint collaboration between MCAA and UPCité/LPI, members of the task.

The network currently has 173 members and has been engaged regularly for network meetings that include a 25 minutes training session, a 5 minute network member presentation on the topic of training and a 30 minute discussion. So far, four of these network members' training have taken place, with three more planned for the months of August, September and October 2024. Training topics were informed by the survey, which asked what training topics researchers would be interested in receiving around citizen science. So far training topics have focused on the following: *The Building Blocks of Public Engagement*, *Participatory Mapping*, *When is Citizen Science Relevant for Different Steps of the Research Process*, *The Ethics of Public Engagement*. Three more trainings are planned until October, that will focus on the following topics: *Publishing in Citizen science*, *Data quality and Impact evaluation*.

These network meetings function well, in relation to keeping the network member base engaged. Each network meeting is joined by about 20 members. These network meetings contribute to maintaining a network of researchers in the field, allowing for network members to share their questions about a specific topic, giving them a chance to share their work. An assessment on the impact of these training on network members engagement, motivation and capacity to engage with citizen science will be carried out in October when this series of network meetings have finished. A new series of network meetings are in the process of being planned in relation to writing citizen science research proposals.

In addition these training contribute to open access training material developed by the ECS Academy, such as video recordings, power points slides, summary and transcript of recordings, in addition to a list of crowdsourced questions from participants about the topic of training. This contributes to a list of open access resources to learn about various aspects of citizen science, contributing to scientific impact, via awareness raising.

### ECS Academy trainings

The following activities, in addition to training given to the network of researchers, have contributed to the increase of awareness of citizen science among researchers.

Introductory sessions on citizen science were run in a range of contexts, for an MSc student at the university of Siena or teaching at UCL for final year undergraduate students in natural sciences as part of a course on science communication. In addition, presentation and Q&A sessions were carried out, for example as part of a workshop on Patients and Public Involvement in research and clinical support in neurotechnologies. This as mentioned above contributed to raising awareness about citizen science as a research method, its potential and when it should be adopted.

The second type of training, as noted, is aimed at improving skills and capacities. Here the activities are aimed at engaging students in a deeper way, so they gain deeper understanding and an ability to run citizen science projects. This type of training is useful for students at research levels - from Masters students and above. The activities here include three courses that are running at UCL: Foundations of citizen science, Introduction to citizen science and scientific crowdsourcing, and designing and managing citizen science. These courses are taken by students in the area of bioscience, geography and conservation. Through focused activities and hand-on experience in doing and designing citizen science, they increase their theoretical and practical knowledge. Another form of in-depth training is a training school - frequently in the form of a summer school. We are involved in the LPI summer school that is dedicated to the SDGs and addressing problems of mobility and accessibility, a summer school in Mexico, HUMETAV-CC, at the university of Guadalajara which was dedicated to addressing environmental science challenges. Students in some of these activities were asked, as part of their learning process, to contribute to citizen science projects and were asked to think about engaging non-researchers into a project they were developing or designing, as a form of participatory research. Finally, dedicated sessions with specialists in different areas such as the Luxembourg Institute of Social and Economic Research (LISER) or the experts who take the certificate in sustainability at the University of Luxembourg, or the students of the UPCité course BiodiveCité are the final examples of this form.

All this has contributed to increased awareness and interest in citizen science, which is a critical step in the development of scientific impact, to the participation in different citizen science activities directly contributing to scientific effort. Another important impact is the creation of material that is sharing best practices in citizen science with different researchers.

### Events

In addition to these training events, three meetings with the network of educators and trainers show the integration of citizen science within higher education as well as informal learning settings. The first was an event organised by UPCité/LPI as part of the Learning Planet Festival. This event was communicated as an open network meeting of the citizen science network educators and trainers, therefore open to anyone interested in the topic of “in what ways does citizen science transform education”. Five network members presented their work - with a total of 67 registered participants. In addition, two closed network meetings, which means not publicly advertised, took place to speak about developing courses on citizen science at university level (bachelor, master and PhD levels). These meetings took place because there was a need identified in the network of educators and trainers, to exchange experience, knowledge about these topics - on the ‘how to’s and an option to share resources.

During the Marie Curie Alumni Association (MCAA) conference, two events were held on the topic of citizen science which received the attention of 259 individuals. This is a first for a MCAA annual conference, demonstrating the rising need and interest of citizen science amongst researchers. After the annual conference 54 new members joined the network of researchers.

### 3.3.2. Development of training material

Another effort that allows the scaling up of citizen science and an increase in its take up is the provision of training material and curation of training material of the EU-Citizen.Science platform, as well as promotion of courses that are available elsewhere. During the reporting period, new training guides and modules were developed. This includes the development of a course on the ethics of citizen science for research funders that is based on the lesson from the PRO-Ethics project, guides for the use of the Minka platform as collaborative space for data acquisition, and five modules that are based on technical data analysis and visualisation with a focus on citizen science data (i.e. Introductions to Pandas, NumPy, Python, Jupyter Notebook and visualisation in Python).





### 3.3.3. Hackathons

#### Data acquisition

Work package 3 carried multiple citizen science events to gather valuable data on biodiversity. Two data acquisition hackathons were organised: a city nature challenge event called BioDiverCiutat and a BioBlitz/Bio Marathon using the Minka Platform. These events so far, one which is still ongoing, have gathered a total of 17,232 observations of a total of 1770 species, from a total of 257 participants. These events engage individuals in citizen science initiatives aimed at gathering data on various species. They not only directly impact scientific research through the collection of valuable data for research, but also the contribution of the public to scientific research in which they may not generally have access too.

In addition, these types of events provide educational and outreach benefits. Engaging the public in such events increases awareness and understanding of biodiversity and environmental issues. Participants learn about local ecosystems, increase their awareness of species identification, and appreciate the importance of biodiversity. This helps foster a greater understanding of nature and science.

Utilising platforms like Minka, which follows the FAIR principles, facilitates the collection, storage, and sharing of data, making it accessible to researchers and the public. This transparency and accessibility can lead to more collaborative research efforts and wider dissemination of findings.

#### Data analysis and visualisation

Beyond data acquisition, several data analysis and visualisation activities were organised. A pilot involving 11 policy makers specialising in the field of environment and territorial management was conducted. Using the [Orange Data Mining Platform](#) and the [MECODA package](#) for data analysis, biodiversity data from the MINKA platform was used to create automated workflows. The goal was to give participants the tools to analyse biodiversity data collected by the MINKA community enabling them to better answer questions related to their management areas.

In addition, a Sci-Art Hackathon was organised in collaboration with the University of Sevilla. Five art projects were created by interdisciplinary teams consisting of artists, scientists, engineers, mathematicians, and psychologists. The five artworks created by the 17 participants will be exhibited in the ARS Electronica Festival, an annual event held in Linz, Austria. Ars Electronica is known for its forward-thinking approach to art and technology and attracts artists, scientists, technologists, and thinkers from around the world, creating a space fertile for interdisciplinary dialogue and collaboration. The works exhibited in Seville in June 2024 and will be shown in Barcelona in

September 2024. The works invite the public to reflect on how citizens can contribute to better understanding and caring for our marine ecosystems affected by the Anthropocene.

*Table 5: Summary key activities contributing to scientific impact, their outputs, outcomes and future means of evaluation*

Scientific impact - key activities	Outputs and initial outcomes at end of Y2	Future means of data gathering
ECS network researchers for citizen science training meetings	<b>Outputs:</b> <ul style="list-style-type: none"> <li>• 4 training recordings</li> <li>• Open access training material (video recordings, crowdsourced list of questions, power points presentations, transcription of video recording).</li> <li>• 4 network trainings</li> </ul> <b>Outcomes:</b> <ul style="list-style-type: none"> <li>• Engaged network of citizen science researchers.</li> <li>• Increased capacity of scientists to implement and perform citizen science</li> </ul>	<ul style="list-style-type: none"> <li>• Registration forms</li> <li>• Network of researchers evaluation forms.</li> <li>• Indicators to monitor increased capacity and motivation of individual researchers, educators and trainers involved in WP4 to drive citizen science in European elite science</li> </ul>
ECS Academy Trainings	<b>Outputs:</b> <ul style="list-style-type: none"> <li>• 10 training given</li> <li>• with a total of about 346 individuals trained.</li> </ul> <b>Outcomes:</b> <ul style="list-style-type: none"> <li>• Awareness and capacity building.</li> <li>• Development of an open science course at Université Paris Cité.</li> <li>• Grant from CircleU to develop a collaboration between UPCité, Aarhus University and King's College London, using material that emerged from related EU projects (TIME4CS, Pattern, Impetus) and developing training around it.</li> <li>• International outreach of citizen science education</li> </ul>	<ul style="list-style-type: none"> <li>• Learning statistics from Moodle</li> <li>• Number of registered participants</li> </ul>

Scientific impact - key activities	Outputs and initial outcomes at end of Y2	Future means of data gathering
Events	<p><b>Outputs:</b></p> <ul style="list-style-type: none"> <li>73 members registered to mailing list of network of educators and trainers</li> <li>Developing summer school module</li> <li>A webinar on citizen science role in transforming education</li> <li>Network meeting on how to organise a summer school</li> <li>Network meeting on citizen science in university</li> <li>Workshop at MCAA conference</li> </ul> <p><b>Outcomes:</b></p> <ul style="list-style-type: none"> <li>Sharing of experience between network members about citizen science training</li> <li>Awareness raising and capacity building</li> <li>New members to the ECS network of researchers</li> <li>Increase number of people engaging with the network of researchers</li> </ul>	<ul style="list-style-type: none"> <li>Meeting minutes of a network of educators and trainers.</li> <li>Outcomes of joint activities within the network of citizen science educators and trainers.</li> <li>Number of times participants share their work, ideas, or contributions within the network (e.g., email, posts, uploads, shares).</li> </ul>
Training modules	<p><b>Outputs:</b></p> <ul style="list-style-type: none"> <li>Course on ethics of citizen science for research funders</li> <li>Guides for the use of the Minka platform as collaborative space for data acquisition</li> <li>Five modules based on technical skills - introductions to Pandas, NumPy, Python, Jupyter Notebook and visualisation in Python.</li> </ul> <p><b>Outcomes:</b></p> <ul style="list-style-type: none"> <li>Training resources that respond to needs</li> </ul> <p>New training resources on the eu-citizen.science platform</p>	<ul style="list-style-type: none"> <li>Communications about trainings offered around the topic</li> <li>Training evaluations</li> </ul>
Hackathons	<p><b>Outputs:</b></p> <p>2 Data acquisition Datathons were organised:</p> <ul style="list-style-type: none"> <li>17,232 observations uploaded on the Minka platform</li> <li>Observation of 1770 species</li> <li>Engagement of 257 participants</li> </ul> <p>Data analysis and visualisation</p> <ul style="list-style-type: none"> <li>1 data analysis and visualisation pilot with policy makers was conducted with 11 participants.</li> <li>1 Sci-Art Hackathon held in collaboration with the University of Sevilla.</li> </ul>	<ul style="list-style-type: none"> <li>Observations uploaded on the MINKA platform</li> <li>Pre-event survey</li> <li>Post-event survey</li> </ul>

Scientific impact - key activities	Outputs and initial outcomes at end of Y2	Future means of data gathering
	<ul style="list-style-type: none"> <li>○ 5 art projects developed by interdisciplinary teams (artists, engineers, mathematicians, psychologists).</li> <li>○ Engagement of 17 participants.</li> </ul> <p><b>Outcomes:</b></p> <ul style="list-style-type: none"> <li>● Lessons learned on the organisation of Datathons and data analysis workshops</li> <li>● Guides for using the Minka collaborative spaces will be published through Zenodo.</li> <li>● Publication to understand user engagement and how to organise a data acquisition event such as a bioblitz will be created for the Citizen Science Academy.</li> <li>● Massive Open Online Course on data analysis and visualisation will be created as a resource for the Citizen Science Academy.</li> <li>● 5 works developed from the Sci Art Hackathon will be exhibited in the ARS Electronica Festival in Linz (Sept, 2024), Seville (June, 2024), Barcelona (Nov, 2024).</li> </ul>	
Activities carried out by affiliated entities	Section 2.3 elaborates on the work of affiliated entities that have contributed to scientific impact.	

### 3.3.4. First lessons learnt concerning the taken impact pathways

Table 3.3b recaps the outputs and the outcomes resulting from the various activities carried out by the ECS consortium in relation to scientific impact.

Here are the first lessons that we have learnt in relation to carrying out and achieving scientific impact. The first lesson is about the effort and time that is required in co-creation of a complex virtual entity such as the ECS Academy. While this is an aspect of co-production that is well documented in the literature, the process that developed during Y1 to the end of Y2 provides yet another indication for the importance of allocating time and resources for such processes. The effort during this period focused on the continued development of the foundations of the means through which we aim to achieve the impact. The ECS Academy needed a longer development period to ensure that the views of as many stakeholders as possible are considered. Based on the effort of setting up a roadmap for the ECS Academy (see deliverable D4.1) and the identification of the ECS Academy within the legacy

planning (see the report on T6.4), the focus remained on establishing the framework on which the ECS Academy can be built. This includes building and activating two networks (citizen science educators and trainers and early career researchers) and carrying out a range of pilot activities or development of training material that can be used in the second part of the project.

Secondly, the activities of ECS in improving scientific impacts through education, training, and monitoring continued to focus on setting up the foundations for the ECS academy and establishing practices of working and collaborating in the two networks. Progress was made in the technical infrastructure (mailing list, moodle), soft infrastructure (building the communities of educators and trainers, and the one with researchers), as well as on identifying appropriate services that the ECS Academy will provide. A major challenge is that the field of citizen science education is wide - there are a lot of citizen science training happening via various institutions in many different European countries. During this period, it became clearer that reaching out to all the institutions and NGOs that are involved in citizen science required careful planning. The effort of reaching research funding organisations, for example, is one that requires getting in touch with the correct gatekeepers. Therefore, careful planning and periods of reflection and research are necessary for such processes.

Finally, it is worth emphasising that there is a need for a dedicated effort to activate and continue to animate the networks that were created with ECS. Because the network of educators and trainers was mostly operating as a broadcasting network due to the lack of mailing list infrastructure, even when such a list was established, the traffic on the network only happened when the network coordinators took the initiative to send a message. The network of researchers has a little more bi-directional communication but is still lacking communication between network members. This is a challenge that will be addressed in the next period.

In terms of the hackathons and datathons organised, the main lessons learned thus far are that data mining tools such as Orange Data Mining and the MECODA package are powerful tools that help decision-makers make informed decisions based on science and evidence. However, the installation process of these tools proved to be complicated for many new to data analysis. This led us to create a Massive Open Online Course, which will be available as a resource on the Citizen Science Academy. We hope that the step-by-step instructions and exercises provided in the course will be helpful to future participants in hackathons and datathons.

Regarding the data acquisition events, we learned weather can negatively impact participation for short events, such as the four-day BioDiverCiutat. To address this, we complemented the four-day event with the BioMarathon, a five-month data acquisition datathon. The collaboration with citizens during the BioDiverCiutat event resulted in important insights for scientists through the registration of 61 exotic species, of which 26 are invasive species, such as the red algae (*Asparagopsis taxiformis*)

and the marine bristle worm (*Branchiommma luctuosum*). The count also includes four threatened species or those under some form of protection.

### 3.3.5. Further evaluation and scientific impact assessment in the second half of the project

In the second half of the project, we are planning to carry out the following activities aimed at identifying and monitoring scientific impact of the ECS project:

- We will evaluate the effect of the trainings delivered with or by the ECS Academy, on researchers' capacity to implement citizen science activities.
- Collect evidence from the network of educators and trainers about their reach and both anecdotal and quantifiable information about the impact that they have with their students.
- 10 new excellent science projects embed citizen science in their research activities - we will follow up with the researchers that were mentored or learned about citizen science through the ECS effort.
- Collaborations and delivery of trainings on STEM disciplines
- Working with ECS partners and affiliated entities to check which of the elements of the impact pathways materialised in their organisations and activities over the past three years.

## 3.4. Institutional Impact

Citizen science holds the potential to have a significant institutional impact in creating more open, and transparent research processes that involve citizens in addressing urgent societal needs. As noted above, both the basic and applied potential of citizen science is far from fulfilled and most science happens within organisations such as universities, research institutions, small and medium sized enterprises (SMEs), non-governmental organisations (NGOs), etc. While citizen science is primarily associated with its societal benefits, it also has important implications for institutions themselves. The institutions that are adopting citizen science practices need to go through cultural, organisational, and practice transitions to support it fully and to get the expected benefits. Therefore, the institutional impact can be defined as the transformative changes that occur within the organisation because of the engagement and involvement of citizen science initiatives.



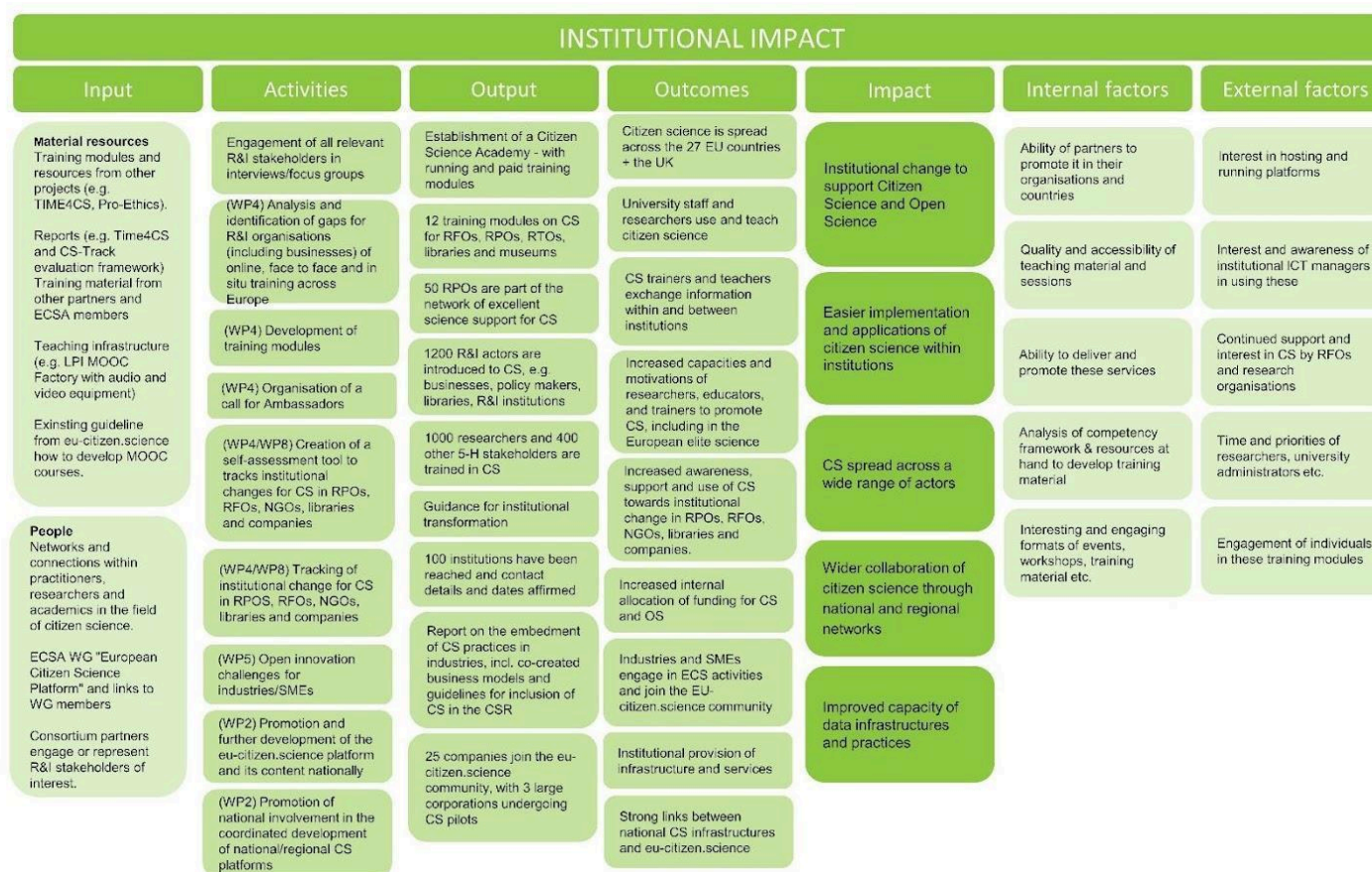


Figure 7: Institutional impact logic model (represented in more detail in D8.1)



Institutional impact was envisioned to result from the following activities from the following various work packages in the ECS project (See table 6). This section reports on the following activities that were carried out during Y1 and Y2: development of training modules, organisation of a call for ambassadors, creation of a self-assessment tool to track institutional changes for citizen science in RPOs, RFOs, NGOs, libraries and companies, promotion and further development of the eu-citizen.science platform and its content nationally and the promotion of national involvement in the coordinated development of national/regional CS platform. Moreover, the project is at its halfway point, therefore this section elaborates on how it seeks to achieve its objectives by the end of Y3 and Y4.

*Table 6. Activities planned of the logic model to achieve institutional impact*

Activities	Work Packages
<ul style="list-style-type: none"> <li>- Development of training modules</li> <li>- Organisation of a call for ambassadors</li> <li>- Creation of a self-assessment tool to track institutional changes for citizen science in RPOs, RFOs, NGOs, libraries and companies.</li> <li>- Tracking of institutional changes for cs in RPOs, RFOs, NGOs, libraries and companies.</li> </ul>	Work Package 4 - European citizen science academy alongside WP2 and WP8
<ul style="list-style-type: none"> <li>- Open Innovation challenges for industries/SMEs</li> </ul>	Work Package 5 - Boosting inclusion and diversity for mainstreaming citizen science
<ul style="list-style-type: none"> <li>- Promotion and further development of the eu-citizen.science platform and its content nationally</li> <li>- Promotion of national involvement in the coordinated development of national/regional CS platform</li> </ul>	Work Package 2 - Strengthening links and collaboration

### 3.4.1. Training

Starting with training, the most notable effort towards institutional change was the effort with libraries (both research and public libraries). A total of 24 public libraries were trained on citizen science. The training was carried out online on the 15th and the 22nd of May 2024. The training was developed by both the ECS Academy and SciStarter (a large US based citizen science platform), a fruitful collaboration to increase the reach and the global scope of public libraries. In addition, this

allowed the ECS Academy to benefit from the work of SciStarter on their work with public libraries. SciStarter, prior to our joint training, had developed a course for public libraries, and coordinate a network of about 1000 public libraries across the world (you can view them in the following link <https://scistarter.org/library-locations>). Our collaboration tweaked the course based on two focus groups that we carried out with the 10 public libraries engaged as part of WP5. The focus group allowed us to gather the needs and interests of public libraries in relation to training, within their context. In addition, we developed a case study, from a Slovenian public library, as supporting material to the course. The course was strongly evaluated as useful, relevant and resourceful. The evaluation form asked whether english as a language of teaching was an issue. Most participants that filled in the evaluation form (86.7%) mentioned that it was not an issue.

In addition to a public library training, UPCité/LPI collaborated with the LIBER citizen science working group to deliver a training on citizen science for research libraries. A total of 19 library executives and mid-level managers in digitalization and open science from 10 countries, including France, the Netherlands, Spain and the United Kingdom took part in the training. On a likert scale of 1-5 (5 the highest score), participants rated the masterclass to have increased their knowledge and awareness about citizen science, with 7 participants choosing 4 and 12 participants choosing 5. The evaluation form was answered by all participants (Table 7 showcases the results of the evaluation).

*Table 7. Evaluation results of LIBER masterclass*

Evaluation questions	Results
Did the masterclass increase your knowledge and awareness about citizen science?	7 (36.8%) responded 4/5 likert scale 12 (63.2%) responded 5/5 likert scale
Did the masterclass increase your understanding of the competences in your library/unit and how they fit citizen science?	2 (10.5%) responded 3/5 8 (42.1%) responded 4/5 9 (47.4%) responded 5/5
Did the masterclass increase your understanding of the processes needed to support citizen science?	11 (57.9%) responded 4/5 8 (42.1%) responded 5/5
Did the masterclass give you ideas on how to get started with citizen science?	1 (5.3%) responded 3/5 10 (52.6%) responded 4/5 8 (42.1%) responded 5/5
Did you develop a plan for supporting citizen science in your library/unit?	7 (36.8%) responded 1/5 1 (5.3%) responded 2/5 5 (26.3%) responded 3/5 4 (21.1%) responded 4/5 2 (10.5%) responded 5/5

Did the masterclass increase your citizen science network?	3 (15.8%) responded 3/5 7 (36.8%) responded 4/5 9 (47.4%) responded 5/5
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Participants to the research library masterclass highlighted that applying for external funding, prioritising the time of the staff, supporting change/changing priorities, engaging staff and senior leadership colleagues, knowledge about reaching out to relevant societal partners, lack of knowledge of citizen science, interest and trust from researchers, governance support, status outside the university were barriers and obstacles that the research libraries anticipated to face in moving forward in implementing citizen science in their library/unit.

The evaluation from these research libraries demonstrates a need and an interest in knowing more about citizen science and participating in training events to know more about it. Research libraries are embedded in universities and contribute to the institutional transformation of universities as research performing organisations in integrating citizen science as part of a university's open science dimension.

A clear institutional impact came out of this gathering, an invitation from the Director of Library and Open Science Services of Université Paris-Saclay to present citizen science to staff.

### 3.4.2. Public library community events

In addition, as part of the ECS project, PL2030 recruited 10 public libraries from its network of innovative 'Lighthouse Libraries' to join the ECS project and organise community events on different citizen science topics. To facilitate the organisation of citizen science-related events, StickyDot and PL2030 worked with the public libraries to develop action plans for their events and put them in contact with citizen science practitioners in their country, as well as their citizen science ambassadors. Six out of the 10 public libraries have organised community events on citizen science. Some of these six libraries have organised several of these community events on citizen science going beyond the scope of their contact with the ECS project. They have in addition, been thorough in collecting evaluation forms and feedback, as well as documenting activities through short descriptions, photos, and videos. This showcases a strong enthusiasm for participating in citizen science. Box 4.3a, 4.3b, 4.3c, and 4.3d summarises the activity carried out by the public libraries in Poland, Slovenia, Finland, and Latvia, who have already completed their activities and provide some of its ensuing results.

#### Box 4.3a. Output of Municipal Public Library of Kudowa-Zdrój citizen science activity

The Municipal Public Library in Kudowa-Zdrój organised a Citizen Science Day in collaboration with the local National Park with a focus on pollinating insects. Participants showed great interest in the citizen science project. The event also created synergies between local organisations for future collaborations on citizen science; for example, during a presentation from the local National Park, a nearby open-air museum director discovered their museum was perfect for observing insects and volunteered to be included in the project. In addition, a local kindergarten was interested in participating in field research. While the event was attended by more people than expected, the library also shared their feeling of disappointment towards local authorities and University of Third Age, which left in the middle of the event and were not very clear in their communication. However, the enthusiasm shown by those who participated in the project gave the librarians a renewed motivation to pursue further activities and projects.

#### Box 4.3b. Output of Kranj City Library in Slovenia's citizen science activity

In 2023 and 2024, the Kranj City Library organised a series of seven lectures by experts in the field of natural beekeeping, dangers for bees, urban beekeeping, bee products, their medicinal properties and apitherapy, and wild pollinators and their irreplaceable role for biodiversity. On the balcony of the library, together with the local beekeeping society and their expert, the library established a 'hotel for wild pollinators' - nests for bumblebees and insect boxes for alternative pollinators - i.e. wild bees, solitary bees, fluttering flies, butterflies, beetles and wasps. The nests were designed in a workshop together with children, parents and other library visitors.

#### Box 4.3c. Output of Viikki Library in Finland citizen science activity

In May 2024, the Viikki Library organised an event 'Explore Nature with Us' to introduce citizens and library patrons to the field of citizen science, and showcase ongoing research projects that utilise observations made by citizens. The library invited four citizen science experts to present citizen science and how library patrons can get involved. Following this first event, the Viikki Library organised two nature walks in collaboration with the Natural History Museum. The walks introduced participants to citizen science and how to use the iNaturalist app to conduct nature observations for researchers. The nature walks gathered over twenty library patrons interested in citizen science, both young and older, demonstrating interest from all age groups. Feedback from the participants showed that citizen science was unfamiliar to them, but many shared that learning about citizen science through hands-on activities made it more exciting and engaging. Many participants noted they would continue making observations after the walk and were inspired to learn more about species identification.

#### Box 4.3d. Output of Valmiera Library in Latvia's citizen science activity

The Valmiera Library in Latvia, has organised several activities and events on citizen science throughout 2024 to popularise citizen science and promote public participation in scientific research. The activities organised include an educational field trip to local natural springs, an initiative to collect place names and stories with teenagers and senior citizens from the region, learning about responsible use of artificial intelligence (AI) tools, and discovering the importance of observing nature. All activities were organised together with experts in the field, including one of the 28 ECS Ambassadors, Sanita Reinsone, PhD, the leading researcher of the Institute of Literature, Folklore and Art of the University of Latvia. The target group of the activities so far have been teenagers and young people, as well as older people, or anyone interested in the topic.

Overall, feedback from the participants of the different activities showed interest and enthusiasm in citizen science, and pursuing this further. The evaluation postcards from the teenagers who participated in one of the library's citizen science workshops provided a more mixed result. While some showed interest in informing others about citizen science and getting involved in future citizen science projects, others were less enthusiastic. However, their school plans to integrate citizen science into one of their school projects next year.

The remainder of the public libraries are expected to organise their activities in the second half of 2024. In October 2024, PL2030 is organising an in-person meeting in Ljubljana, Slovenia for the public libraries to share experiences and best practices. This will also serve as an opportunity to reflect and think about how they will continue developing citizen science activities beyond the ECS project.

#### 3.4.3. Self-assessment impact tool

As part of T8.2 a self- assessment tool on institutional integration of citizen science for different kinds of institutions, such as public libraries, research funding organisations (RFOs), research & technology organisations (RTOs) and research performing organisations (RPOs) was developed by an intern hired by UPCité/LPI. The self-assessment tool was developed from previous work done within the framework of an EU-funded project called [TIME4CS](#).

The adaptation process of the TIME4CS self-assessment tool for a wider range of institutions required consideration of different organisational and management schemes. It was essential to factor in the activities and the distinct management frameworks within which citizen science operates in research funding organisations or public libraries. This ensured that the tool could be effectively integrated and utilised across various settings, enhancing its relevance and applicability to a broader spectrum of research environments. Table 8 highlights specific indicators of institutional transformation for citizen science to RFOs and public libraries that were developed in ECS.

*Table 8: Specific indicators to RFOs and Public libraries in relation to institutional integration of citizen science.*

Intervention areas	Research funding organisations	Public libraries
Policy and assessment	<ul style="list-style-type: none"> <li>- Percentage of funding calls explicitly mentioning citizen science as a valued approach</li> </ul>	<ul style="list-style-type: none"> <li>- Existence of guidelines/documents addressing data quality, ethics, and evaluation.</li> </ul>
Support research	<ul style="list-style-type: none"> <li>- Existence of dedicated funding streams or quotas for citizen science projects.</li> <li>- Number of joint projects funded and the extent of collaboration between academics and citizen scientists</li> </ul>	<ul style="list-style-type: none"> <li>- Availability and accessibility of curated collections supporting citizen science approaches</li> </ul>
Education awareness	<ul style="list-style-type: none"> <li>- Number of educational materials developed to generalise citizen science methods in research methodologies, and number of institutions adopting these materials.</li> </ul>	<ul style="list-style-type: none"> <li>- Number of advocacy events, publications, or meetings promoting citizen science.</li> <li>- Number of guides distributed on how to get involved in citizen science, best practices, citizen science index for citizen scientists to get involved.</li> </ul>
Resources and infrastructure	<ul style="list-style-type: none"> <li>- Amount of funds allocated to development and maintenance of technological platforms that facilitate citizen science (e.g., data collection apps, online collaboration tools, and databases)</li> </ul>	<ul style="list-style-type: none"> <li>- Number of tools/platforms available to the public</li> <li>- Existence of digital and physical repositories.</li> <li>- Availability of collaboration spaces.</li> </ul>

		<ul style="list-style-type: none"> <li>- Available data management services and infrastructure to support citizen science initiatives</li> </ul>
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To assess the self-assessment tool's functionality, a pilot study was undertaken with an array of different organisations including RPOs, RFOs, libraries (both public and research), museums, NGOs and companies. From July 1st to July 17th, 14 meetings were held by UPCité/LPI intern.

The pilot revealed the self-assessment tool's different values: the tool was found to be more useful to some participants than others. Institutions more advanced in the integration of citizen science, some of which have a designated citizen science unit, already have established robust frameworks and methodologies for incorporating citizen science, found the tool less useful as less experienced institutions. This self-assessment tool, in this case, allowed to shed light on what has already been achieved, therefore fulfilling its objective of providing a comprehensive review of current practices and identifying areas of strength. However, this tool did not appeal as a roadmap to organisations that have extensively developed citizen science initiatives, but on the contrary may appear redundant. For instance, the North Carolina Museum of Natural Sciences, which initiated their citizen science initiatives in 2001, did not find this tool beneficial for an organisation of their seniority in the field of citizen science, hence they are not the primary target. On the other hand, institutions less experienced with citizen science are provided with a tool particularly valuable for guidance and support. In fact, the same tool when completed with the University College Dublin Library had a different value. As an institution that's actively been working in citizen science integration for a year, this tool sparked some opportunity and ideas to solidify citizen science strategy in the organisation. Not only did the tool reinforce their perspective on their existing activities and strategic planning, but it also highlighted opportunities for further impact and growth, ensuring continuous improvement in their citizen science initiatives. This disparity highlights the importance of tailoring resources and tools to meet the diverse needs of institutions at different stages of their citizen science integration journey.

Essentially, the tool contributes to institutional impact as institutions are better able to know where they stand in terms of their citizen science institutionalisation as well as pinpoint specific areas that require development. For emerging institutions, the tool can act as a roadmap, providing essential guidance on how to develop and implement successful citizen science integration. Furthermore, the self-assessment tool's ability to highlight both strengths and weaknesses provides a balanced perspective, encouraging institutions to celebrate their achievements while also addressing areas



that need improvement. This balanced approach can boost morale and motivation among staff and volunteers, as they can see tangible progress and set realistic goals for future development.

#### **3.4.4. Eu-citizen.science platform co-design**

In Y1 and Y2, 6 workshops were carried out, through a co-design process to facilitate user participation in shaping the future development of the eu-citizen.science platform. These workshops are described in more detail in Chapter 3.5.1.

The co-design process of the platform contributed to institutional impact through strengthening institutional collaboration by involving a wide range of stakeholders. The workshops facilitated a network of institutions committed to the advancement of citizen science. This collaboration showed that institutions can leverage each other's strengths and resources, leading to more robust and effective citizen science initiatives. In addition, participating institutions have developed their capacity to engage with and contribute to the eu-citizen.science platform. This includes improving their ability to identify and address user needs, develop relevant functionalities, and integrate new services. As a result, institutions are better equipped to support citizen science activities and contribute to the platform's ongoing development. By directly involving users in the design process, institutions have learned to prioritise user needs and preferences, leading to more user-friendly and effective citizen science platforms. This shift towards a user-centred approach is expected to have lasting benefits for institutional practices and policies related to citizen science.

#### **3.4.5. Supporting the development of national citizen science platforms**

The primary aim of this activity is to offer technological support and assistance in the use and co-development of the open-source code of the eu-citizen.science platform. It is described in more detail in Chapter 3.5.3.

From an institutional impact point of view this collaborative approach has fostered a shared understanding and commitment to interoperability and best practices amongst the diverse stakeholders from different countries involved in the activities. Two national platforms have been developed since the start of the ECS project in [Brazil](#) and [Portugal](#), one is concretely planned for Spain and others are in discussions, and the focus on sustainability has been a key aspect of this activity. By providing countries without existing national platforms the opportunity to adopt this new technology, the project has significantly expanded the reach and impact of citizen science by providing a place for CS projects to be presented and making the CS community more visible to external audiences. The developed API allows projects and national platforms to link to the eu-citizen.science platform. The exchange of data from eu-citizen.science to other platforms via the API has already been realised for the [Swedish national CS platform](#), for the [CS Track](#) and for the [VERA platform](#) that supports SSH CS and was developed in the [COESO project](#). There are currently discussions to facilitate the data

exchange with the two CS platforms in France ([Particip-Arc](#) and [Science ensemble](#)), the one in [Denmark](#), and the planned Amazon Region CS platform.

### 3.4.6. Securing external funds

Another important activity toward institutional change is the securing of funding from the local universities alliance of which UPC is part of, called Circle-U, to develop and deliver two citizen science related courses at the University of Aarhus, King's College London, and Université Paris Cité. The courses will be promoted in the framework of the open campus of the Circle-U alliance, and are aimed to increase awareness for the importance of citizen science within open science. It is noticeable that many universities ignore the importance of citizen science in open science, and therefore by securing funding and using the communication mechanism of the Circle-U alliance, we can increase awareness. The secured funding for the two courses also relates to the economic impact described in more detail in Chapter 3.6. on economic impact.

*Table 9: Summary of ECS activity outputs, outcomes in relation to scientific impact*

Institutional impact - key activities	Outputs and initial outcomes at end of Y2	Future means of data gathering i
Training	<b>Outputs:</b> <ul style="list-style-type: none"> <li>• 24 Public libraries trained</li> <li>• 19 Research libraries and others trained.</li> <li>• Public library module</li> </ul> <b>Outcome:</b> <ul style="list-style-type: none"> <li>• Increased awareness, knowledge and interest of public and research libraries in actively promoting and implementing CS in their institutions</li> <li>• Lessons learned about drivers and barriers for the integration of CS in libraries</li> <li>• Collaboration with SciStarter</li> <li>• Collaboration with LIBER citizen science working group</li> <li>• Intervention for research libraries at Université Paris-Saclay</li> </ul>	<ul style="list-style-type: none"> <li>• Evaluation forms of training</li> </ul>

Public library community events	<p><b>Outputs:</b></p> <ul style="list-style-type: none"> <li>• 10 public libraries developing citizen science activities across 9 EU countries throughout 2024</li> <li>• As of July 2024, at least 6 public libraries organised citizen-science related events at their libraries</li> <li>• Several public libraries organised more than one citizen science event</li> <li>• Development of evaluation tools and documents for librarians and participants</li> <li>• Documentation collected on the citizen-science related activities (photos, videos, blog posts published on ECS blog)</li> <li>• Collection of librarians' observation forms, participant testimonials, and evaluation postcards (questions on the level of enjoyment, interest in citizen science, and plans to further get involved in citizen science)</li> </ul> <p><b>Outcome:</b></p> <ul style="list-style-type: none"> <li>• Lessons learned about the role of public libraries in becoming key promoters of CS towards the public</li> <li>• Insights on the encountered challenges and perceived benefits for public libraries</li> <li>• Hundreds of citizens involved in CS activities through the newly developed CS activities</li> </ul>	<ul style="list-style-type: none"> <li>• In-person meeting of the 10 public libraries in Ljubljana, Slovenia in October 2024 will include a session for libraries to share on their experience, challenges, and main takeaways</li> <li>• Collecting evaluation forms from public library staff</li> <li>• Further citizen science events organised by the public libraries</li> </ul>
Self-assessment impact tool	<p><b>Outputs:</b></p> <ul style="list-style-type: none"> <li>• Self-assessment tool adapted to various types of institutions (RPOs, RFOs, Public libraries)</li> <li>• Self-assessment result report (answer breakdown, intervention area score and tailored resources for further integration)</li> <li>• Development of indicators for institutional integration of citizen science in various institutions.</li> </ul> <p><b>Outcomes:</b></p> <ul style="list-style-type: none"> <li>• Feedback and insights from 14 pilot cases (Museums, Public libraries, Research libraries, Universities, NGOs, Research funders, Companies)</li> <li>• Lessons learned on usefulness and applicability of the self-assessment tool in different organisational contexts</li> </ul>	<ul style="list-style-type: none"> <li>• Digitised version of the self-assessment tool to facilitate completion, as well as generated result reports for participating organisations</li> </ul>
Eu-citizen.science platform co-design	<p><b>Outputs:</b></p> <ul style="list-style-type: none"> <li>• 6 workshops with 85 participants</li> <li>• More outputs described in the technological impact</li> </ul> <p><b>Outcomes:</b></p>	<ul style="list-style-type: none"> <li>• User access statistics of the eu-citizen.science platform will provide insights in</li> </ul>

	<ul style="list-style-type: none"> <li>• Strong commitment to user-centred design principles within participating institutions</li> <li>• Participating institutions have developed their capacity to engage with and contribute to the eu-citizen.science platform, improving their ability to identify and address user needs, develop relevant functionalities, and integrate new services.</li> <li>• By involving a wide range of stakeholders, including universities, research institutions, and governmental bodies, the workshops have fostered a network of institutions committed to the advancement of citizen science.</li> </ul>	the further uptake of the platform.
Supporting the development of national citizen science platforms	<p><b>Outputs:</b></p> <ul style="list-style-type: none"> <li>• 2 national platforms developed (Brazil and Portugal), one under development (Spain)</li> <li>• APIs to the Swedish national platform developed, to the 2 platforms in France, and the Danish platform under development</li> <li>• Comprehensive documentation</li> </ul> <p><b>Outcomes:</b></p> <ul style="list-style-type: none"> <li>• Participating institution has enhanced its technological capabilities</li> <li>• Fostered a shared understanding and commitment to interoperability and best practices.</li> </ul>	<ul style="list-style-type: none"> <li>• Spanish national platform.</li> <li>• APIs for the two platforms in France, and Danish.</li> <li>• Use of comprehensive documentation.</li> </ul>
Securing external funds	<p><b>Outputs:</b></p> <ul style="list-style-type: none"> <li>• Two courses: introduction to citizen science for masters students and open data management and FAIR principles with citizen science data.</li> </ul> <p><b>Outcomes:</b></p> <ul style="list-style-type: none"> <li>• Beyond the delivery of the courses, the material will be available in English and French and will be promoted through Circle-U, a university alliance.</li> </ul>	<ul style="list-style-type: none"> <li>• Number of grants secured</li> <li>• Training activities enabled with these grants</li> </ul>
28 ECS Ambassadors recruited	See Chapter 3 that reports on the work elaborated by the 28 ECS Ambassadors and their respective impacts.	

### 3.4.7. First lessons learnt concerning the taken impact pathways

Impact is slow and will only be visible in a few years. StickyDot and PL2030 work with public libraries has been essential and one of the fastest ways to see an institution developing a citizen science activity. StickyDot and PL2030 work with public libraries has demonstrated the importance of a timespan and monitoring and financial incentives to partake, to adopt and prioritise the engagement of institutions with citizen science activities. In addition, the training with research libraries and public

libraries, showcase the interest and the emerging need of training for these institutions. These interventions have also showcased and taught us the need for more interventions, mentorships so that individuals and or groups of individuals that want to bring citizen science within their institutions are able to, feel the support needed to be able to.

In addition, the work with research libraries is also supported through the [LIBER citizen science working groups](#). The lesson here is the importance of finding other groups and communities of practice that can benefit from the additional resources that are offered through ECS to push towards their internal changes.

In relation to the self-assessment tool, it seems that it is useful to various institutions, especially those less advanced in the integration of citizen science. Overall, this tool seems to contribute to a feeling and a kind of support to institutions that carry it out.

It is important to identify synergies and additional resources that are available through different networks such as Circle-U and use them to “Make Institutional Noise” – that is, using the communication and promotion that such funding offers to promote the activities of ECS.

### **3.4.8. Further evaluation and institutional impact assessment in the second half of the project**

In the second half of the project, our goal is to identify and monitor institutional impact of the ECS project. Towards achieving that we are planning to carry out the following activities:

- Count the number of institutions trained in citizen science that develop citizen science activities
- Keep track of the number of trainings delivered for various institutions (e.g., public libraries, RFOs, RPOs)
- Evaluate the uptake of trainings from the ECS Academy and ECS Data Academy by institutions

## **3.5. Technological Impact**

In this section, the technological impact of the ECS project is detailed, including various significant activities from the first reporting period. As will be shown in greater detail in the following, the eu-citizen.science co-design workshops enhanced collaboration and knowledge exchange among diverse stakeholders, of which over 50% were women, leading to five new services on the platform.

The Datathon Training sessions by CSIC improved data literacy and skills for technicians using citizen science data, focusing on open-source software and hands-on learning. Digitally-enhanced workshops with Deaf and Hard of Hearing (DHH) individuals promoted inclusion and engagement through digital tools, creating a connected community. Supporting the development of national citizen science platforms ensured interoperability and sustainability, increasing collaboration and data sharing. Applied research on best practices in infrastructures contributed to sustainable infrastructure, focusing on ethical considerations and data privacy. A framework to measure the technological impact of citizen science is under development, prioritising 30 platforms for analysis. Future evaluations will use the "Guide to Report Technological and Economic Impact" with surveys and statistics to measure impact and align contributions with project objectives.

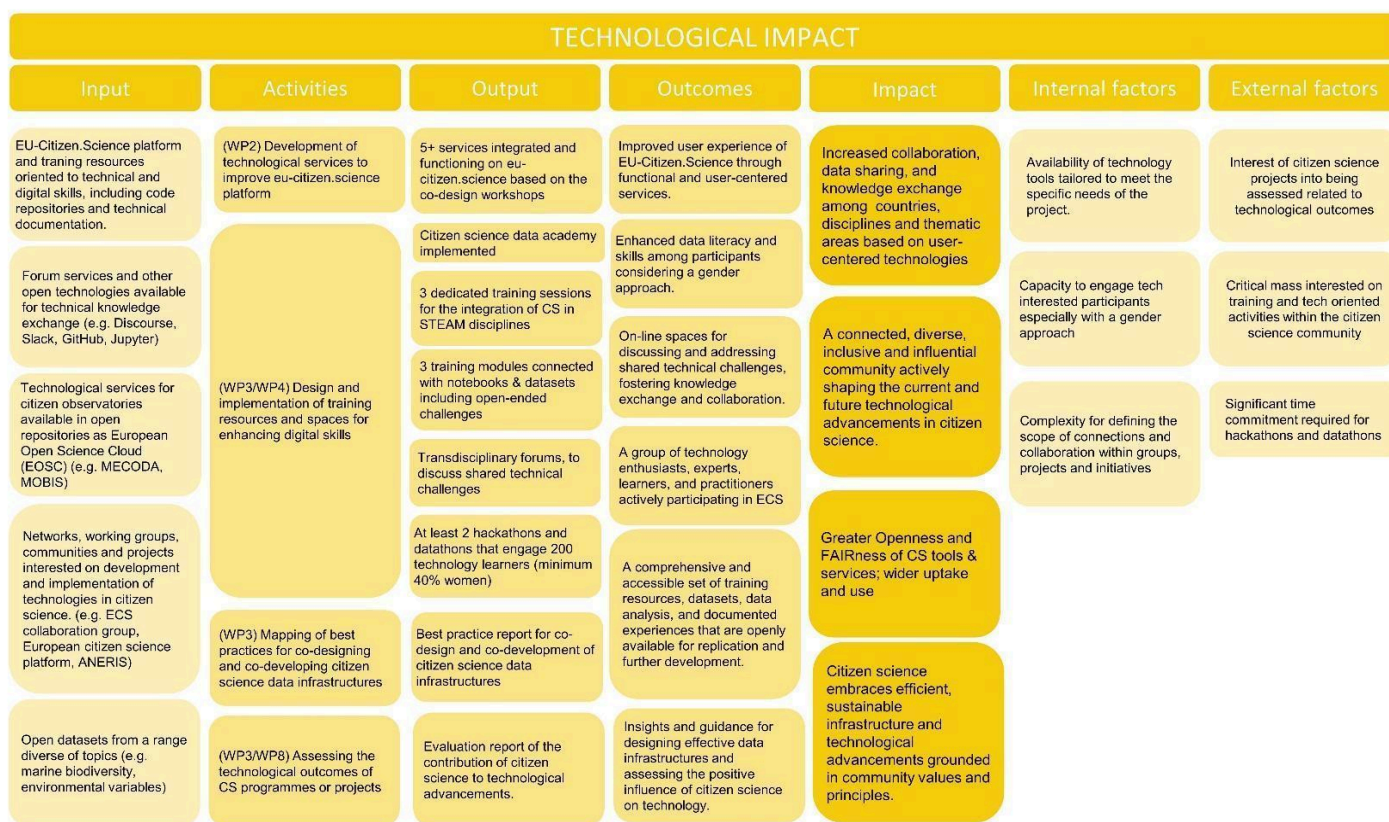


Figure 8: Technological impact logic model (represented in more detail in D8.1)



### **3.5.1. Increased collaboration, data sharing, and knowledge exchange among countries, disciplines, and thematic areas based on user-centred technologies**

Several co-design workshops were organised by Ibercivis, ECSA and SfC throughout the first half of the ECS project. Notably among them were the activities implemented in WP2 for the further development of the eu-citizen.science platform, as detailed in *D2.1 Plan for the Community Co-creation Activities*<sup>8</sup>. There, a full co-design process involving four annual cycles is laid out, each encompassing the identification of needs, participatory selection workshops, co-design of functionalities, and final development and testing. Since April 2023, this process has included six workshops held on 17 and 18 May 2023, 20 October 2023, 11 December 2023, 15 January 2024, and 3 April 2024, engaging a total of 85 participants and impacting over 5000 platform users. The participants came from a wide range of backgrounds and institutions, such as universities, research centres, non-governmental organisations, and governmental bodies. This diversity ensured that the perspectives and needs of different stakeholders were considered, leading to more comprehensive and inclusive platform developments.

To date, five new services have been developed and implemented on the platform, directly reflecting the community's needs and preferences. Increased community engagement has been evident, with users actively reporting bugs and providing feedback, contributing to the platform's continuous improvement.

With these concrete features and improvements, the co-design workshops have contributed to the technological advancement of the ECS project and created a platform for diverse stakeholders to collaborate, resulting in a dynamic exchange of ideas and best practices. Researchers, educators, policymakers, and citizens from various European countries participated, enriching the environment with cross-disciplinary knowledge. The workshops contribute to a connected and diverse community around the eu-citizen.science platform. With over 50% female participation, the initiative has successfully promoted gender diversity and inclusivity in the context of technology co-design. Future measurements of the platform's usability impacts will be potentially developed using analytics from the eu-citizen.science platform.

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<sup>8</sup> <https://zenodo.org/records/10615167>

### 3.5.2. A connected, diverse, inclusive and influential community actively shaping the current and future technological advancements in citizen science

The **Datathon Training sessions**, developed by CSIC in November 2023, aimed to enhance data literacy and skills, particularly for technicians using citizen science data to manage protected or natural areas. This initiative is part of broader efforts to drive technological impact within ECS. The training was focused on the use of open-source software such as MECODA, MINKA, and other tools to explore and leverage the potential of citizen science data. Participants were evaluated on their current and potential use of these skills in their work related to digital skills and citizen science. A survey was sent out to training participants, conducted anonymously to protect personal information. It received responses from 13 participants, with a relatively balanced representation of gender and age groups, with 7 respondents identifying as “Male”, 5 identifying as “Female”, and one identifying as “Other”. Participants spanned various age groups, with the highest representation from the 36-50 age group, and all were employed in the Government/Public Sector, reflecting the targeted audience of the training.

Despite the limited number of 13 responses, the Datathon training session survey results offer valuable insights. These findings will guide future event planning, highlight lessons learned, and help maximise the project's impact. The assessment of open science practices implementation reveals a general inclination towards using open data and digital platforms. However, it also identifies areas needing additional support, particularly in sharing code and participating in open peer review. This need for support becomes especially apparent when considering the responses related to current digital skills and training requirements. Participants' self-assessment of digital skills reveals a positive attitude, with more than half rating (7 respondents) themselves highly. Of the remaining 6 respondents, two express apprehension, indicating a need for more comprehensive support. Similarly, participants' readiness for digital training is evident, with about half willing to learn more and influence others, and only one expressing a lack of interest in or time to invest in this kind of training. Our questions regarding learning methods indicate a relatively strong preference for hands-on and visual approaches, emphasising the importance of interactive content. According to respondents, the training effectively enhanced key digital skills, particularly data cleaning, statistical analysis, and data interpretation, though programming skills saw less improvement. The usefulness of the training was affirmed by most participants, with significant practical value for daily tasks. Additionally, the training materials and methodology were well-received, with the majority rating them as good or excellent, suggesting they were effective and engaging. These findings will guide future Datathons to provide targeted support, emphasise interactive and practical learning, and continuously improve training materials and methodologies to enhance participant engagement and skill development. Detailed explanations of some of the survey responses are available in [Annex 3 of this document](#).

The **Digitally-enhanced citizen social science workshops with Deaf and Hard of Hearing (DHH)** individuals, conducted from December 2023 to February 2024, aimed to enhance inclusion and engagement in citizen science while empowering participants through digital tools. A series of 4 physical workshops involving 30 participants were implemented by ECS affiliated partner Web2Learn. Of the 30 people involved in the workshops, a third were women. The overall age of participants ranged from 19 to 55 years old. Utilising mobile applications such as iNaturalist, GR and IMCity, the workshops aimed to engage the Greek DHH community in biodiversity monitoring via dedicated activities that included technological support tools to those interested. Thirteen of the thirty participants actively engaged with these digital tools, reflecting a substantial interest for the uptake of technology within the community. The workshops not only enhanced technological proficiency but also demonstrated the capacity of digital tools to bridge gaps, empower marginalised groups and facilitate broader inclusion, while enabling DHH participants to develop their technological skills. Integrating these technologies into the workshops showcased how citizen science platforms could be inclusive and adaptive, promoting greater technological engagement and literacy among DHH individuals.

Measuring impact through surveys and forms (traditional evaluation methods) was not suitable to the workshop's target groups due to their visual and sometimes cognitive difficulties encountered. Instead, the organiser team opted to measure impact through **graphic elicitation and arts-based methods** used by DHH participants during the workshops. In particular, all 25 (direct) DHH participants engaged in drawing-based action to produce [a zine](#)<sup>9</sup> that narrated their involvement in citizen science. Moreover, during the hands-on workshops, participants worked in groups to co-create citizen science action plans to expand their engagement in citizen science for social good. Additionally, they co-created their [own poem](#) on citizen science that was shared on instagram to raise awareness and increase impact. Finally, a [project page](#) was set up on iNaturalist for the workshops, which shows the concrete data collected by the group.

### 3.5.3. Greater openness and FAIRness of CS tools & services; wider uptake and use

The primary aim of the activity supporting the development of national citizen science platforms is to offer technological support and assistance in the use and co-development of the open-source code of the eu-citizen.science platform. This effort includes preparing specific documentation, conducting virtual meetings to facilitate code reuse, and organising technical meetings focused solely on best practices for co-developing the code. The objective is to ensure that new services developed on different national platforms are interoperable across the entire community. Aligning the platform

<sup>9</sup> Cambridge Dictionary: a small magazine that is produced cheaply by one person or a small group of people, and is about a subject they are interested in.

with the co-developer community involves adopting new development strategies to guarantee interoperability, not only from the outside in but also from the inside out. This initiative has been ongoing since January 2023, with regular meetings to maintain progress and collaboration.

The activity contributes significantly to the technological impact of the project. It increases collaboration, data sharing, and knowledge exchange via a collaborative environment hosting stakeholders from different countries. This leads to a more cohesive and interconnected citizen science community, promoting mutual learning and the sharing of valuable resources. The project embraces efficient, sustainable infrastructure and technological advancements, offering countries without existing national platforms the opportunity to adopt this new technology. This ensures that technological advancements are accessible and utilised efficiently and contributes to a more sustainable infrastructure for citizen science activities. Moreover, the creation of a co-developer community capable of contributing to the open-source code of the platforms enhances their sustainability. This community-driven approach ensures that the platforms can evolve and adapt over time, supported by a base of contributors who are invested in the ongoing development and maintenance of the citizen science infrastructure.

Notable examples include the [CIVIS platform](#), developed by the Brazilian Institute of Information in Science and Technology IBICT, which successfully employs the open source code of eu-citizen.science. This implementation demonstrates how the code can be adapted and reused to build a national platform, highlighting the flexibility and utility of the open source approach. Similarly, the Portuguese citizen science platform [Rede Portuguesa de Ciência Cidadã](#) utilises the open source code from eu-citizen.science, showcasing the widespread applicability of the code and its capacity to support diverse national initiatives in citizen science. The [Spanish citizen science platform](#) also expressed interest to adopt the code of eu-citizen.science, while connections were created to share data between eu-citizen.science and the [Swedish national CS platform](#), the Virtual Ecosystem for Research Activation [VERA](#), and the platform developed by the [CS Track](#) project. Both French CS platforms [Science ensemble](#) and [Particip-Arc](#) as well as the [Danish CS platform](#) plan to connect to eu-citizen.science through its open API, as well as the Italian platform that might be built in the coming year.

Another key component of this impact is measuring the technological impact of citizen science as part of Task 8.4, led by CSIC. The applied research in progress is developing a framework and mapping practices within citizen science platforms, which host more than 100 citizen science projects, to identify best practices in data governance and data ethics. This includes managing privacy, openness, and data sharing. This research aims to identify the fairness and openness within the main tools of citizen science used for data collection, particularly in citizen observatories. It will provide

recommendations and highlights for future implementation of functionalities and practices within these platforms. In the first period of ECS, significant progress has been made in developing the framework and prioritising the 30 platforms that will be analysed.

### **3.5.4. Citizen science embraces efficient, sustainable infrastructure and technological advancements grounded in community values and principles**

The research conducted by CSIC for best practices in infrastructures contributes to enhancing knowledge exchange among the citizen science community and supports sustainable infrastructure in citizen science. The deliverable [D3.1 report titled "Best Practices for Collaborative Development of Citizen Science Data Infrastructures"](#) submitted in July 2023 outlines effective strategies for co-designing and developing data services in citizen science projects. It covers various aspects, including data infrastructure, data services, collection, standards, quality assurance, accessibility, and ownership, policy, and ethics. Key practices involve setting up robust systems for data management, developing tools to enhance data sharing and collaboration, implementing efficient data collection methodologies, and establishing protocols for data consistency and interoperability. The report also emphasizes the importance of maintaining data quality, promoting open access, and addressing legal and ethical considerations.

This resource has been shared with the citizen science community through the ECSA conference held in April 2024. It is also included as part of the training inputs for designing training materials by CSIC for datathons and hackathons and is available on Zenodo for the ECS consortium and the community at large.

Also, the eu-citizen.science platform exemplifies citizen science embracing efficient, sustainable infrastructure and technological advancements rooted in community values. Its open-source codebase enables other communities to efficiently set up their own citizen science infrastructures, demonstrating the value of sharing proven technology. Recurring co-design cycles with key stakeholders ensure the platform remains aligned with community needs and principles. Adherence to FAIR principles for citizen science tools further promotes sustainability and efficiency. As it evolves into a standard for national citizen science platforms beyond Europe, the platform showcases how continued investment in community-driven technology can benefit diverse groups. The collaborative spirit of the citizen science community, prioritising shared benefits over individual gains, reinforces the platform's grounding in community values. Dedicated co-design formats and continuous exchange among stakeholders allow the platform to adapt to evolving needs, fostering a sense of ownership and driving increased engagement. This approach not only enhances the platform's effectiveness as a tool



for community building and information exchange but also embodies the principles of collaboration, sharing, and openness central to citizen science.

*Table 10: Technological impact - outputs and outcomes at end of Y2*

Technological impact - key activities	Outputs and initial outcomes at end of Y2	Future means of data gathering
<ul style="list-style-type: none"> <li>• Datathons</li> <li>• Research about best practices for citizen science infrastructures</li> <li>• Progress about research for measuring impact of technology in citizen science</li> </ul>	<p><b>Outputs</b></p> <ul style="list-style-type: none"> <li>• 1 Datathon training.</li> <li>• 13 participants.</li> <li>• D3.1 Best practices for collaborative development of citizen science data infrastructures</li> </ul> <p><b>Outcomes</b></p> <ul style="list-style-type: none"> <li>• Enhanced digital skills among public governance participants to improve evidence-based decision-making using citizen science data.</li> <li>• Lessons learned about the required skills for data analysis</li> <li>• Exchange of knowledge about data management, including ethics, within the citizen science community.</li> </ul>	<ul style="list-style-type: none"> <li>• Analysis of data collected via the report about Technological and Economic Impact.</li> <li>• Datathon and Hackathon surveys.</li> </ul>
Co-design process to advance eu-citizen.science	<p><b>Output:</b></p> <ul style="list-style-type: none"> <li>• 5 Co-design workshop organised</li> <li>• 85 participants.</li> <li>• Deliverable 2.1 “Plan for the community co-creation activities”</li> <li>• 5 services implemented.             <ul style="list-style-type: none"> <li>- User-friendly interfaces to improve accessibility and engagement.</li> <li>- Features showcasing diverse citizen science projects to highlight the breadth of activities across Europe.</li> <li>- Tools and incentives designed to encourage more active participation from a broader audience.</li> </ul> </li> </ul> <p><b>Outcome:</b></p> <ul style="list-style-type: none"> <li>• Improved openness and FAIR approach within the eu.citizen.science platform through a co-design approach for developing new services.</li> </ul>	Access statistics of the eu-citizen.science platform

	<ul style="list-style-type: none"> <li>• Connected citizen science community with an emphasis on increasing the representation of women in technology activities.</li> <li>• Expanded knowledge available about citizen science infrastructures and practices for future integration within the community.</li> </ul>	
Digitally-enhanced citizen social science workshops with Deaf and Hard of Hearing individuals (DHH)	<p><b>Output:</b></p> <ul style="list-style-type: none"> <li>• 4 DHH workshops organised</li> <li>• 30 participants.</li> <li>• One <a href="#">zine</a> that narrated the involvement of participants in citizen science</li> </ul> <p><b>Outcome:</b></p> <ul style="list-style-type: none"> <li>• Lessons learned about the uptake of digital tools for the involvement of hard to reach groups</li> <li>• Increased interest of this hard to reach group to participate in CS</li> </ul>	
Co-development of the open-source code of the eu-citizen.science	<p><b>Output:</b></p> <ul style="list-style-type: none"> <li>• 2 national platforms in Brazil and Portugal using the eu-citizen.science source code for their national platforms, one for Spain in development</li> <li>• Documentation of the open source code</li> </ul> <p><b>Outcomes:</b></p> <ul style="list-style-type: none"> <li>• Discussions with other national associations to link to eu-citizen.science or reuse the code (e.g. Italy, Romania)</li> <li>• Sustainable code maintenance led to agreements on the reuse and co-development of the open-source code from the eu-citizen.science platform</li> </ul>	Further countries using the opensource code of eu-citizen.science

### 3.5.5. First lessons learnt concerning the taken impact pathways

Our efforts to assess the technological impact of ECS show how we already went beyond laying the groundwork for later impact. While technological impact, like all dimensions of impact, takes a long time to unfold, it is specific in how it is often tied to production cycles of technological innovation. In terms of expertise, we see a need for technicians to be involved in activities aimed at the development and adjustment of infrastructures. In turn, a lot of the activities in this context have been higher level, connecting e.g. citizen science practitioners engaged in setting up national citizen science



infrastructures in the form of platforms. While the eu-citizen.science platform is currently reworked in recurring co-design cycles with various key stakeholders as part of the ECS project, communities in Brazil and Portugal draw on the existing open source codebase of eu-citizen.science for an initial setup of their own platforms. In this, continuous guidance, support, and exchange with the technicians behind these efforts are essential. However, it also demonstrates how valuable the sharing of proven technology is to a more effective and efficient consolidation of new communities. Eu-citizen.science is developing into a standard for national CS platforms beyond Europe, showing how a continued investment into this endeavour can enrich communities never involved in its initial setup.

In this, we can already identify several helpful factors:

- Open source codes and the FAIRness of CS tools have proven key to this quick and effective adaptation, and thus the proliferation of the architecture underlining eu-citizen.science. Here, the principles and values of the CS community are also an important factor, since the involved practitioners show a high willingness to put community benefit above personal gains. Collaboration, sharing and exchange are key practices followed by all.
- Consequently, continuous exchange among relevant community stakeholders is another essential component of technological impact generation in CS, allowing both for an effective flow of information and a comparatively quick adjustment of processes, workflows, etc. should this prove necessary. While this presumably is not necessary at all times, when existing technologies are adapted to new contexts, such support is exceedingly helpful.
- Finally, our dedicated co-design formats to involve the community in the development of new services which have also proven to be an effective approach to adapting existing services according to the needs of the community. This also helps diversify the community and who is able to feel ownership over this shared technology.

These efforts also lead to an increase in subscriptions to the eu-citizen.science platform, which in turn makes it a more effective tool for community building and information exchange.

Other efforts show how we need to be very mindful of how we utilise technologies towards different ends and in the engagement of different communities. As our activities with Deaf and Hard of Hearing people show, not all apps are appropriate for or interesting to all communities, or all individuals of a

community. As such, this shows both how formats and technologies need to be chosen carefully, but also how topics and thematic foci need to receive similar attention.

Overall, we are confident that we can further deepen our understanding of how technological impact unfolds in the second half of the project.

### **3.5.6. Further evaluation and technological impact assessment in the second half of the project**

For the second half of the project, we will work to further develop and conduct the evaluation and assessment of technological impact. In particular, we will utilise the internal guide to report technological and economic impact, developed by CSIC to document the impact of various activities implemented by the ECS consortium. Surveys and statistics will measure the impact of training on participants and assess the impact of services within the eu-citizen.science platform. The guide helps ECS project partners accurately record their contributions and align them with the broader project objectives. The main aim is to develop a balanced approach, using both general and tailored instruments, to ensure an accurate and effective evaluation of the ECS project's technological impact until the end of the project.

## **3.6. Economic Impact**

While most of the other impact areas have already been assessed in various other contexts and programmes, we hardly see a systematic collection of evidence for the economic impact of citizen science so far. First evaluation data collected in the ACTION project show that 3 out of 16 CS projects under investigation reported about the creation of new services and the generation of revenues ([D6.4. Impact Assessment Report V2](#)). Thus, the project ECS aims to shed more light on the economic potential emerging from an increase in citizen science practices. This may relate to emerging technologies, new services and products as well as support infrastructure and networks.

We broadly identified four specific economic impacts that we want to achieve with ECS activities:

- **Citizen science infrastructure and services (e.g. ECS Academy) are self-sustained**, which is important for the long-term effectiveness and integrity of these initiatives. For ECSA, one of the main goals is to find appropriate models to self-sustain the ECS services in the future.



- **Take-up of new open business model for citizen science activities:** ECS will explore new business and governance models by analysing other citizen science programmes and how they guarantee sustainability of citizen science activities and making economic advancements.
- **Increased awareness and engagement of industry actors in citizen science:** ECS plans to increase industry awareness and engagement by organising a policy event on commercial use of citizen science generated data and specifically reaching out to the private sector encouraging them to join the eu-citizen.science community.
- **Citizen science embedded in innovation departments and CSR (Corporate Social Responsibility) plans of industries/SMEs:** Within the ECS project, three large corporations will be undergoing a pilot to embed citizen science in their innovation departments and Corporate Social Responsibility Plans (CSRP), and at least 25 companies will be familiarised with citizen science as we develop guidelines for the embedding of citizen science practices within Industries and SMEs.

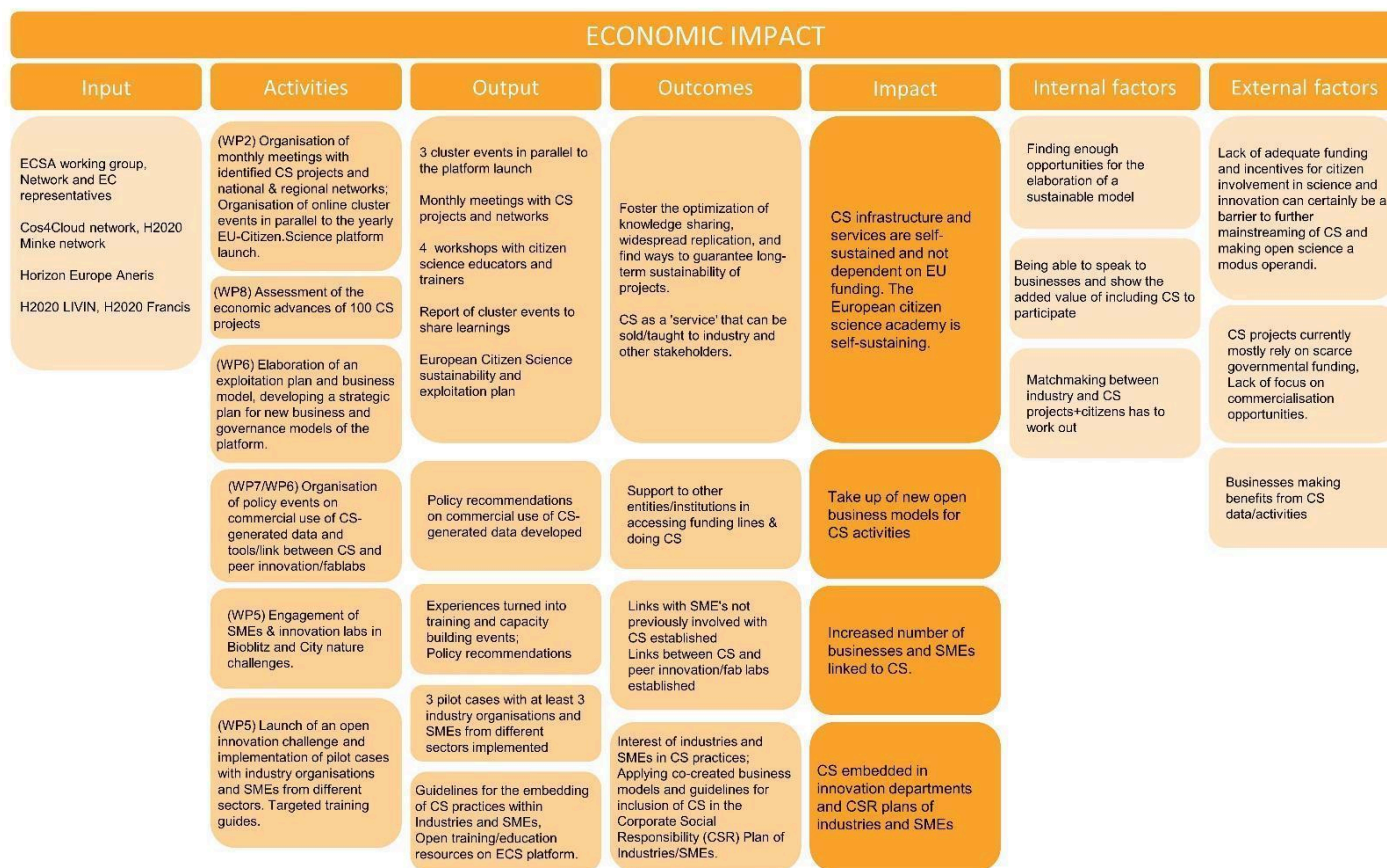


Figure 9: Economic impact logic model (represented in more detail in D8.1)

### 3.6.1. Development of an ECS exploitation plan and business model

#### Explorative analysis and SWOT analysis

To approach the objective of developing income streams to ensure the eu-citizen.science platform operates sustainably after the ECS project ends, an exploratory analysis was conducted. This included the analysis of existing documents and various discussions with stakeholders from the ECS consortium and other stakeholders involved in ECSA. This step was essential to gather and consolidate an overview of the different ideas, working methods and approaches of people in the field. In each case, the focus was on engaging work package leaders and ways of thinking through guideline-based interviews to capture existing knowledge.

Subsequently, it was necessary to further consolidate the initial findings from the exploration phase and in particular the interviews. To this end, a SWOT analysis was used to gain a deeper understanding of the ECS project activities in dialogue with all consortium partners, exploring four dimensions related to future sustainability: What are its strengths and weaknesses? What are the opportunities in the ECS environment, but also what are the threats that need to be considered and addressed?

#### Ideas for potential revenue streams

With reference to the results of the SWOT analysis and the data collected from the interviews conducted during the exploration phase, the findings were summarised in a long list of ideas for potential services or products that would add value to the basic services provided by ECSA and could therefore be offered for a fee, thus contributing to the goal of financial sustainability. In order to make these various ideas more tangible, a next step was taken in a continuous exchange with stakeholders within ECSA: the concretisation and initial description of the potential products/services on the longlist.

Furthermore, the ideas were discussed and analysed against a set of criteria in an online workshop with the core project partners in June 2023. In this workshop, it was decided which of the potential services/products of the longlist should be prioritised and which of the potential products/services should not be pursued further due to lack of potential and/or feasibility. Finally, two ideas were identified as the most promising by the partners involved in the process: ECS Academy and Dedicated Web-Sections for National Partners.



### Taking ideas to the next level: Creating value propositions

The next step undertaken was a refinement of these two ideas for potential products/services from the conceptual level to the level of a well-defined value-creating product. To this end, they were explored, further specified and tested from different perspectives, including those of ECSA (also as a provider of infrastructure), of potential service providers – in the form of trainers, mentors, facilitators, etc. –, and also from the perspective of potential customers. A 'value proposition canvas' was chosen as the methodological approach for this. This method allowed all participants to take different points of view and thoroughly analyse the value of these possible products. Value propositions and a description of customer target groups were created in an in-person workshop in July 2023. As a result, reasonable assumptions were made about what potential customers would value in the products and services and what needs could be met.

It was then necessary to validate whether these assumptions could withstand the judgement of the project participants and the assessments of experts in the field. In an ongoing process of exchange between the project partners and the experts, new conclusions were drawn, ideas were explored and findings were tested against the knowledge and comments of the people involved in the project. To further understand and assess the economic impact, the next section describes the methodology developed and applied to provide an overview of the economic benefits resulting from ECS activities.

#### 3.6.2. Development of a methodology applied to get an economic impact overview

The four economic impacts defined above are intended to outline the economic benefits in terms of internal and external implications for different concentric levels touched by ECS: science, society, community and organisation.

To provide a comprehensive overview of these areas, a pilot survey was conducted to assess the economic benefits of the citizen science activities developed within the project framework. The survey was distributed to organisations involved in activities related to the data acquisition Bioblitzs and hackathons associated with the ECS projects. Catalonia was chosen for the pilot based on the existing relationships with the private sector (SMEs and non profit organizations), and the well-established community of practices around the MINKA infrastructure, which has been further strengthened by the data acquisition (BioDiverCiutat and BioMarato) activity. This pilot survey in Catalonia serves as a robust foundation for future activities in task 5.5, which focus on the potential involvement of SMEs and private sector participation. The survey comprises 16 questions divided in 5 sessions: information about the organisation, involvement in the citizen science initiatives, resources effort analysis, sustainability of the citizen science initiatives of the private sector, and prioritisation

of the potential benefits of the citizen science activities. The analysis of the survey outcomes will be completed for D8.3. Final Impact Assessment Report.

### 3.6.3. Contributions of partner organisations and outside stakeholders

In order to assess the potential economic impact of citizen science we may also relate to additional activities of our consortium partners. Some partners are exploring impacts on certain industry sectors, such as tourism. BWI in Croatia facilitated private dolphin watching organisations in the usage of the Marine Ranger App. This approach was taken up successfully and well perceived by both - the organisations and their clients/the tourists. An estimation of the economic impact will follow in the second half of the project.

Other activities that provide us insights into economic impact are those related to the activities with funding organisations, like the funding advice given by FGC and IBERCIVIS, but also activities aimed at adapting existing funding programmes towards more (dedicated) support for citizen science, as has been sought for instance by our Dutch partner (ULEI).

We also see that further funding opportunities are explored for CS training as described in Chapter 3.4.6.

*Table 11: Economic impact - outputs and outcomes at end of Y2*

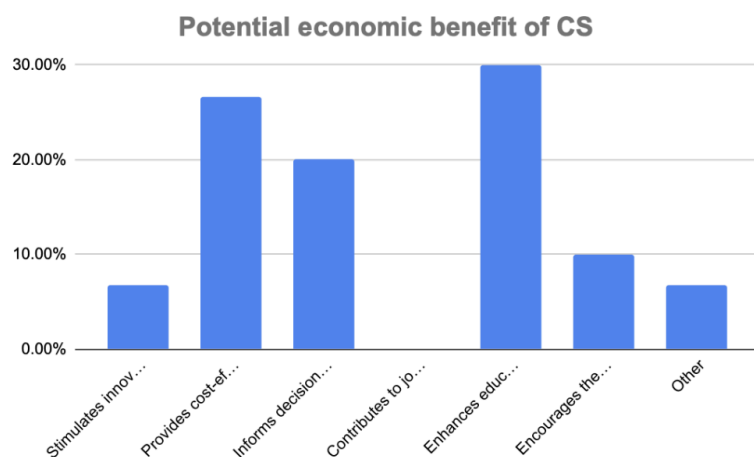
Economic impact - key activities	Outputs and initial outcomes at the end of Y2	Future means of data gathering
Survey ECS Economic Impact (ECS-EI)	<b>Outputs:</b> <ul style="list-style-type: none"> <li>• Creation of the economic impact survey, including 16 questions in a pilot in Catalonia (ES).</li> <li>• Distributed to organisations involved in 2 data acquisition hackathons in Catalonia (ES).</li> <li>• 10 entities filling in the questionnaire</li> </ul> <b>Outcomes:</b> <ul style="list-style-type: none"> <li>• First insights into estimated values of the economic impact of citizen science-based activities in a pilot.</li> </ul>	Spreadsheet with results of the 10 entities participating in the survey. A follow-up of the organisations participating in the survey will be conducted with the objective of involving them in the Task 5 dynamics to strengthen connection between CS and private sector as well as to feed the 3 pilots cases.



Economic impact - key activities	Outputs and initial outcomes at the end of Y2	Future means of data gathering
Exploitation plan and business model	<b>Outputs:</b> <ul style="list-style-type: none"> <li>Creation of the MS 26- Report on the strategic positioning of ECS</li> <li>Strong involvement of ECS partners in interviews, face-to-face and online workshops</li> </ul> <b>Initial outcomes:</b> <ul style="list-style-type: none"> <li>Generation of 6 potential avenues for value creation, validation of two high potential ideas by creation of value propositions</li> <li>Elaboration of a value proposition canvas for the 6 potential avenues</li> </ul>	Documentation of feedback and discussion of avenue streams

### 3.6.4. First lessons learnt concerning the taken impact pathways

Regarding the objective of developing income streams to ensure the platform operates sustainably after the ECS project ends, two ideas have been identified as having the most potential. These are the ECS Academy and the potential offering of the eu-citizen.science platform for citizen science associations that do not operate such a web platform themselves.



The pilot survey conducted in Catalonia indicated varying levels of interest in participating in CS from the 10 entities filling it in. Respondents expressed interests in roles ranging from the direct implementation and coordination of projects to just the participation in them. Respondents highlighted that their current involvement in citizen science generates an internal economic impact on the entities due to the need for human resources to support the actions. Therefore, support

from the ECS website and the concept of CS as services could lighten the workload of activity coordination. In addition, an external benefit of CS has been identified as the promotion of other economic activities of companies as an indirect marketing tool.

Regarding the perception of potential economic impacts, seven options were proposed to the entities in detail: Stimulates innovation and/or entrepreneurship; Provides cost-effective data collection and/or analysis; Informs decision-making processes in businesses and/or government; Contributes to job creation in science and/or technology fields; Enhances education and/or engagement through CRS (Corporate Social Responsibility) actions; Encourages the development of new tools and/or technologies; Other. It was unexpected that none of the respondents identified citizen science as a potential asset for job creation. In contrast, the majority of participants identified CS as an educational instrument more closely related to CRS in terms of its connection to the private sector.

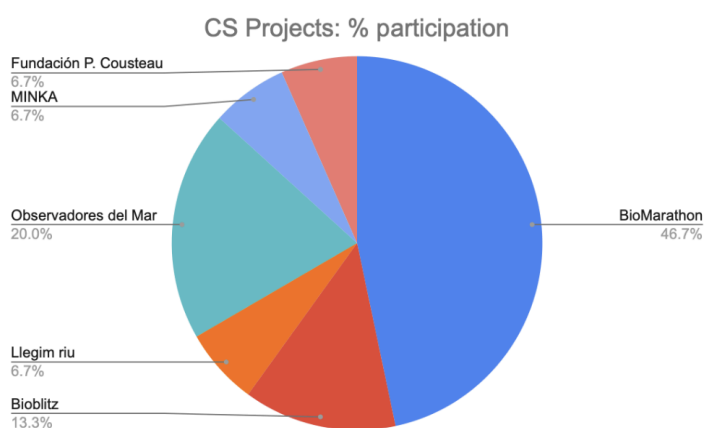
While the number of respondents is not exhaustive due to the limited scope of the survey, which was conducted in a specific target area, the results support the concept behind the ECS platform, which is to offer services and support to organisations, particularly in the private sector. Further analysis is required to extend the scope of the surveys to the country level. This would enable the verification of potential discrepancies in perception across Europe and facilitate a detailed examination of this specific topic: Corporate Social Responsibility. It is evident that a significant proportion of respondents (27%) continue to perceive CS as a cost-effective tool for data collection and analysis. Consequently, it requires raising awareness about the diversified economic benefits of CS and to promote a less utilitarian vision of citizen science. An example for such an awareness raising activity comes from the ACTION project where a [webinar](#) with testimonials from two companies which finance CS projects, stress doing this as part of their CSR plans.

### **3.6.5. Further evaluation and economic impact assessment in the second half of the project**

The further evaluation of economic impacts builds strongly on the work done in the first half of the project. The development of the pilot cases using the information collected as a baseline will facilitate the generation of more precise outputs. The high interest in CRS should be considered in the business plan definition. The current value propositions describe a product/service and the value it creates for the targeted customer group. It's not a business plan, which will be developed in greater detail in the second half of ECS considering the outputs of the surveys done to create services fit for purpose and customers. A business plan builds on the value proposition by describing the activities required to produce the product/service and the fixed and variable costs involved. By adding the dimensions of volume and price, the potential returns can be modelled. In addition, a business plan addresses other dimensions such as sales and distribution or the resources and technology required. Once the business plan has been drafted, it is necessary to create a plan for implementation. This requires that all ECS partners who have a role in the actual implementation of the business plan are instructed and guided on what needs to be done. The business model can then be tested by running pilot

products/services. This step is crucial as it provides the learning from these pilots and allows the business plan to be adapted accordingly, should this prove necessary. The process of further development is a process of learning from and with all those involved and can lead to various insights. It may be necessary to consider a possible modification of ECSA's governance to enable the business model to operate smoothly. This should be discussed in joint consultation as appropriate.

On top of the business plan development, ECS will also make concerted efforts to engage SMEs and industry representatives to further citizen science in the private sector and support economic impact generation. Targeted activities are currently in the process of preparation with the aim of identifying relevant private sector organisations aligned with EU mission goals and open to exploring their potential to take up citizen science efforts and integrate them into their innovation workflows. In order to learn from others, we will also assess the outcomes of citizen science programmes or projects with regard to their potential contributions to economic and advancement. The initial survey was filled in by ten organizations participating in a total of eight projects in the area of the Catalonia region, aiming to gauge the perception of the economic impact and benefits of different organisational structures, specifically small and medium-sized enterprises (SMEs), private non-profit organisations and public institutions.



The initial findings derived from this pilot study will serve as the foundation for subsequent inquiries into the involvement of SMEs and dynamics that will facilitate a deeper understanding of the ways in which the private sector can be engaged in CS, both directly and indirectly.

In addition, some partners are exploring how specific ECS services can be positioned so that they achieve economic sustainability, such as offering specific mentoring and training services for SMEs (UP, ULHT/CeD) or supporting others in building their citizen science platforms and services, such as CIVIS in Brazil (IBERCIVIS). In collaboration with other projects such as H2020 LIVIN or H2020 Francis, we will also review guidelines for the embedding of citizen science practices within industries and SMEs. CSIC plans to intensify their connection with technological impact in relation to the potential of AI and spatial analysis SMEs, and has some collaborations with fablabs and innovation labs, which may also give insights into how citizen science can become a growing economic factor.

In addition, MfN is planning a policy event on commercial use of citizen science generated data and tools/links between citizen science and peer innovation/fablabs etc.

## 4. Summary, conclusion and outlook

ECS partners, affiliated entities and ambassadors have been engaged in an impressive number of activities addressing a variety of stakeholders, which are partly represented by the project KPIs introduced in Chapter 2. However, since the breadth and depth of activities can never be expressed by numbers only, this deliverable aimed to provide context and further insights along our six impact areas of social/societal, political, institutional, scientific, technological and economic impact. In each dedicated subchapter, we set out to draw a rich picture containing impact stories, description of outcomes and important lessons learned. Being only at the halfway point of the ECS project, we expect many impacts still to develop throughout the remainder of the project – and beyond.

In the following, we discuss the main outcomes, lessons learned and conclusions across the impact areas, starting with a summary of more qualitative impacts metrics we defined to operationalise the broader impacts we set out to achieve. Since project KPIs are highly limited in showcasing the overall benefits of a project, we worked to gather additional, richer data to assess the changes engendered by ECS. This more practical evidence of project impact is summarised below in the form of alternative impact metrics – both quantitative and qualitative – reached by the ECS project:

*Table 12: Alternative impact metrics of the ECS project according to impact area*

Impact Area	Impact metrics from quantitative and qualitative evidence that ECS has contributed to:
Social/societal impact	<ul style="list-style-type: none"> <li>• mutual learning and increased knowledge on citizen science as a practice to address important societal challenges among practitioners</li> <li>• new knowledge gains and skills – in citizen science and specific subject areas – among citizens</li> <li>• increased knowledge on inclusion of underrepresented target groups</li> <li>• growing and more interconnected citizen science communities in different national contexts</li> <li>• feelings of inclusion, being heard and taken seriously amongst newly engaged actors</li> <li>• new societal needs addressed with citizen science</li> <li>• a growing sense of community and empowerment amongst citizen</li> </ul>

	scientists involved in our activities
Political impact	<ul style="list-style-type: none"> <li>• increased awareness about citizen science among policy makers</li> <li>• rising awareness for required structural policy changes, including more CS funding and changes in assessment policies</li> <li>• a better understanding of the value of citizen generated data by public authorities</li> <li>• increased awareness for the needs of policy makers at different levels (local, regional, national, European, international) within the CS community</li> <li>• positioning CS in European and global policies (e.g. via the Science Communication G7 Working Group, the Global Science Forum Citizen Science Working Group of the OECD, the Policy Working Group of the ECSA, or the planned CoARA working group on CS)</li> </ul>
Scientific impact	<ul style="list-style-type: none"> <li>• engaged and growing network of citizen science researchers, communication infrastructure established</li> <li>• committed and growing network of citizen science trainers and educators, communication infrastructure established</li> <li>• increased capacity of scientists and especially young researchers to implement and perform citizen science</li> <li>• increased capacity of public and research libraries to support and implement CS activities</li> <li>• better understanding of required training materials and modules on CS (e.g. young researchers and research management in RFOs)</li> <li>• collaborations with relevant networks such as LIBER and SciStarter</li> <li>• increases in projects employing citizen science methodologies</li> <li>• increase in open science and citizen science practices</li> </ul>
Institutional impact	<ul style="list-style-type: none"> <li>• increase of educational opportunities for and awareness of citizen science in academic institutions (and beyond)</li> <li>• increase in citizen science resources, tools and infrastructure</li> <li>• awareness of the necessity to change assessment policies for professional researchers; understanding of potentially appropriate new assessment policies, evaluation and impact assessment procedures</li> <li>• lessons learned on usefulness and applicability of the WP4 self-assessment tool in different institutional contexts</li> <li>• an increased understanding amongst public libraries how to drive institutional changes supporting CS</li> </ul>
Technological impact	<ul style="list-style-type: none"> <li>• improved openness and FAIR approach within the eu.citizen.science platform</li> <li>• perceived usefulness of the eu.citizen.science platform and co-designed new services</li> <li>• increased acceptance and usefulness of citizen science (data)</li> </ul>

	<p>infrastructures and lessons learned on datathons, hackathons and data analysis workshops</p> <ul style="list-style-type: none"> <li>• increased knowledge and skills on citizen science data handling</li> <li>• lessons learned about the uptake of digital tools for the involvement of hard to reach groups</li> <li>• agreements on the reuse and co-development of the open source code from the eu-citizen.science platform</li> </ul>
Economic impact	<ul style="list-style-type: none"> <li>• value creation strategy of the ECS Academy and other ECS services</li> <li>• 6 potential avenues for value creation, validation of two high potential ideas by creation of value propositions</li> <li>• framework to investigate technological and economic impact of other CS platforms and projects elaborated</li> <li>• consequences of the advancement of economic business activities through the utilisation of citizen science-based activities, services and technologies</li> <li>• new business opportunities in the realm of citizen science</li> </ul>

Together with the KPIs and the rich descriptions in the previous chapters of this deliverable, this table shows the manifold outcomes and impacts the ECS project contributed to. When reflecting the work done across the six impact areas, we think that some impact pathways are worth highlighting in this concluding chapter, as they turned out to be especially important and relevant.

One impact pathway we want to highlight here was the work with the 28 ECS ambassadors. Reaching out to people in 28 European countries, which are well connected to their local communities and are backed by the ECS project with training, networking and the support of the European CS community, turned out to be highly effective in a number of ways. Being part of the programme via commission enabled the ECS ambassadors to take action in the name of a big European project while providing enough flexibility to adapt activities to the very specific requirements of each country. Consequently the ECS ambassadors strongly promoted CS within their countries, especially in those countries where citizen science is not so well established yet.

Another important impact pathway is represented by the work done by and with libraries. Collaborating with the LIBER network and PL2030 to reach out to both public and research libraries, providing them with CS training adapted to their specific needs, and offering networking opportunities was very effective. For one thing, it resulted in an increased knowledge on CS among participants, both institutional actors and citizen scientists. Then, the processes built on support for CS in each individual organisation, bringing the practice forward in the specific context of libraries. It also resulted in first CS activities that involved citizens that had not been actively involved in research so far. This impact pathway shows that libraries can be a very important stakeholder group to foster

CS in the future, via the first public library community events that attracted around 900 citizens new to CS. The lessons learned on their needs and requirements will support the further outreach in the second half of the project.

To reach political impact, several impact pathways have been taken in the project. On the one hand, we see numerous meetings and workshops with local and regional policy makers aimed at raising awareness for citizen science in general, and CS generated data in particular as a basis for political decision making. These activities were also adapted to the very specific concerns of local policy makers (e.g. related to air quality, marine conservation, land use, biodiversity monitoring). Key in this context is understanding the respective needs of political decision makers and to share concrete case studies on how citizen science data positively impact and enrich political decision making. On the other hand, we see that positioning CS in European and global policies (e.g. via the Science Communication G7 Working Group, the Global Science Forum Citizen Science Working Group of the OECD) is a highly important pathway to impact, leveraging existing conversations and initiatives such as those connected to the CoARA Agreement to ensure the visibility of citizen science and its benefits on a broader stage. Especially CoARA might prove important in the next two years, supporting the institutionalisation of CS in RPOs, while citizen science can support the implementation of the CoARA Agreement in a mutually beneficial partnership.

When it comes to the involvement of people who are less active in CS so far, the ECS project has not reached the impressive KPI of involving 1000 people of “hard to reach” groups yet. But the activities that took place on a much smaller scale during the inclusive pilots gathered important lessons learned on how to approach groups that have so far been overwhelmingly left out in science-society collaborations. Co-designing and adapting CS activities to the specific requirements of the involved citizens (ideally with someone who is very knowledgeable about the group) was very important and resulted in formats that allowed e.g. migrants, older people or students from disadvantaged socio-economic backgrounds to get involved in CS. The first evaluation results show that the impact of this involvement can be highly relevant, not only in terms of generating new knowledge for science and increasing awareness and understanding for the topic under research amongst participants. We also learned that these CS activities provided participants with the feeling of being heard, valued and taken seriously – a fact that many of these groups miss in today's society.

Finally, we think that co-designing the eu-citizen.science platform and making the underlying code available as open source to be shared with other national platforms provides a significant impact pathway towards the development of efficient, sustainable infrastructures and technological advancements grounded in community values and principles.



As can be seen in the length of this deliverable, these are only some impact pathways and we expect many more to take shape in the second half of the project. Considerable evaluation and impact assessment efforts are planned for the final two project years. The next steps in our impact assessment journey are defined by continuing the data gathering process across the consortium to capture the richness of outputs, outcomes and impacts and by reflecting on the main insights from the collected data together with our partners in regular reflection sessions. The final analysis and an overall discussion of the ECS impacts will be presented in *D8.3 Final Impact Assessment Report*.

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# Annex 1: ECS Collaboration Group Activities

## *First ECS Collaboration Group Meeting with a focus on impact assessment*

On 07.03.2023, the first thematic session of the ECS Collaboration Group meeting took place with a focus on the **evaluation and impact assessment of citizen science initiatives**. The session was prepared and hosted by Stefanie Schuerz, Teresa Schaefer and Barbara Kieslinger (ZSI/ECS project), with support from Antonella Passani (IMPETUS), Usue Lorenz (YouCount) and Stephen Parkinson (MICS).

In preparation of the session, a collaborative document was sent out to group members. This document laid out seven main impact areas that could be addressed through citizen science initiatives: social / societal, political, institutional, scientific, technological, economic and environmental impact. With a definition outlined for each impact area, participants were asked to identify two main areas they address in their projects and map out:

- the main stakeholders that they expect to be impacted by the project,
- the expected outcomes and impacts they expect from the project and that they want to collect evidence for in the evaluation process,
- the data collection instruments used to bring evidence for the outcomes and impacts,
- influencing factors that might affect the project reaching the expected outcomes and impacts, and
- open questions and challenges of the evaluation processes

### StepChange

Main Impact Areas	Main Stakeholders	Expected outcomes and impact	Data collection	Influencing factors	Open questions and challenges
Social/Societal Impact	People in charge of local or national policies	Evaluation of CS data, CS navigator, increases contribution of CS in areas of health, energy and environment conservation.	Citizen engagement.	Communication with citizens.	Recruiting citizen scientists, stakeholders engagement to help understanding barriers in CS (health, energy and conservation)
Environmental Impact	Policy makers	Using different tools and mutual learning for evaluation of CS	Workshops, terrain work and citizen engagement for developing tools.	Local policies and tools for official institutions.	Standardized and outdated systems in environmental policy and difficulty in finding ways to implement innovative tools.

*Figure 10: Example from the StepChange project*

From the inputs collected there, ZSI extracted four recurring questions which were prepared for an interactive, guided discussion in breakout rooms with the help of a Jamboard. The main points of

these conversations are summarised below. In total, 29 initiatives and 35 colleagues took part in the exercise.

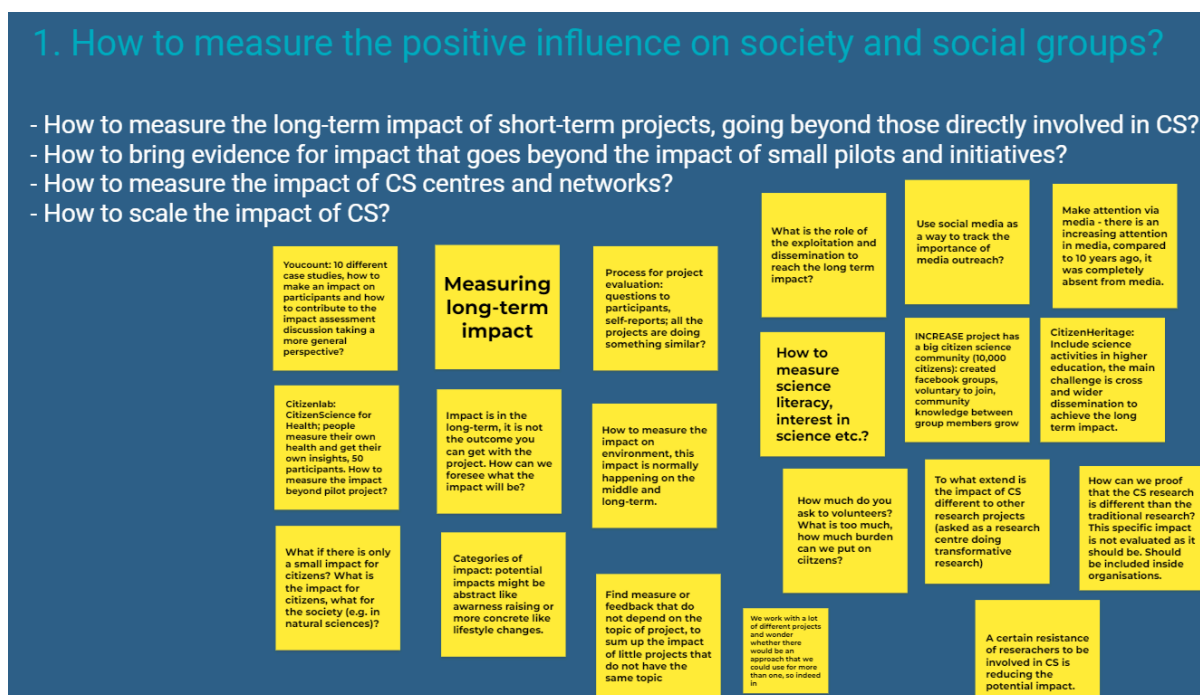


Figure 11: Jamboard created in Group 1

## 1. How to measure the positive influence on society and social groups?

In the first group, the main focus of the conversation revolved around the question of how to measure long-term impact within the timeframe of a limited, short-term project. While outcomes are still within the scope of such interventions, larger impacts on e.g. the environment, behaviour, or policymaking usually unfold over time and are sometimes hard to quantify. Especially more abstract impacts such as raising awareness of an issue, science literacy, community building, or empowerment are not easily measured in a standardised, quantifiable manner. Some impacts might also be small and hard to scale, like direct impact on the participating citizens, and it might not be clear how these impacts affect – or should affect – wider society.

The group then suggested looking outside the scope of singular projects and towards the combined efforts of a plethora of thematically and methodologically related initiatives on various geographic scales – from the regional to the global. This might be a way of both continuing to measure impact beyond the runtime of a project and amplifying the impact achievable by individual, time-limited projects. Finally, dissemination and exploitation were also mentioned as important pillars of longer-term transformation, which ties both into the role of social media outreach and community

building, as well as the role of traditional media, which has shown increasing attention to citizen science.



Figure 12: Jamboard created in Group 2

## 2. How to convince public authorities that citizen science data are good for policy decisions?

In this group, a lot of best practice examples were shared where citizen science produced data was either picked up by, or its value inscribed into policy. For instance, advocacy efforts by ECSA and citizen science initiatives via success stories led to the explicit recognition of citizen science and crowdsourcing as sources of environmental monitoring data in the reworked UNECE Aarhus Convention, namely in the recommendations on electronic information tools<sup>10</sup>. Similarly, the European Network of Environmental Protection Agencies set up an Interest Group on Citizen Science (IGCS) to improve the understanding and use of citizen science within environmental policy and

<sup>10</sup> The Aarhus Convention is the United Nations Economic Commission for Europe (UNECE) Convention on access to information, public participation in decision-making and access to justice in environmental matters. The updated recommendations on the more effective use of electronic information tools can be found here: [https://unece.org/sites/default/files/2022-05/ECE\\_MP.PP\\_2021\\_2\\_Add.2\\_E.pdf](https://unece.org/sites/default/files/2022-05/ECE_MP.PP_2021_2_Add.2_E.pdf) A concrete example of the advocacy efforts undertaken by ECSA can be seen here: [https://unece.org/fileadmin/DAM/env/pp/a\\_to\\_i/7th\\_meeting/Statements\\_and\\_Presentations/7TFAI\\_IV\\_4\\_EITRec\\_ESCA\\_Haklay.pdf](https://unece.org/fileadmin/DAM/env/pp/a_to_i/7th_meeting/Statements_and_Presentations/7TFAI_IV_4_EITRec_ESCA_Haklay.pdf) and here: <https://citizenscience.org/2020/10/07/supporting-environmental-democracy-and-the-aarhus-convention/>

governance<sup>11</sup>. Examples from concrete projects collecting data for policy that were shared in the group focus on odour pollution, use of natural resources, biodiversity monitoring, and others. Thus, the field of environmental monitoring gives overall rich evidence of the potential policy impact of citizen science, while showing a number of learnings to observe going forward:

First of all, it is important to understand that policymakers need to be made aware of the existence and the strengths of employing citizen generated data. They need to be shown the added value of such data, and their buy-in must be ensured. At the same time, such data must be made accessible to decision makers, and it needs to be translated in such a way that it is useful to both science and policy. This includes not just a contextual understanding of the data, but also data and metadata standards that allow for its use by ministries, agencies, scientists, and statistical offices. To this end, understanding the data and its needs in terms of quality and make-up is key. In each case, the question must be answered in practical terms of how data can be translated between various target groups – citizen scientists, professional scientists, policy makers – and into legislation and policy action. In this context the importance was also pointed to critically reflect on how data and initiatives can be protected from being instrumentalised by any one political party. And, as always, the challenges of securing sufficient resources to create policy impact remains to be considered.

### 3. How to initiate the potential for social impact?

From Kerstin (INCREASE), Enrico (STEPCHANGE), Eva (NATIONAL PLATFORM CS CZ) and Meritxell (RadoNorm)

- How to successfully deal with awareness raising, recruiting, motivation, behavioural change, sustainability?

Recruitment process: difficulties with digital technologies (webs/apps); decentralised recruitment (consortium disseminates); different communication channels/strategies are more effective depending on the country (newspapers in Germany; TV in Italy; national radio in France; networking or addressing associations; depends on whether citizens are already organised or not; their level of motivation); unpredictable how many citizen scientists you will recruit; schools can also be a target for CS (need education material); regular feedback to consortium members about recruitment; stakeholders (external to the project) are important; recruitment managed at local level by partners in the consortium. Citizen scientists are also involved in dissemination of the project and the results.

Motivation: scientific vs. lay citizens opinion on certain controversial topics; some people against using apps in some countries; take care of cultural differences of the different countries

- How to different languages in transdisciplinary projects?

Native language works best

Translation team from consortium or automated translations are used

(Private) facebook groups in different languages to support new participants and connect with each other (not possible through the app for security reasons) - this also helps scientists (eg. translating the app by volunteers)

Figure 13: Jamboard created in Group 3

<sup>11</sup>

<https://epanet.eea.europa.eu/reports-letters/epa-network-interest-group-on-citizen-science/epa-network-interest-group-on-citizen-science>

### 3. How to initiate the potential for social impact?

The third group focused their discussion on two challenges. First, the group discussed how to successfully deal with awareness raising, recruiting, motivation, behavioural change, and sustainability to initiate the potential for social impact. Regarding the recruitment process, participants touched on the difficulties brought on by the use of digital technologies (webs/apps), which brings up many questions from how to address the digital divide through budgeting of such tools to privacy concerns. A decentralised approach to recruitment via the dissemination through various partner networks was named as beneficial, as was the use of different communication channels/strategies depending on the target group, but also the country of recruitment (e.g., newspapers in Germany, TV in Italy, national radio in France). Schools can also be a target for CS, but there is a need of specific educational materials for this to be successful. The role of established networks, associations and other multiplier organisations was also stressed, although their role also depends on whether citizens are already organised in the region and field of interest, and, associated with this, the already existing levels of mobilisation and motivation. It was also pointed out how it is always somewhat unpredictable how many citizen scientists a recruitment effort will mobilise. Organising regular feedback loops with consortium members about recruitment can be beneficial in adjusting a project's approach.

To keep citizen scientists motivated and achieve sustainable change, it can also be beneficial to involve them in dissemination efforts of the project and the results. To keep all involved stakeholders engaged, it is also important to balance the opinions represented in a consortium, including potential differences between lay and scientific citizens' opinions on certain controversial topics. In any case, being aware and addressing cultural and subcultural differences – including between different countries – is key.

Regarding the question of how to approach different languages in transdisciplinary projects, the group was united in the opinion that native languages work best for successful communication. The citizen science initiatives represented in the group employed translations both produced within the consortium team and by technological means to meet the different stakeholder groups. Some colleagues could draw on good experiences with (private) facebook groups in different languages to support new participants and connect with each other. However, an important caveat is that this is not possible through the app for security reasons.



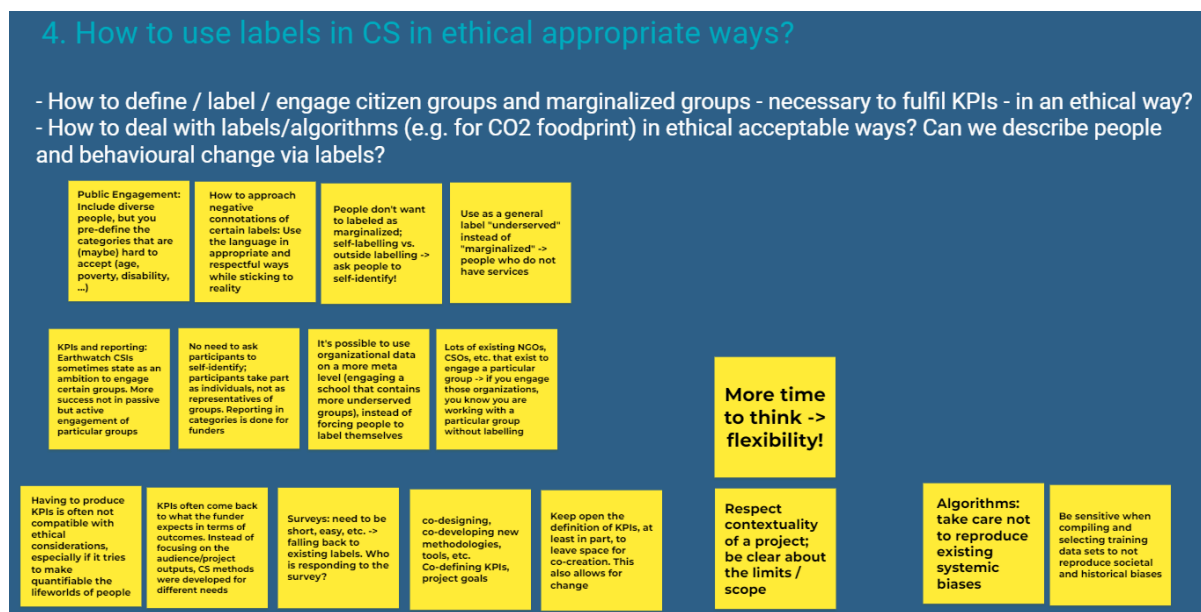


Figure 14: Jamboard created in Group 4

#### 4. How to use labels in CS in ethical appropriate ways?

The fourth group focused on the question of ethical classification. As certain standards are needed for accurate and comparable measurements, it is important to take into account ethical considerations when choosing labels. This is especially true in cases when marginalised and underserved groups are engaged, where certain labels may be dangerous or reinforce existing inequalities. In the discussion, once consideration brought up was the question of whether people want to identify with certain categories such as old, poor, or disabled, and in turn how to approach possible negative connotations of certain labels. As a solution, it was proposed to use language in appropriate and respectful ways while not disregarding social and material realities. Another potential approach is to let people label themselves, i.e., to let them self-identify. This, however, might be easier done in interactive activities rather than situations where specific underserved groups are sought out for inclusion. At this step of a process, it might be helpful to draw on specific organisations already serving such communities without having to label participants beyond that. Through this, participants are allowed to take part as individuals rather than representatives of certain societal groups. Furthermore, organisational data might be used instead of forcing people to label themselves, while people are not put into situations where they might be pressured to out themselves.

Finally, it is also important to ask for whom the monitoring and reporting in certain categories is done – namely usually the funders rather than the participants. The pressure to produce Key Performance Indicators (KPIs) might not be compatible with ethical considerations, especially if it tries to make quantifiable the lifeworlds of people without capturing their quality and complexity. KPIs also often

come back to what funders expect in terms of outcomes, instead of focusing on the needs and expectations of the engaged communities. Thus, it is important to keep some flexibility in the definition of KPIs and leave space for co-creation and co-definition of project goals. At the same time, the complexity this entails may also be overwhelming, depending at least in part on the employed methodology. In turn, existing and established labels may also be helpful, depending at least in part on the intended audience of an intervention. In any case, it is paramount to respect the contextuality of a project and be clear about its scope and limits. Having more time to reflect and adjust an approach is also always beneficial.

## *Second ECS Collaboration Group Meeting with a focus on impact assessment*

There are a growing number of citizen science initiatives (CSIs) across Europe, each actively engaging citizens and other stakeholder communities to achieve tangible change. Some of these initiatives are represented in the monthly meetings of the ECS Collaboration Group, which kicked off its thematic sessions of 2024 with a focus on the impact of citizen science endeavours. A coalition of researchers from the ECS, IMPETUS and CitiObs projects collaborated on this workshop, which invited participants to map out the variety of impacts they seek to achieve in their CSIs across a diversity of areas and stakeholder groups. Together, we built an impact landscape and collected challenges, open questions, and further resources to share important learnings and support citizen science practitioners in clarifying their respective impact vision.

### **How we worked**

The first thematic session of 2024 of the ECS Collaboration Group meeting was held on March 5, 2024 with a focus on the impact assessment of citizen science initiatives. The session was prepared and hosted by Stefanie Schuerz, Teresa Schaefer and Barbara Kieslinger (ZSI/ECS project), with support from Antonella Passani (IMPETUS) and Margaret Gold (ECS, CitiObs).

The hosts prepared a Miroboard laying out an impact landscape that included technological & economic impact, institutional and scientific impact, as well as social impact, political impact, and environmental impact. For each of these areas, participants were asked to outline both planned and achieved impacts, as well as the primary stakeholder groups addressed by each impact. On top of this, three fields were prepared to collect 1) challenges and open questions, 2) needs in order to measure, monitor, solve challenges regarding impact, and 3) further resources. In total, 19 initiatives and 21 colleagues took part in the exercise, which were invited to share their experiences in the context of three breakout rooms. The main points of their conversations are summarised below.

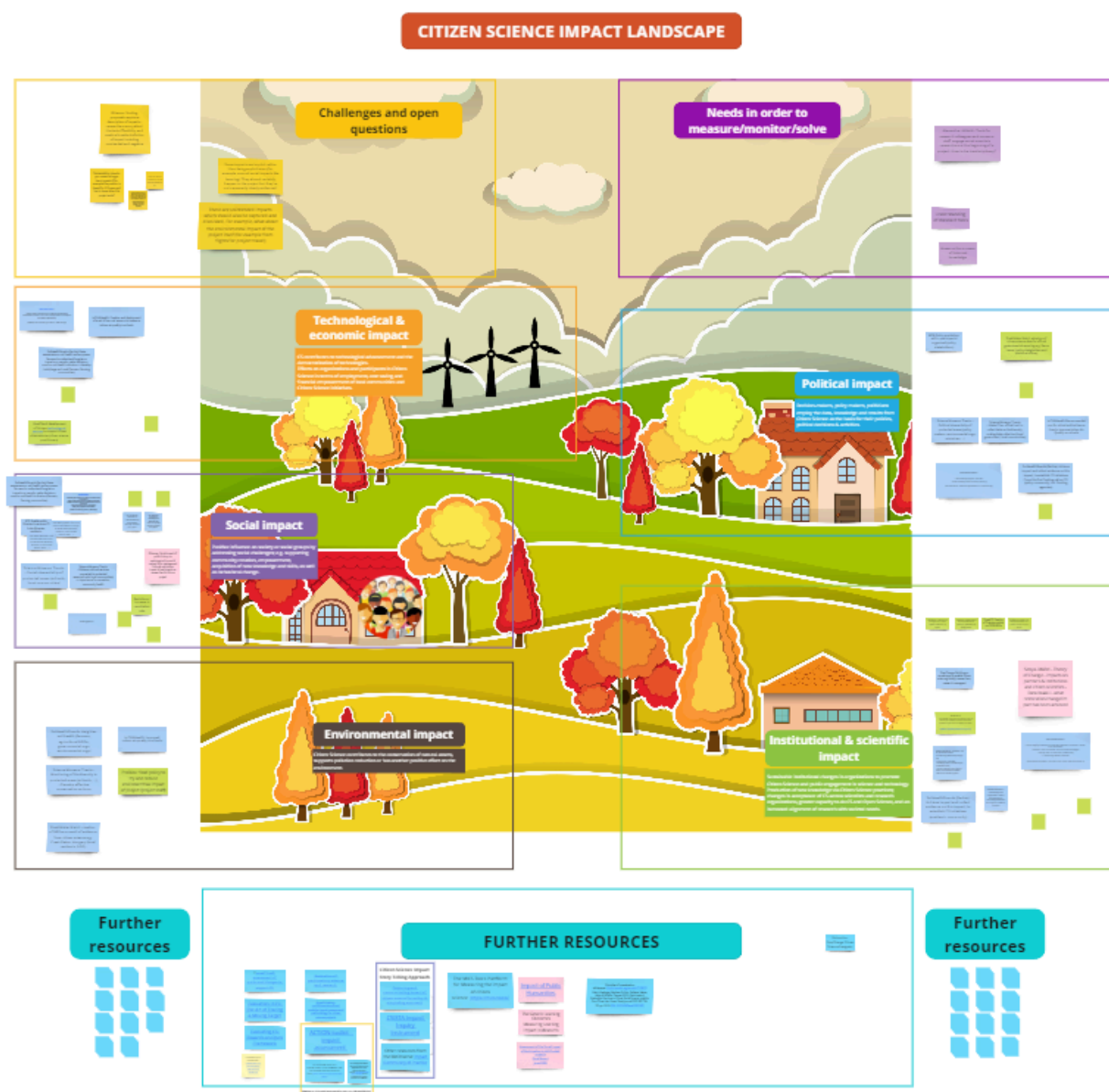


Figure 15: MiroBoard from the ECS collaboration group meeting

## Overview of the discussion

The participants agreed that for some impacts, it is quite evident to which category they belong, but many more overlap or are closely intertwined, covering two or more impact areas. For instance, efforts that aim to positively affect soil health can have an environmental impact (better soil health), a social impact (changes in behaviour and attitudes, community building), and an economic impact

(better yields and longer-lived soil) all at once, but also depending on the framing applied. As such, impacts might be complex to categorise.

Another important tension arises in the very act of planning for specific impacts, since some are more explicitly sought than others – both by project implementers and funding agencies. Individual capacity building, community empowerment, or changes in attitude are really common in citizen science, but are usually not monitored closely and often not defined as specific aims, which makes them hard to put down as either planned or achieved impacts, while they are still an important part of most projects.

There are also unintended impacts which we might miss or not have as open an eye for, that should still be taken into account somehow. This is also tied to the process itself. For instance, one might have a specific category of impacts at the heart of the project, but then throughout its implementation and especially through collaborative efforts, other impacts might come along the way. This means there is never a clear pathway, and it is necessary to have some flexibility, which might also be achieved by describing impacts more broadly when starting a project. Here, an important challenge is how to plan and be interdisciplinary at the start, including in the (co-)evaluation efforts, and set up a resilient monitoring procedure.

In a similar manner, impacts that unfold on a different timescale than the project itself might be difficult to assess, such as changes in air quality. Here, as well, it is often hard to decide how to define and measure these types of impact at the beginning of the project already. And while there are tried measures in place already that we use repeatedly throughout our initiatives, sometimes it is hard to define these early in the process.

Then, especially with regards to environmental impacts of a project, there are also unintended effects of the projects themselves that must be taken into account, e.g. through large-scale travelling, online meetings, or analogue materials that use a lot of resources. Here, the argument was brought forth that we need to capture also potential negative impacts of our work and face them honestly. Finally, some impacts we define as positive can be negative for others, especially when stakeholder groups with opposing interests are at play. A good example for this are changes that benefit communities, but might have a negative economic impact on corporations.

## Annex 2: Citizen science and research assessment reform: notes from the first ECS high-level policy event

As part of its policy engagement work, the ECS project is organising a series of online policy events with high-level experts and decision-makers from both academia and politics. The first of these events took place on 15 March 2024 under the title *Redefining Excellence: The CoARA Agreement as an Opportunity for the Citizen Science Community*. It was facilitated and moderated by Alan Irwin (Copenhagen Business School - Research, Innovation and Organization Group). Angelee Pavanee Annasawmy, Marie Curie alumna and ECS ambassador in France, kicked off the event with a short input. Together with our panellists Eva Méndez (CoARA Steering Board, Universidad Carlos III de Madrid), Diana Bowler (UK Centre for Ecology & Hydrology), Georgios Papanagnou (European Commission - DG Research and Innovation) and Bregt Saenen (Science Europe), we then used this opportunity to examine the role of citizen science in reforming research assessment and redefining scientific excellence. In total, 71 participants joined the event, 33 of which signed up for a follow-up workshop to co-design a policy brief.

Calls for a reform of research assessment have markedly increased in recent years, with many scholars pointing out the limitations of quantitative indicators such as the journal impact factor and criticising the ‘publish or perish’ culture they foster. The [Declaration on Research Assessment \(DORA\)](#) developed in 2012 was the first widely shared and endorsed document recognising the need to improve the ways in which the outputs of scholarly research are evaluated. One of its recommendations is to include “qualitative indicators of research impact, such as influence on policy and practice.” In order to counterbalance the current overreliance on journal-based metrics, DORA encourages the adoption of more holistic measures of research impact that take into account the content of the research itself and its broader contributions to society.

The [CoARA Agreement](#) echoes this call to reduce the weight of journal-based metrics and other quantitative indicators in research evaluation, but elaborates more on the need for an overall diversification of assessment criteria (and thus of career paths) in academia. It is the result of an extensive stakeholder consultation and co-creation process jointly coordinated by the European Commission, Science Europe and the European University Association (EUA). The idea of jointly developing new standards and principles for research assessment obviously struck a chord with the

scientific community. More than 350 RPOs, RFOs and other research-related institutions were involved in the drafting of the agreement, which was finalised and published in July 2022. As of 11 June 2024, 735 organisations from across the globe have signed the CoARA Agreement. 646 organisations and institutions have additionally joined the CoARA Coalition, a platform for experimentation, exchange and mutual learning. CoARA coalition members are organised in national chapters, whose purpose is to advance the implementation of the CoARA principles and commitments on the national level, and working groups, which function as 'communities of practice' on specific topics or research areas. All signatories are expected to submit an action plan for the implementation of CoARA's core commitments within one year of signing the Agreement. Within five years of signing the agreement, they are expected to have made tangible progress in developing new assessment criteria and processes.

The CoARA Agreement's overarching aim is to ensure "that the assessment of research, researchers and research organisations recognises the diverse outputs, practices and activities that maximise the quality and impact of research." 'Engagement with society' is cited as one of the practices that contributes to research quality and impact. But while terms like 'public engagement' and 'collaboration with societal actors' appear at several points in the text, citizen science is not explicitly mentioned in the CoARA Agreement.

In our high-level policy event we therefore wanted to discuss how we (the citizen science community) can put citizen science on the CoARA Coalition's radar and, more generally, make our voices heard in the current debate around research assessment reform. In terms of expected outcomes, our aim for this event was to collect input for concrete, actionable policy recommendations and invite participants to join us in co-designing a policy brief on the topic. The main points made during the panel discussion can be summarised as follows:

- CoARA is a fantastic opportunity to raise awareness and advocate for citizen science among research funders and policy-makers.

The number of signatories shows that the CoARA Agreement has generated a lot of momentum over the past 24 months. CoARA is creating space and opportunities for change and now it is incumbent upon the CS community to use that space, join the conversation around research assessment (e.g. by attending relevant events), and make a comprehensive case for the added value of citizen science. What is needed is a focused and concerted effort to demonstrate how research assessment can capture societal engagement and how this would benefit researchers, RPOs and society as a whole.

- If we want to create a thriving, innovative and impactful citizen science landscape in Europe, we need to set the right incentives. To do that, research assessment reform is essential.

In areas like biodiversity studies, citizen science can be (and is already being) used to conduct research that actually matches conventional concepts of scientific excellence - by yielding oft-cited papers in high-impact journals. On the other hand, working on more collaborative or even co-creative projects, which require much more project management and communication effort, typically leaves little time for scientists to write papers. Thus, as long as research assessment frameworks use publications as the sole measure of scientific performance, engaging in this type of citizen science project can potentially be a career killer for young researchers.

- We need to concretise the place of citizen science in the CoARA Agreement not at the programmatic level, but at the level of operationalisation and implementation.

The CoARA Agreement is not a living document - it cannot be amended. Advocating for a more explicit integration of citizen science into the Agreement is therefore pointless. Moreover, all panellists agreed that although the term 'citizen science' itself is not mentioned explicitly, the CoARA Agreement does already contain a clear commitment to public engagement and collaboration with societal actors. The logical next step is thus to make a case for citizen science on the implementation level. This means providing concrete input for the integration of citizen science into new research assessment criteria, indicators and procedures currently being developed at the institutions that have signed the CoARA Agreement.

- The goal is to establish citizen science as one of many practices or approaches that can produce excellent, innovative and impactful research, not to turn citizen science into a box that all researchers, research institutions and research projects need to tick.

There is no 'one size fits all' in research assessment. Rather, research assessment frameworks should respect and reflect the particularities of specific institutions, research areas etc. Not all research projects need to incorporate citizen science and not all researchers need to be public engagement experts. To ensure that citizen science is implemented in a way that produces added value and not as a mere box-ticking exercise, the CS community needs to develop and proactively communicate best-practice standards and quality criteria.

The panel discussion was flanked by a lively debate in the meeting chat and followed by a Q&A session. Topics raised by participants included the active participation of citizens in research assessment procedures, such as evaluation panels or review boards, and possible collaborations with actors in adjacent fields (transdisciplinary research, public engagement, participatory science communication etc.) on the topic of research assessment reform. Several participants stressed that while talking about recognition for professional researchers involved in citizen science projects we should not forget that citizen scientists also often get very little recognition for their contributions.

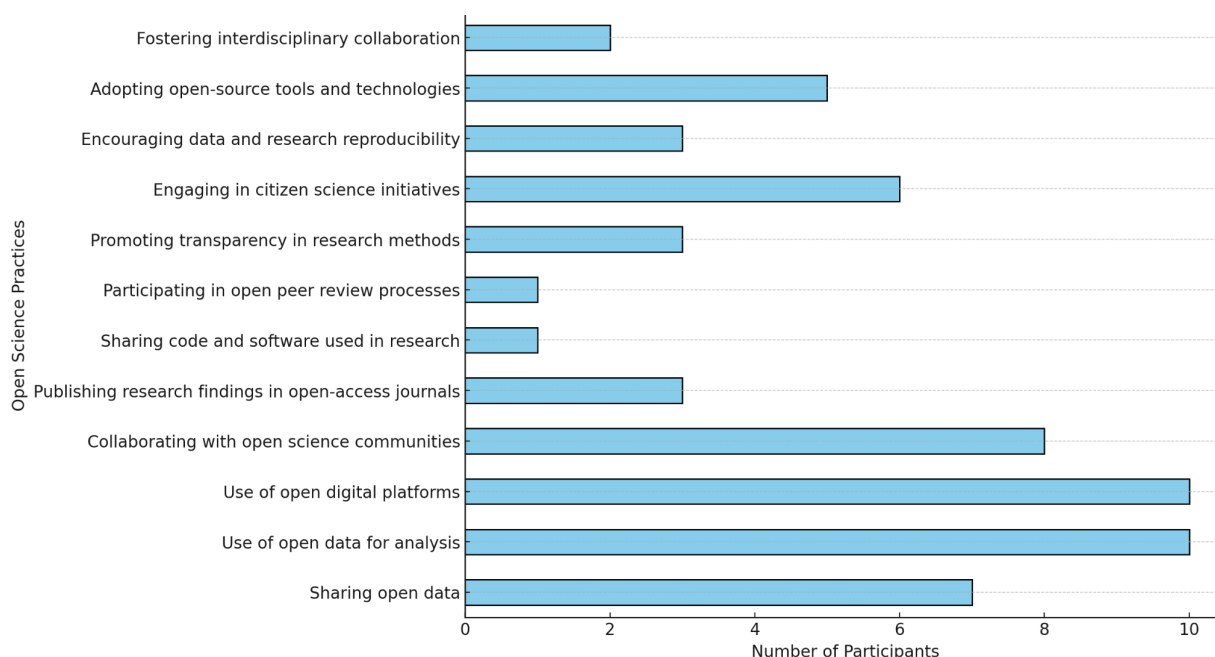


The CoARA Agreement is paving the way for a transformative cultural shift towards a more nuanced, holistic and socially responsible system of research assessment - a system that uses a combination of different criteria, indicators and metrics to acknowledge and reward diverse scientific contributions. It is up to us to make sure that these new criteria and indicators also recognize involvement in citizen science or other forms of public engagement. To do so, we need to build convincing arguments for the benefits (and limitations) of citizen science, provide concrete input for the development of assessment criteria and indicators, and work towards change at the institutional level.

The event provided the ECS project and all participants with a better understanding on how to position and drive CS via the CoARA agreement. The project has created a mailing list of people interested in a follow-up workshop, which might be the first steps towards creating a working group proposal for the next working group call of CoARA.

## Annex 3: Datathon training evaluation survey (Highlights)

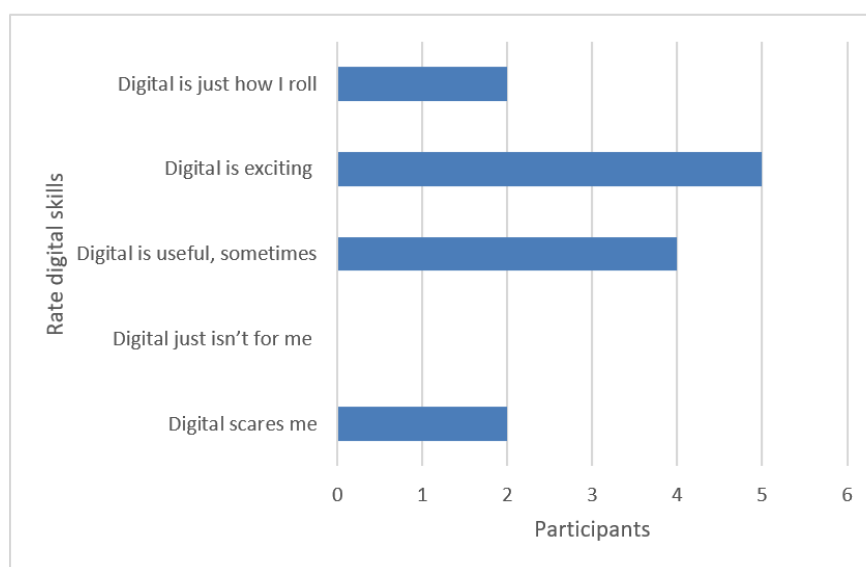
This annex presents key findings from the survey conducted during the Datathon training session hosted by CSIC in November 2023. The survey, completed anonymously by 13 participants, aimed to gather feedback on multiple aspects of the training. It assessed the session's effectiveness, the usability of introduced digital tools, and the overall impact on participants' data literacy and citizen science skills. The insights gained from this survey offer valuable perspectives on the training's success and highlight areas for potential enhancement in future sessions. These results will inform our ongoing efforts to refine and improve our training programs.



*Figure 16: Feasibility of implementing open science practices.*

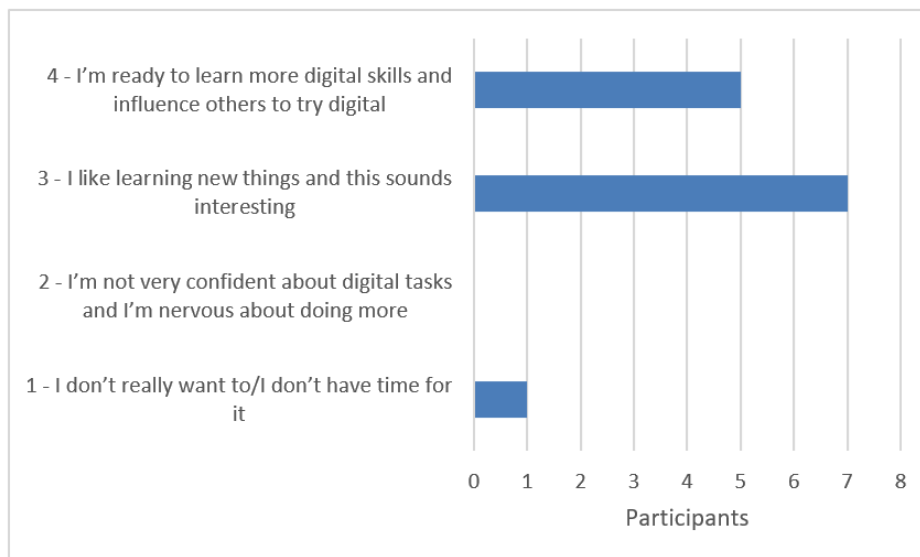
The bar chart depicts the respondents' reaction to the question, "Which of the following open science practices do you consider feasible to implement or are you already using in your work?". The practices with the highest number of affirmative responses include "Use of open digital platforms" and "Use of open data for analysis," each recognized by 10 out of 13 participants. "Sharing open data" and "Collaborating with open science communities" were also notably feasible, with 9 participants each.

On the other hand, practices such as "Sharing code and software used in research" and "Participating in open peer review processes" had fewer affirmative responses, indicating potential challenges or lower current adoption in these areas. Overall, the results highlight a strong inclination towards using open data and digital platforms, while other practices may require additional support or resources to increase feasibility and adoption.



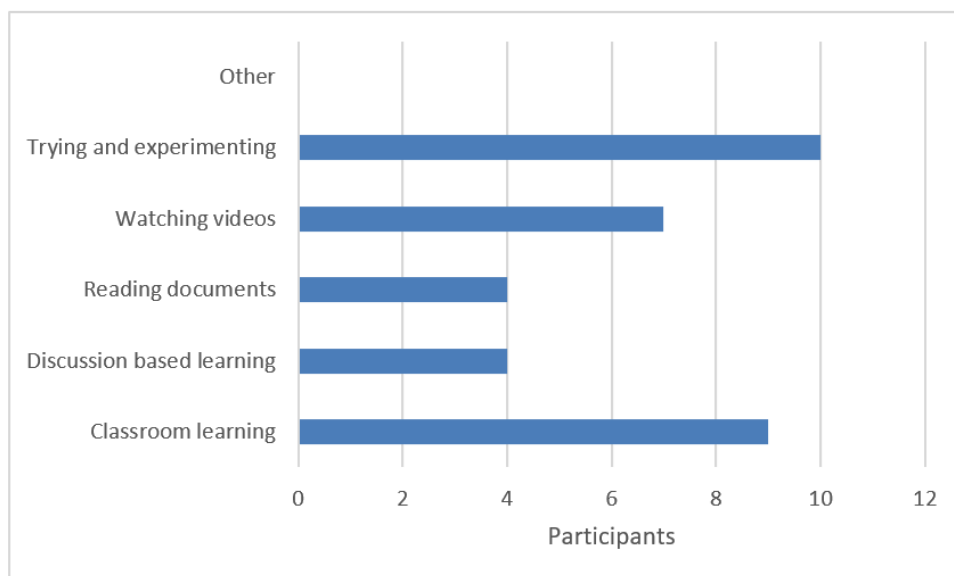
*Figure 17: Participants' digital skills.*

The survey results reveal diverse self-assessments of digital skills among participants. When asked the question "On a scale of 1-5 how would you rate yourself in terms of digital skills?", a majority of respondents positioned themselves at levels 4 and 5, indicating high comfort and enthusiasm with digital technology. A significant portion selected level 3, suggesting they find digital tools useful, but perhaps not essential. Notably, a small group of participants chose level 1, expressing apprehension towards digital technology. This distribution paints a nuanced picture: while most demonstrate confidence in their digital abilities, a considerable portion remains less engaged with digital tools. The absence of level 2 responses is interesting, possibly indicating a polarization in attitudes towards digital skills, but the patterns we see here need to be studied better with more participants.



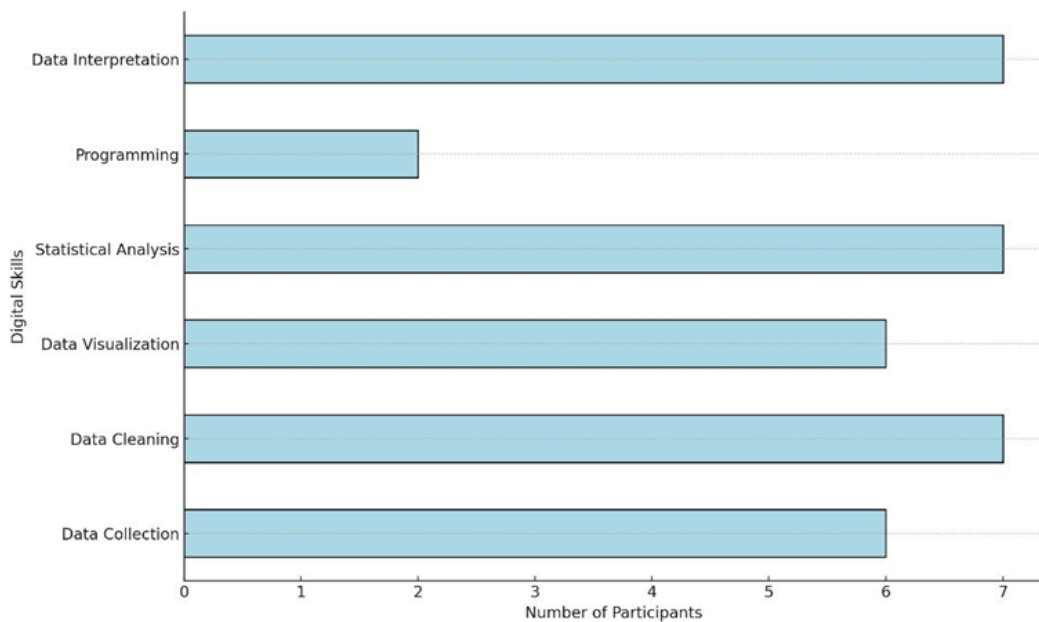
*Figure 18: Feelings about digital training and support.*

The analysis of the survey results on how participants feel about digital training and support reveals varied attitudes. A small number of participants indicated a lack of interest or time for digital training, suggesting potential barriers to engagement in this area. None of the participants expressed a lack of confidence in digital tasks, which is a positive sign indicating that most individuals feel somewhat comfortable with digital activities. The majority of responses show a keen interest in learning new things, viewing digital training as interesting and beneficial. Additionally, a significant portion of participants expressed a readiness to further develop their digital skills and influence others, highlighting a proactive attitude towards digital learning and support.



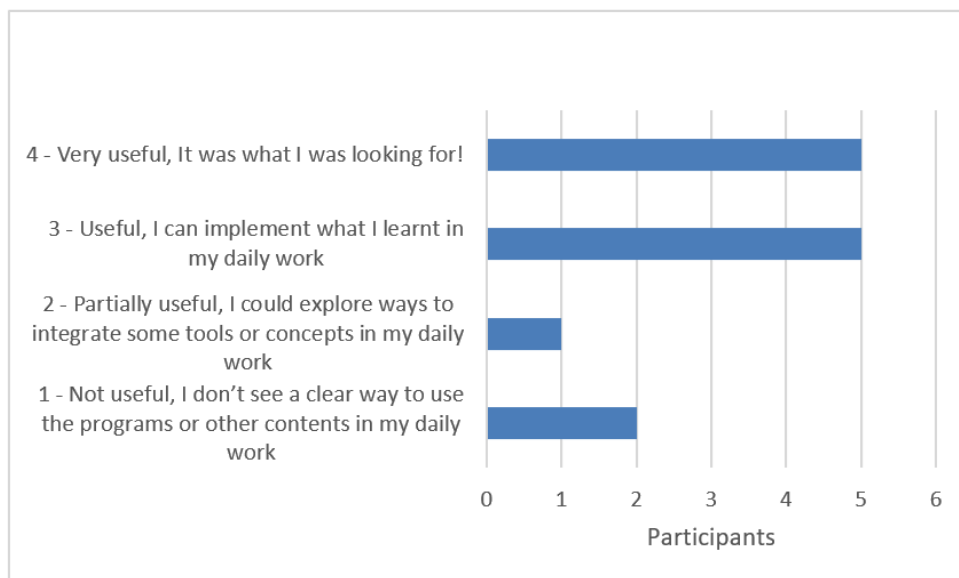
*Figure 19: Preferred learning methods among participants.*

The survey results on preferred learning methods reveal that "Trying and experimenting" emerged as the most favored approach. This indicates a strong preference for hands-on, practical learning experiences. "Watching videos" also received considerable support, reflecting the value participants place on visual and auditory learning aids. Both "Classroom learning" and "Reading documents" garnered moderate interest, suggesting that while traditional learning methods are still relevant, they are not the top choice for most participants. "Discussion-based learning" had fewer preferences, indicating that interactive dialogue, while beneficial, might not be as popular as other methods.



*Figure 20: Digital skills developed or enhanced by the Datathon Training.*

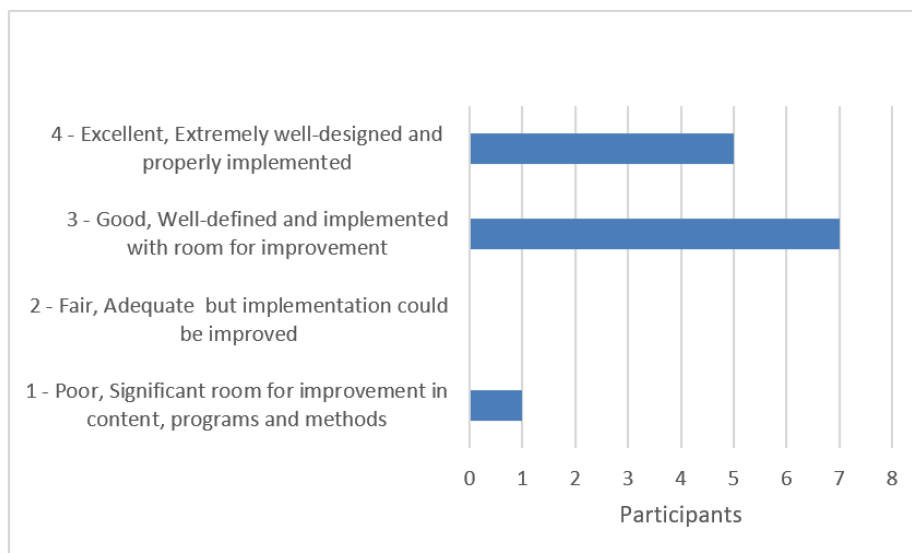
The survey question, "Which of the following digital skills do you believe the Datathon training helped you develop or enhance?" reveals varied individual experiences in skill development during the Datathon training. While some participants chose to focus on a single skill, others identified multiple areas of enhancement. Data Cleaning was the most frequently cited skill, with eight participants recognizing improvement in this area. Data Collection, Data Visualization, and Data Interpretation each received acknowledgment from seven participants, indicating significant gains in these skills as well. Statistical Analysis was noted by five participants, while Programming saw the least development, with only one participant selecting it. Interestingly, some participants considered that they enhanced only one skill, such as data collection, whereas at least three participants chose five different skills, showing a broader impact of the training. This variation suggests that while the training was generally effective, future sessions might benefit from a more tailored approach to address the specific needs and varying skill levels of participants.



*Figure 21: Usefulness of the Datathon Training Session.*

The survey question, "Use the scale below to tell us how useful you consider the datathon-training session?" reveals varied opinions on the usefulness of the training. In general there is positive reception, with the majority of participants finding it either "Useful" or "Very useful." These respondents indicated they could implement the learned material in their daily work or that the training precisely met their needs. However, a smaller portion of participants found less value, rating it as "Partially useful" or "Not useful," suggesting difficulty in applying the content to their specific roles.





*Figure 22: Usefulness of the Datathon Training Session.*

The survey question, "Use the scale below to evaluate the Datathon training session (considering as whole the content, programs, and methodology)," reveals varied opinions on the overall quality of the training. This distribution highlights that while the majority of participants found the training to be good or excellent, there is still room for improvement, especially in addressing the needs of the participant who found the training poor.

## Annex 4: Impact Story Booklet

# The impact of citizen science: 12 stories from across Europe

Stefanie Schuerz | Teresa Schaefer | Barbara Kieslinger



**ecs**

european  
citizen  
science



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# The impact of citizen science: 12 stories from across Europe



Stefanie Schuerz | Teresa Schaefer | Barbara Kieslinger

In this book, we tell 12 impact stories from citizen science efforts implemented across Europe. They serve as examples of how citizen science can create change with and for our society with the aim of achieving a more inclusive and sustainable future.

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# Why this book



Citizen science is creating impact with and for the people, going far beyond what can be captured by numbers and statistics. While impact is often measured in figures, these only tell part of the story. The true effects and changes brought about by citizen engagement in scientific endeavours are diverse, profound, and often intangible, extending into areas that numbers alone cannot fully convey. To truly understand the depth and breadth of these impacts, we must turn to the power of storytelling.

Storytelling conveys the richness of data in a way that resonates on a personal level, providing anecdotal evidence and insights into the experiences of those involved. Through stories, we can explore the nuanced ways in which citizen science contributes to change—how it empowers individuals, fosters community, and sparks innovation. Stories give voice to the people behind the numbers, honouring the richness of their experiences and making the impact of citizen science relatable and tangible.

The 12 impact stories presented in this book exemplify how citizen science is contributing to a more inclusive and sustainable future in Europe. Each story highlights the diverse ways in which citizens engage with science, from local environmental monitoring projects and ad-hoc activities in public libraries to strategic endeavours to establish citizen science at national scale and beyond. These stories showcase the power of collective action, where everyday people come together with scientists to create meaningful change.

By telling these stories, we aim to go beyond the numbers and show the real-world impact of citizen science. We hope these narratives will offer

you a glimpse into the potential of citizen science to transform not just the way we do science, but the way we live and work together as a society. As you journey through them, you will see how citizen science is more than just a method of data collection—it is a movement that fosters inclusion, drives sustainable development, and empowers communities across Europe. These stories are a testament to the incredible potential that lies in the hands of everyday citizens when they are given the tools and opportunities to engage with science.

Welcome to a new perspective on citizen science, where the impact is measured not just in numbers, but in stories that bring those numbers to life.

# The European Citizen Science project



## Building a stronger, more inclusive citizen science community

The European Citizen Science (ECS) project takes flight, driven by a bold vision: a vibrant, inclusive, and globally connected community tackling societal challenges and driving transformative change across Europe. Funded by the European Union (HORIZON-WIDERA-2021-ERA-01-60) for 48 months (August 2022 – July 2026), this ambitious initiative, led by the European Citizen Science Association (ECSA), brings together 21 organisations from 15 European countries.

## Building on success, expanding the scope

The ECS project inherits the legacy of past successful initiatives like EU-Citizen.Science and Cos4Cloud, aiming to significantly expand and strengthen the European citizen science landscape. This project champions open science practices, positioning Europe as a frontrunner in integrating citizen participation throughout the research and innovation process.

## Widening the circle: engaging newcomers and opening up to new audiences

ECS prioritises inclusivity and community growth. Through innovative initiatives like the European Citizen Science Academy and a dedicated network of ambassadors, the project aims to attract new participants and empower existing ones.

## Building bridges and sharing knowledge

## International cooperation: a global force in citizen science

## The road to global leadership

[illegible]

16



Web

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[https://eu-citizen.science/ecs\\_project/](https://eu-citizen.science/ecs_project/)

The ECS platform

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<https://eu-citizen.science/>

The ECS digital magazine *Citizen science lighthouse*

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<https://eu-citizen.science/subscribe/>

Social media



E-mail

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[eucitsciproject@ecsa.ngo](mailto:eucitsciproject@ecsa.ngo)



# Section 1



## Social Inclusion

How to achieve  
diversification in  
citizen science

# Older adults join citizen science: insights from Spain's OdourCollect



ECS partner Science For Change from Spain was responsible for the implementation of an inclusive pilot that involved older people in the usage of a citizen science app for the mapping of odours. 30 older people from three different locations shared their concerns with using a mobile app and brainstormed on solutions to overcome barriers to their involvement in citizen science projects. The pilot applied an innovative artistic approach to overcome some of the barriers related to technology and has not only generated a comprehensive guide on how to involve older people in science, but also outlines benefits for the people involved.

**Science For Change** is a social enterprise based in Barcelona that promotes collaborative research, evidence-informed public policy and quality scientific communication.

More info: <https://scienceforchange.eu/>

**OdourCollect** is a citizen science application that puts odour pollution issues on the map, giving a voice to citizens affected by odour issues. The application has been implemented and used since 2019 and now provides citizens' contributions on odour pollution from around the world.

<https://odourcollect.eu>

The inclusive pilot presented by Agostina Bianchi and Mireia Ros of ECS partner Science For Change (SFC) built on the citizen science project "OdourCollect and the elderly: digitising and co-creating our olfactory memory". In this innovative initiative, older people were actively involved in the mapping of odours and odour pollution through the use of a mobile application. This project targeted older individuals specifically, since they typically show low engagement in such technological and scientific activities. The overarching aim was to identify and address barriers to their participation, culminating in the creation of a comprehensive guide with recommendations for incorporating older populations in citizen science projects.

With financial support from FECYT, the The Spanish Foundation for Science and Technology, the project unfolded in three distinct Spanish locations: Barcelona, Vilanova i la Geltrú, and Ataun, engaging a total of 40 participants. Each setting offered unique insights into the challenges and opportunities of involving elderly citizens in citizen science.

In Barcelona, the initiative was integrated into a local civic centre's science week, attracting individuals with varying degrees of scientific background, including retired professionals. The participants' interaction with the app highlighted technological adeptness among the younger seniors (aged 60-70) but significant challenges among those over 70, many of whom lacked smartphones.



**Figure 2.** Pilot in Ataun. A journey through time into olfactory memory. (credits: Mikel Blasco)



**Figure 3.** Pilot in Ataun. Collaborative timeline of olfactory memories. (credits: Mikel Blasco)

“One day we walked around the neighbourhood, we used the app, we showed the participants how to use it and we recorded all the limitations they had in the usage,” explains Agostina Bianchi. “So the biggest limitation for working with these groups is technology because nowadays it’s immersed in everything we do. And we

could see a big difference between people between 60 and 70 years who have to use it, and people who are older than 70, who find a lot more difficulties in using new technologies because most of them don’t even have smartphones. And they’re not quite interested actually in learning how to use this new technology. But they are interested in being included in other things, in other activities.”

The citizens involved in the small city of Ataun came from an organisation for people aged 65+ and had a similar profile to those in Barcelona, while in Vilanova i la Geltrú the pilot engaged older people from a geriatric residence, resulting in additional factors to be considered to have a successful intervention.

### Driving factors and successful interventions

The project faced several barriers, notably the varying degrees of cognitive and physical abilities among participants, especially in settings like the geriatric residence. Some participants suffered from conditions such as dementia, were wheelchair users, or had other physical limitations which limited their ability to engage with typical citizen science activities and im-

peded e.g. the use of a mobile phone. The Science For Change team identified some key elements to address these barriers:

#### Technological adaptation and support

The project team adopted a hands-on approach to discover usability issues with the app. They facilitated direct interaction with the app through guided neighbourhood walks, which helped pinpoint specific usability issues. This hands-on approach was crucial for developing practical modifications to the app, enhancing its accessibility for older users. Participants who did not possess a mobile phone could use mobile phones provided by the Science For Change team.

#### Artistic engagement

A particularly innovative aspect of the project was its use of art to bridge the gap towards scientific activities for older participants. In workshops focused on the emotional connections to odours, participants created art pieces that expressed their personal stories and relationships with specific scents, culminating in a virtual museum exhibition.

Says Agostina: “In another session, we talked about how odours are related to memory and emotions. And we did a collaborative timeline in which they were able to share their memories, linked with odours from their personal stories. So we engaged them in a conversation, and then they chose a material to materialise all these memories in art. And we created a virtual museum. So this was a way for them to tell us about their stories through the odours and to create a conversation on that, and what they knew about science and how they would like to be included.”

#### Support by local organisations

It turned out to be very important that representatives of e.g. the civic centre in Barcelona or the geriatric centre in Vilanova i la Geltrú supported the



process. Agostina explains: “It is very important to engage people from entities and organisations who are used to working with older people because they know them and they know their needs. They can make them feel more comfortable. They know: this participant likes that, this participant can not do that. They can suggest how to adapt activities to the concrete needs and requirements of the involved participants.”

### **Enhanced social interaction**

The project's social component was particularly effective. Participants valued the opportunity for social interaction, which was facilitated by group activities and discussions. This not only enhanced their engagement with the scientific aspects of the project but also provided a valued sense of community and belonging.

### **Flexibility in implementation**

Adapting activities to suit participants' physical and cognitive capabilities, especially in geriatric settings, ensured that all could participate meaningfully. Activities were designed to minimise writing and maximise hands-on involvement, with staff deeply engaged to assist those unable to participate independently.

### **Outcomes and reflections**

Many participants valued and benefited from the opportunity to connect with others and share their experiences. In addition, it was very important for the community to be heard and voice their opinions. The topic of odours was relevant for those living in the city and outside of the geriatric centre.

Agostina summarises the main benefits for participants as follows: “The most important benefit for participants was the social aspect, to be able to participate with other people, to talk, to be heard, to be valued. Some of

them were interested in science so they were happy to be included, as they had this feeling of being left aside. They mentioned many times that they would like to have spaces to be heard and to talk. Not just to do things, but exchange opinions and talk. They also shared a lot of concerns about odours in the city. So people from the first pilot found it very relevant, but technology was the barrier. The artistic part was a lot of fun too.”

That the OdourCollect inclusive pilot was successful in engaging older participants can largely be attributed to the tailored strategies, which addressed both the technological and social needs of the demographic. By fostering an environment that valued their contributions and adapted to their limitations, the project not only improved the accessibility of citizen science for older people but also enriched their social and emotional well-being. The scientific insights from the innovative co-design process directly informed the development of the guide *Guía de recomendaciones para la inclusión de personas mayores en proyectos de ciencia ciudadana* published in Spanish on Zenodo, which serves as a resource for integrating older people into similar projects in the future. Overall, the project provides a valuable model for future initiatives aiming to engage underrepresented groups in scientific research, demonstrating that with thoughtful adaptation and a focus on social connectivity, older citizens can actively contribute to and benefit from citizen science.

# Seniors embrace biodiversity research: a Viikki Library experience



Viikki Library in Helsinki is a member of LIBER, a network of European research libraries and a cooperation partner of ECS. In this context, Viikki Library implemented an inclusive pilot that embarked on an innovative journey to make citizen science accessible and engaging to traditionally underrepresented groups in scientific activities, particularly seniors and unemployed people. Leveraging nature-based activities to draw these groups into the world of citizen science, the pilot resulted in an enthusiastic participation of citizens during the walks, an increased awareness for biodiversity research, and new biodiversity data for scientists.

Viikki Library is located in the Viikki campus area of the University of Helsinki. Located close to nature, nature and science are also highlighted in the library's numerous events and in its slogan: A green and lively library close to nature.

<https://directory.libraries.fi/helsinki/viikki-library>

Viikki Library in Helsinki is a public library serving both the community and the University of Helsinki. The library engages in numerous collaborative efforts with local organisations. For instance, Avoin Työtoiminta provides rehabilitative work activities and social rehabilitation for long-term unemployed individuals and those with impaired work capacity in Helsinki. Viikki

Library collaborates with Avoin Työtoiminta for participation in the Finnish Environment Institute's (Syke) campaign, where they collect trash from the beach, provide research kits for borrowing to library patrons, and report all findings to Syke.

As part of Viikki Library's collaboration with the Finnish Museum of Natural History, library patrons can borrow tickets to the museum, book talks for adults and pop-up libraries are organised at or in collaboration with the museum, and the library often invites experts from the museum to its events. One such event is the **Great Nature Night**, organised in partnership with the Finnish Museum of Natural History and the Helsinki Nature Conservation Association, and hosted by the popular nature journalist Paul Segersvärd.

Viikki Library furthermore organises **Nature walks** that take place in the vicinity of the library and employ the iNaturalist app to help identify birds and plants. While these walks are open to everyone, seniors and students are usually the main participants. Another format employed by the library are **Nature book walks**, which happen in the Kaisaniemi Botanic Garden.

In an interview, Tuula Rönkä from Viikki Library shared her insights from this diversity of citizen science approaches based at a public university library.

## Project design and community engagement

The library recognised early on that traditional, indoor presentations on citizen science might not have a broad appeal, particularly to those unfamiliar with or disinterested in science. This insight led to the development of nature book walks and nature-focused events that offer hands-on, practical experiences in local biodiversity through the use of the iNaturalist app.

These activities were designed to be physically accessible and paced to accommodate all participants, especially seniors, ensuring that no one was excluded due to physical limitations.

**iNaturalist** is a social network for sharing biodiversity information to crowdsource observations about nature. It is one of the world's most popular nature apps and helps its users to identify the plants and animals around them while generating data for science and conservation.

<https://www.inaturalist.org/>

### Strategic collaborations

The initiative was notably enhanced through strategic partnerships, particularly with the Finnish Museum of Natural History. These collaborations were instrumental in organising major events like the Great Nature Night at the museum and pop-up library installations in the Kumpula Botanical Garden.

### Inclusion of underrepresented groups

The library put an additional effort into engaging seniors and unemployed people, which stemmed from an identified need to engage these groups more actively in community and scientific activities. In addition, the inclusion of often underrepresented groups is also sought due to the personal investment of staff members who have identified a need for active engagement of this kind. The library utilised various engagement methods, including integrating eco-social education into existing social support structures for the unemployed, and aligning citizen science activities with social events like movie groups for seniors. This approach made citizen science both more accessible and more relevant to these participant groups' daily lives.

### Engagement methods and adaptations

To effectively engage these groups, the library employed several innovative strategies.

**Adaptive activities:** Nature walks were set up in a way that met the people where they are. They were also kept short and required no personal equipment, as the library provided tablets and phones loaded with the necessary apps.

Tuula Rönkä explains: "I think we also have to be active and talk outside the library. We have to go where the people are. For example, we had our Nature Book Walk in spring in the Botanical Garden here in the city, and during these walks we could also talk to people and motivate them to join our other citizen science activities."

**Social media and community outreach:** Active use of platforms like Facebook and Instagram helped reach a broader audience, while direct community engagement ensured that those less likely to visit the library could still participate.

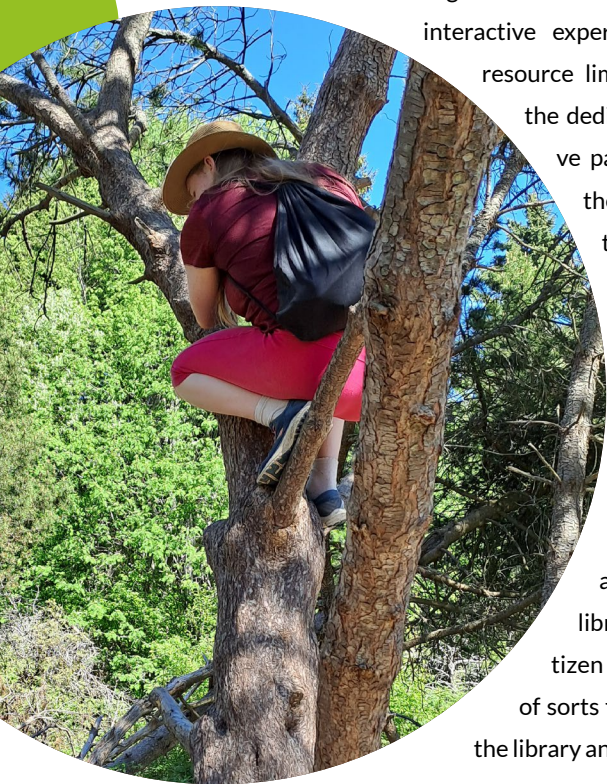


**Figure 4.** Bird watching in Nature Walk Viikki Library (credits: Helsinki City Library)

**Event hosting and celebrity involvement:** Hosting events with popular figures, such as well-known nature journalist Paul Segersvård, attracted larger crowds and increased interest in library activities.

“We have the Nature walks, and in September we have the Great Nature Night at Viikki Library, and we have a popular, familiar nature journalist as a host of the event. He is really popular and seniors really want to see him. We have to be creative, as you can imagine,” says Tuula.

As such, the library tackled the identified barriers to accessibility by transforming citizen science into a dynamic, outdoor, and interactive experience. Time constraints and resource limitations were significant, yet the dedicated library staff and effective partnership networks mitigated these challenges. Ongoing efforts to reach out directly to community groups and tailor activities to their interests and capabilities proved essential in maintaining engagement. This feeds into the overall efforts libraries have to extend in order to motivate people of any age and background to use libraries as a resource, making citizen science activities an extension of sorts for the ongoing task of making the library an attractive place for all citizens.



**Figure 5.** Many university students participated in Nature walks (credits: Helsinki City Library)

**Figure 6.** Nature Walks were really popular in Viikki Library (credits: Helsinki City Library)

### Impact and future directions

The success of the project is evident in the enthusiastic participation during the Nature walks, with participants contributing to biodiversity data collection using the iNaturalist app. Anecdotally, many participants continued to use the app independently, indicating a lasting impact beyond organised activities. Viikki Library's initiative not only promoted biodiversity awareness but also enriched community life, particularly benefiting those who might feel excluded from scientific or academic pursuits.

This approach to citizen science exemplifies how libraries can serve as catalysts for inclusion and educational enrichment. By moving beyond traditional settings and embracing community-based, interactive science activities, the library has not only broadened the scope of citizen science but also enhanced its role as a community hub, fostering an inclusive and scientifically engaged public.





# Bridging generations: seniors and teens unite to explore Latvia's place names



In Latvia, public libraries are pioneering the engagement of groups often sidelined in citizen science activities, specifically seniors and teenagers. This innovative project, centred on collecting local place names, leverages the rich storytelling traditions of Latvia to engage these under-represented groups, merging local heritage with the global movement of citizen science. The results of this approach are a lavish collection of local place names and insights on how to engage older adults in scientific research via a public library.

The study of **toponyms** (proper names of places) is the study of **place names** or geographic names and includes their origins, meanings and usage. Place names can be names of e.g. fields, regions, routes, forests, inhabited locations, and urban elements. Probably the first toponymists were the storytellers and poets who explained the origin of specific place names as part of their tales. The Place Names Database in Latvia maintains information on place names (official and unofficial ones), the type of geographic feature, administrative affiliation, location, but also data sources (like maps or narrators), quotes, and more detailed description of the name.

<https://www.lgia.gov.lv/en/place-names-database-0>

**Valmiera Library** is an institution of the municipality of Valmiera, Latvia, and part of the PL2030 network, which is a partner of the ECS project. The library's mission is to enrich the life of the local community and sensitively respond to changes in the cultural, educational and informational needs of society.

<https://biblioteka.valmiera.lv/>

In Latvia, 32 public libraries implemented a project that involved seniors and teenagers in the collection of local place names. To capture the inspiring lessons learned from this approach, we conducted an interview with Alīna Pūce, Librarian at the Valmiera Library. Alīna participated in the two-day ECS training on citizen science, organised in May 2024 and specifically targeting public libraries that are interested in this innovative research approach.

## Project background and design

The citizen science initiative at Latvia's public libraries was introduced as part of an effort to involve groups typically less active in such projects. Recognising that seniors often participate in library storytelling events and that teenagers are generally less engaged in library activities, the project was designed to collect place names, which is also the library's "topic of the year" and has historical roots in the community but had not previously been labelled as citizen science. The engagement spans 32 libraries in the region, allowing participants to contribute place names and associated stories throughout the year.

"We do a lot of activities on storytelling. Last year it was about peoples' names and surnames and this year we have storytelling events about place names. So right now we kind of have an ongoing process in all 32 public libraries in our region. We're collecting place names in a free form where everybody can come to the library, write down all of the place names that they know

from their local places and tell stories about them. Usually, seniors are coming to these events, but we're doing a separate thing with teenagers trying to tell them more about what citizen sciences is and how collecting place names can contribute to research and to language development and things like that," explains Alīna.

### Strategies for social inclusion

The libraries employed several strategies to ensure the inclusion of seniors and teenagers in the citizen science activities.

**Tailored engagement:** For seniors, the project minimised technical explanations of citizen science, focusing instead on the storytelling aspect, which naturally aligns with the older peoples' personal interests and strengths. In contrast, teenagers received a more detailed introduction to citizen science to help them understand its relevance and potential impact.

**Adapted technological engagement options:** For the older generations, pen and paper are used to document the stories, so that they do not need to apply any technological interface to add their stories to the place name database. At the same time, younger people were given the option of entering their place names directly to the database.

**Personal outreach:** Librarians utilised personal contacts to engage seniors in smaller towns, often speaking directly to them about the project. This personal touch significantly boosted participation among seniors.

**Utilising existing platforms:** Information about the project was disseminated through local newspapers, library web pages, and social media platforms. However, personal invitations were noted as the most effective method of encouraging participation.

### Drivers and barriers

The sense of community and belonging strongly motivated seniors, who appreciated the opportunity to discuss and document local knowledge.

"I think their motivation is the local community and the sense of belonging.

This is something that we're very much working on

here, because that's something that motivates the elderly people when

they can talk about their places, their families, their

people around them, so that is a very good topic to give them.

It always motivates them to come,"

tells Alīna from her experiences, and

adds: "Of course, when you have a

small library then the librarian knows

everybody that comes to the library and basically

knows everybody that lives there in the local area. So there

are personal contacts and you can get

them into conversations on the street and invite them to the event."



**Figure 7.** Seniors sharing their stories about local places. (credits: Valmiera Library)



**Figure 8.** Teenagers sharing their place names on a tour around Valmiera. June 19, 2024 (credits: Valmiera Library)

Motivating teenagers proved challenging, with only a small number becoming involved despite various outreach efforts, as Alīna explains: “For teenagers, that may be a hard subject. It is very hard to motivate teenagers to get involved in activities. Yet we managed to get some 10-12 teenagers to involve themselves in this project.” The broader societal trend of declining library attendance posed additional challenges, indicating a need for libraries to adapt to changing community engagement patterns. Something that proved valuable in motivating teenagers was the involvement of their peers, particularly through a youth programme that has been part of the library’s offerings for several years.

### Reflections and future directions

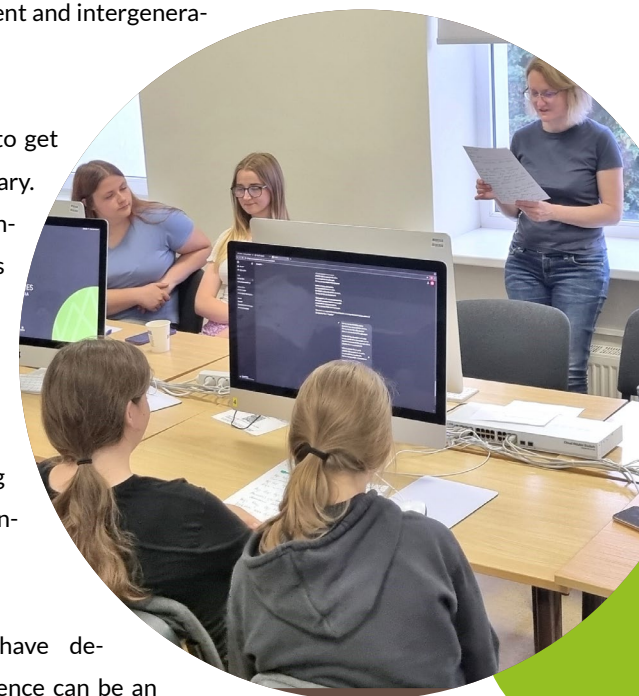
The project has produced a rich collection of local place names, now integrated into a national database. This outcome does not reflect individual contributions by age group, but it captures the essence of local heritage as preserved by different generations. For seniors, the project provided a platform to record and validate their knowledge and stories, while teenagers contributed by digitising this information, thus bridging the gap between traditional knowledge and modern technology.

The success of the place names project in fostering participation of groups who have so far been less involved in citizen science, and has inspired Lat-

vian libraries to consider more nature-related citizen science activities. The recent participation of library staff in the ECS training on citizen science has further equipped them with the knowledge to expand these initiatives. Although challenges remain, particularly in engaging younger demographics, the project has highlighted the potential of citizen science to foster significant community engagement and intergenerational collaboration.

“Right now it is a struggle to get people to come to the library. Society seems to be changing and the library is always trying to keep up and adapt. There are some things that are working well — like the storytelling events for the elderly to share something local and personal of their interest.” concludes Alīna.

Latvia’s public libraries have demonstrated that citizen science can be an effective tool for including especially older generations in citizen science, as well as for engaging seniors and teenagers in meaningful activities that contribute to both scientific and cultural knowledge bases. By continuing to tailor their approaches to meet the unique needs and interests of these groups, the libraries can enhance their role as vital community centres that bridge the gap between science and society.



**Figure 9.** Teenagers learning AI tools and developing stories about place names (credits: Valmiera Library)

# Empowering teens to protect nature: Berlin students monitor biodiversity



The Natural History Museum Berlin organised a BioBlitz event specifically designed to engage students from an integrated secondary school, with the group entailing young people with migrant or refugee background, as well as those with learning difficulties and cognitive challenges. Implemented in close collaboration with teaching staff, a group of thirteen year old students were taken on a field trip which allowed them to engage with their immediate environment while contributing to broader biodiversity monitoring efforts. This event generated important learnings on how to involve this target group and manifold benefits for those involved, as we learned from the BioBlitz team Marius Oesterheld and Julia Rostin.

The **Natural History Museum Berlin** is an integrated research museum located in Berlin, Germany, with a mission to discover and describe life and earth – with people, through dialogue. The museum is currently involved in developing the Citizen Science Center for Nature, Sustainability and Digitalization

<https://www.museumfuernaturkunde.berlin>

The BioBlitz was conceived as a standalone event rather than part of an ongoing citizen science project and took place in June 2024 in Berlin. The Natural History Museum focused on engaging 20 students, most of them

aged 13 years, from an integrated secondary school known for its diverse student body, including many who face barriers to educational success such as language barriers and cognitive challenges, as well as differing levels of emphasis placed on education by parents and guardians.

“Students at this kind of school hardly ever participate in citizen science projects. They are also underrepresented as a target audience of other types of science outreach activities.” says Marius Oesterheld, researcher at the Natural History Museum and co-organiser of the BioBlitz.

## Project design and implementation

The event involved a preparatory phase where the Natural History Museum Berlin collaborated closely with a teacher from the school who was already interested in citizen science. This teacher played a crucial role in facilitating the involvement of the school and ensuring administrative approval. He also supported the Museum für Naturkunde team in adapting the BioBlitz event to the requirements and needs of the students. Preparatory materials, including a short information sheet for parents and students, and a gamified bingo sheet, were developed to make the event engaging and accessible.

The actual BioBlitz took place in an urban park in Berlin, called Freizeitpark Marienfelde, and known for its exceptional biodiversity, where students spent approximately two hours exploring and documenting local flora and fauna using tablets provided by Museum für Naturkunde.

“The BioBlitz for all of us was an experiment. We hadn't done anything like this before and we agreed that the main goal was to make this into a fun experience for everyone. So we just wanted everyone to have fun and connect something positive with this whole citizen science and biodiversity topic,” explains Marius Oesterheld, researcher at the Museum für Naturkunde.



## Engagement and inclusion strategies

The engagement strategies were carefully tailored to meet the needs of the participants.

**Simplified communication:** The complexity and intensity of explanations regarding the concepts behind citizen science and the importance of biodiversity monitoring were reduced in communications with students. Instead, the focus was on hands-on activities and direct engagement with nature.

**Group work:** The students were divided into groups of 4 which were put in a playful competition with one another to finish their bingo cards first. In their feedback, the students reported that they really enjoyed the group work. The specific make-up of each group was chosen by the teacher, based on his knowledge of group dynamics in the class. This was a very important input seen as crucial to the success of the activity.

**Technological integration:** The use of tablets with the iNaturalist app pre-installed made the citizen science activity dynamic and interactive. It provided instant feedback to the students when they uploaded their observations and simplified the identification process of flora and fauna, which was crucial for keeping the students engaged and motivated.

**Supportive environment:** The high ratio of adults to young people was also beneficial, with the group being accompanied by several adults, including teachers and Museum für Naturkunde staff with expertise in biodiversity. This ensured adequate support and supervision, allowing students to explore safely and ask questions freely.

**Clarity of roles:** Due to the abundance of adult supervisors with different expertise, each team member could focus on their area of expertise, be it bio-

diversity expertise or pedagogical questions and issues in group dynamics, to the benefit of the overall success of the activity.

**Trustful relationships:** The good relationship between the students and their teacher was positioned as especially advantageous, positively impacting the mutually respectful yet somewhat relaxed collaborative work, for instance allowing the young people to ask questions quite freely.

**iNaturalist** is a social network for sharing biodiversity information to help each other learn about nature. It is one of the world's most popular nature apps and helps its users to identify the plants and animals around while generating data for science and conservation.

<https://www.inaturalist.org/>

As such, key drivers of success included the use of gamification to spark a competitive spirit in a non-aggressive way, the integration of technology to provide quick feedback and gratification for the students' efforts, and the physical activity involved in exploring the park. The collaborative group work and the scenic nature of the park also significantly enhanced student engagement. At the same time, certain challenges to working in such a setting became evident, although none of them broke the activity. One important aspect in this regard was managing the diverse needs of students, particularly those with behavioural or learning difficulties. The logistical aspects of organising such an event, including coordinating transportation and managing time effectively, also posed challenges.

It was essential to have approval from relevant decision-makers, as Marius notes: "I mean, this is kind of counterfactual now because it did work out well in our case, but I guess having a headmaster that is kind of resistant to novel ideas or excursions in general, and there are headmasters that are really hesitant about that sort of thing, or having teachers that feel that this



**Figure 10.** Teens taking part at the BioBlitz at the Freizeitpark Marienfelde, Berlin (credits: Kim Mortega, Museum für Naturkunde Berlin)

is additional work for them and they can't really be bothered, or also teachers that are not allowed to spend several hours away from school doing stuff that is not directly linked to the curriculum would really make this more challenging.”

#### Outcomes and impact

The BioBlitz was considered a success by all involved, leading to a desire to repeat the event in the future. For the students, the event provided a rare opportunity to engage in scientific inquiry in a real-world setting. The data collected contributed to a broader citizen science database, with 40 contributions achieving “research grade” so far, which means that they meet all the requirements to be used by scientists all around the world and are automatically added to the GBIF (Global Biodiversity Information Facility) database.

**GBIF - the Global Biodiversity Information Facility** - is an international network and data infrastructure funded by the world's governments and aimed at providing anyone, anywhere, open access to data about all types of life on Earth.

<https://www.gbif.org>

The BioBlitz event also highlighted several important aspects of social inclusion:

- **Co-creation of activities for the target group:** The event was co-designed with a teacher who was very knowledgeable about the target group. Through this, it was made highly accessible and fun for students from diverse backgrounds, providing a low threshold for them to get involved in a new and meaningful form of engagement with science.
- **Empowerment through participation:** By actively involving students in citizen science activities, the event empowered them to contribute to scientific knowledge and learn about the biodiversity in their immediate urban environment, fostering a sense of achievement and belonging, and opening up new areas to them. This was registered both by their teacher and in a final feedback conversation at the end of the activity. Marius adds: “I think it was a really nice spot and none of them had ever been there. There's a hill in that park from which you have a fantastic view of the whole city. Most of them spent quite some time on the hill at first and just looked where their house is and where the school is and where you can see the city centre and that sort of thing.”

**Figure 11.** Team photo of the BioBlitz at the Freizeitpark Marienfelde, Berlin (credits: Kim Mortega, Museum für Naturkunde Berlin)



- **Educational enhancement:** The event complemented traditional education by providing hands-on learning experiences, which is particularly valuable for students who may struggle in more conventional educational settings: “The teacher insisted that they needed gadgets, there needs to be instant gratification. And some of them are not great at reading yet. So I think that was definitely a very good decision to have tablets and the iNaturalist app, and the binoculars were also very popular. If it had been just pen and paper, and if they had to look up stuff in brochures and identification books, I think it wouldn't have worked that well,” says Marius.

Through all of this, the Museum für Naturkunde's BioBlitz serves as an example of how citizen science can be leveraged to enhance social inclusion and educational outreach. By adapting citizen science activities to the needs of underrepresented groups, such initiatives can enrich scientific research while fostering a more inclusive, informed, and engaged community. This event underscores the importance of thoughtful engagement strategies and the necessity of supporting diverse participation in citizen science for the mutual benefit of science and society.

## Climate resilience in Spain: listening to all voices



**Spanish ECS partner Ibercivis involved underrepresented groups in focus group discussions aiming to upscale adaptation processes for building a climate resilient Europe. They engaged people with a migration background, women aged 65+, young people and workers, who are traditionally further away from tertiary education and academic contexts, in the discussion of climate change adaptation and how to combat disinformation on climate change. The diversified outcomes of this process show how important the engagement of diversified societal groups is for a comprehensive approach to climate adaptation challenges.**

This inclusive pilot, implemented by Lucía Moreno and her team at the ECS partner organisation Ibercivis as part of the AGORA project, represents an innovative measure towards integrating diverse societal groups into citizen science. Aimed at enabling climate change adaptation and preventing climate related disinformation, AGORA has effectively engaged underrepresented communities, including older adults and migrants, in meaningful scientific dialogue and action. This collaboration between ECS and AGORA provides valuable insights for the AGORA Spanish pilot, particularly in terms of engagement and reaching multicultural communities. This activity is one of the seven inclusive ECS pilots that seek to boost inclusion and diversity in citizen science by providing advice to the projects that are part of the ECS



inclusive pilots. In addition, the ECS project carried out an impact assessment for the participants in the focus group.

**Ibercivis** is situated in the city of Zaragoza, Spain. It was established as a foundation in 2011 and aims to implement, promote and study citizen science, both in Spain and in Europe. Since its formation it has supported the implementation of 80 citizen science projects.

<https://ibercivis.es>

The **AGORA project**, set to conclude in December 2025, supports the overall objectives of the EU Mission on Adaptation to Climate Change. AGORA aims to apply transdisciplinary tools and approaches to effectively engage European communities and regions in climate actions, upscaling adaptation processes to support developments towards a climate resilient Europe. It encompasses four European pilot regions in *Sweden, Germany, Italy and Spain*. <https://adaptationagora.eu/>

### Pilot design and thematic focus

The pilot design is centred on inclusivity, with tailored strategies to ensure the engagement of groups often excluded from scientific discourse. The project leverages a combination of a localised workshop and targeted focus groups to foster an inclusive environment where all participants can contribute effectively. Within the Spanish pilot of the AGORA project, the work of inclusiveness of the activities was done following the strategies of the ECS project.

In Spain one specific workshop and three focus groups for distinct demographic segments were conducted on various aspects of climate change

adaptation, necessitating slight adaptations in formats to effectively reach each participant group:

- Young people aged 16-25 years: here, engagement efforts were designed around academic schedules to accommodate their availability.
- Working adults aged 25-65: this group was reached through collaborations with the Aragón Open Governance Laboratory, leveraging existing networks and digital platforms.
- Women over 65: this group was recruited in rural settings. This was the only activity that did not follow the focus group model, through a workshop the activities were adapted to include more participants due to high demand, reflecting a strong desire among older women to make their voices heard and contribute to meaningful activities with positive impact on their communities.
- People with migration background: special focus groups for migrants from Latin America were facilitated by leveraging existing community connections, such as a Venezuelan co-worker well-connected within the migrant community. This pre-existing relationship also served to enhance trust and participation.

Figure 12. Fabaroles Women's Association participating in the focus group (credits: Ibercivis)



These sessions allow participants to co-design soft adaptation solutions by specifying climate-related challenges and proposing tailored solutions, ranging from urban greening initiatives to the establishment of climate refugee centres. They are also engaged to co-evaluate participatory methodologies.



**LAAAB - Aragón's Open Governance Laboratory** - encourages citizen participation in the design of public policies: laws, plans and programmes. It is a meeting place between regional government and civil society, a place to cooperate, reflect and experiment together on finding solutions to common challenges.

<http://www.laaab.es/>

Figure 13. Fabaroles Women's Association talking (credits: Ibercivis)

### Drivers of inclusion

The main drivers facilitating social inclusion in the Spanish pilot of AGORA included various actions.

- **Community connections:** Utilising personal and professional networks within communities, especially for engaging migrants and other vulnerable groups.
- **Institutional support:** In one rural area, links to older female participants were established through an organisation for retired women which supported the recruitment efforts by connecting the AGORA to its members. For the involvement of a group of workers in the pilot, the Aragon Open Governance Laboratory supported outreach making use of its very strong communication channels.

- **Adaptability and responsiveness:** Flexibility in planning and responsiveness to community interest and feedback were critical in ensuring the relevance and success of the initiatives.

As Lucía Moreno of Ibercivis explains: "It was not easy to establish contact with the migrant community. Our initial outreach efforts focused on large NGOs or local ones. However, a breakthrough came through Marianna Martínez Alfaro and Susana Barriga, two Venezuelan co-workers from the Aragon's Open Governance Laboratory. As community leaders, they played a pivotal role in connecting us with the target population."



Figure 14. Migrants focus group in Zaragoza (credits: Ibercivis)

### Barriers to inclusion

Despite the project's success, several challenges impacted the success in making the engagement efforts inclusive,

- **Scheduling conflicts:** Engaging younger participants, aged 16-25, was particularly challenging due to their school schedules and academic commitments.
- **Language barriers:** To overcome potential language barriers in working with migrant communities, Ibercivis decided to work with migrants from Latin America.

- **Resource limitations:** At the beginning, a collaborating NGO inquired whether participants were going to be reimbursed for their efforts. This highlights a recurring challenge on resources needed to facilitate engagement.

## Impact and reflections

The pilot has empowered groups that are normally underrepresented in citizen science activities, to contribute actively to solutions that directly affect their lives. The participating older women, in particular, appreciated the opportunity to share their experiences and insights, which are often undervalued in other contexts.



Lucía shares her insights: “So the motivation between those two groups of migrants and older women were a bit different. The women felt their voices were usually not heard and they wanted to do something new, to participate. They had a really intrinsic motivation. And the migrant group was attracted by this personal contact. We invited them by having a cup of coffee for the climate. They also know the different hazards we have with climate change, so they are already engaged with the topic and they want to participate because of that too.”

Figure 15. Migrants focus group in Zaragoza (credits: Ibercivis)

The project’s innovative engagement strategies, such as leveraging personal contacts within migrant communities and adapting focus group formats to meet participant needs, have been crucial in its success. These approaches have facilitated a deeper understanding of the diverse ways different groups perceive and are affected by climate change, leading to more effective and inclusive adaptation strategies. The outcomes show that different stakeholder groups have different concerns related to climate change: while the younger ones living in comparatively small lodgings were most concerned about heat waves, the stakeholders from rural communities were more worried about flooding.

And when being asked how the participants wanted to be actively engaged in climate actions and information about climate change, there were differences observable as well: “The workers wanted to have climate assemblies that we don’t have in Aragón. The youths wanted more to have music acts and festivals that raise awareness about climate change — explains Lucía. — And the women wanted to have more workshops in the village and to have stands in the street to see more cases about climate change adaptations and the things you could do as an individual to recycle, putting solar panels in your house, etc.”.

The ECS inclusive pilot that is built on the AGORA project gives a good example of principles to follow when involving underrepresented groups in scientific processes. The diversity of outcomes from the involvement of these stakeholders shows that science can strongly benefit from the active engagement of different societal groups to find adapted solutions for today’s pressing societal challenges. By continuing to tailor its approaches to the needs and preferences of underrepresented groups, AGORA not only enriches its scientific outcomes but also supports a more inclusive, informed, and engaged community ready to face the challenges of climate change.

# Croatia's fishing community tracks large marine vertebrates



Blue World Institute, the Croatian partner of the ECS project, initiated activities that aimed at bridging the gap between marine scientists and fishing communities, a group traditionally seen as separate from wildlife conservation efforts. They advanced its 30 year long history of data collection on sightings of large marine vertebrates, like dolphins and sea turtles, via the app Marine Ranger. The initial challenges for involving the fishing community in the usage of the app were significant, but resulted in an enriched collection of research data actively used for policy-making and the cultivation of a sense of stewardship among the fishing communities.

**Blue World Institute of Marine Research and Conversation (BWI)** is an independent non-profit organisation founded in 1999. Its aim is to carry out scientific research and conversation of the marine environment as well as educational activities with an emphasis on the Adriatic Sea.

<https://www.blue-world.org>

In the coastal waters of Croatia, the ECS partner Blue World Institute of Marine Research and Conversation (BWI) runs a citizen science project that transcends traditional environmental research by actively involving lo-

cal fishing communities, tourists and skippers in the collection of sightings of large marine vertebrates such as dolphins and sea turtles. Representing the longest ongoing research in the Mediterranean with 30 years of data collection, the Blue World Institute has been extending its portfolio of engagement options, most notably with the use of a mobile application called Marine Ranger as part of the ECS inclusive pilots. The introduction of the app aims at facilitating the collection of crucial data on animal sightings and behaviour, marking a significant addition to how environmental data are gathered and utilised for the purposes of marine conservation in the Adriatic Sea. This article presents some important learnings from the recent work done by the BlueWorld Institute, both in terms of barriers and drivers observed across their activities, as shared by Jelena Basta and Marinela Cukrov Car.

**Marine Ranger** is a citizen science application developed within the EU funded LIFE DELFI project (<https://lifedelfi.eu/project/?lang=en>), enabling the collection of information on opportunistic observations of live, injured or by-caught cetaceans (whales and dolphins) and other marine mammals.

[https://play.google.com/store/apps/details?id=org.blueworld.marineranger&pcampaignid=web\\_share](https://play.google.com/store/apps/details?id=org.blueworld.marineranger&pcampaignid=web_share)

## Project design

The BWI activities were triggered by the need to extend engagement formats that bridge the gap between marine scientists and fishers, a group traditionally seen as separate from wildlife conservation efforts. Recognising the fishing community's crucial role in safeguarding marine ecosystems, the Blue World Institute leveraged an important meeting of local fishers on the island Lošinj to introduce the Marine Ranger app.



“It is very difficult for the fishermen to change their daily routines, so bringing up something new is always a big challenge — explains Jelena. — When we learned that they had a big gathering we took the opportunity to introduce the project and the app. And some of them showed an interest in using the app and now we are in the phase where we follow how often they use it and who uses it and how often they report when they see something.”

When the app is first accessed, users receive an educational introduction enabling them to identify certain species, but also outlining guidelines on how to approach marine wildlife and how to contribute to the preservation of the marine ecosystem. The submission of entries is based on the GPS data of the mobile phone, and can be amended with pictures and videos of the animals, as well as descriptions of their behaviour. The app presents an extension to existing engagement options like reporting sightings via (online) questionnaires or telephone calls to the Blue World Institute centre.

The long-term plan is to not to restrict the usage of the app only to the fishers on the island Lošinj but also to approach other fishermen on the Croatian coast. As such, the work on the island Lošinj serves as a pilot for a larger rollout to come in future.

### Engaging fishers, tourists and skippers

The initial challenge faced by the Blue World Institute was substantial — changing the ingrained practices of fishers, who are often wary of new technologies and resistant to altering their routines, was no small feat. Most notably, fishing communities have a contentious relationship with certain large marine vertebrates.

“It is very crucial for us to accept that the fishermen are not happy normally when they see the dolphins. But more and more they understand that dol-

phins are part of the ecosystem and that everything is very interconnected, and when you lose one part then this will also destroy their fishing resources.” explains Jelena.

Thus, education and awareness raising is essential in shifting perceptions, helping the fishing community see dolphins not as competitors but as integral parts of a healthy marine ecosystem that could coexist with human activities. It is important to not only train fishers in using the app but also engage them in conversations about the ecological importance of dolphins and give them a chance to act as stewards for the wider Adriatic sea.

**Figure 16.** Dolphin watching educational tour with tourists (credits: Blue World Institute)



In the summertime the Blue World Institute also tries to focus more on collaborations with tourists and skippers. The connection to dolphin watching organisations turned out to be a very fruitful approach to engage tourists, as every participant receives an initial introduction into the appropriate behaviour when seeing the dolphins and also in the usage of the app. Tourists love to report their sightings as they feel being part of something big and helpful for the marine ecosystem. As Marinela notes: “We actually had very good responses from sailing boats and skippers that are really into nature and they would send us videos and picture materials where we actually managed to identify some rarely seen species in the Adriatic that we were aware that they exist, but now we actually had a proof.”

### Barriers and drivers of participation

#### Combination of meeting formats

The motivation and ongoing engagement of fishers in the small, enclosed communities of the island Lošinj continues to prove challenging.

The team observed that the willingness individual fishers show in engaging in the project is dependent on the context, with group size being an important factor. Jelena says: “They are a very specific group. They tell you one thing when you have individual meetings, they tell you other things when they are in a small group, and again other things when they are in a big group.”

That’s why the Blue World Institute team decided to combine different types of meetings. They provide general information on the project



Figure 17. Meeting with local fishermen on the island Lošinj (credits: Blue World Institute)

in bigger meetings with fishers, let participants process the information and then speak to them individually to keep engagement and attention high and specifically address individual concerns. Jelena also stresses how important this multi-pronged approach is to develop and maintain trustful relationships with the community: “Because if you do only individual interviews, then they start hiding. They feel like the others will see them and then it will look like they’re having some secret job with us. If you work only with the group, then you don’t get the truth out of them, the information that you want. So you have to be seen with everyone so they don’t feel like someone will tell them that they cooperate with scientists who protected dolphins.”

#### Usage of a portfolio of instruments

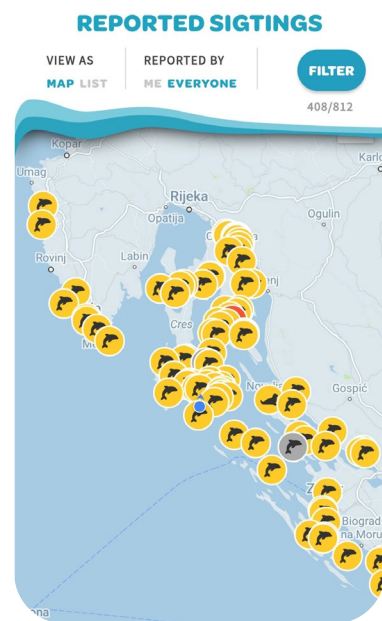
Despite the option of the new app the institute still sticks to the more traditional data collection methods and alternative reporting techniques like direct calls and interviews, ensuring that everyone could contribute regardless of technological proficiency.

#### Bi-directional communication

Another important driver of a long term relationship and engagement is the two-way communication between fishers and scientists. The app is a very nice tool that makes reporting easier, but when people share their sightings, the feedback of researchers is important to make them understand how essential their contributions are.

Marinela shares the swallowing story as an example of this important two-way communication between fishermen and researchers: “Yesterday we had another fisherman calling us. He told us that he had seen a very small dolphin in shallow water. He was worried that something was wrong with it and thought it was a baby without its mother. That’s why he called us. In the call I told him that this was a different, much smaller species that he was

seeing. I explained to him that we had been following this dolphin for the last two years. This information changed something in the fisherman, he became part of the whole story.”



**Figure 18.** Overview of reported sightings on the Marine Ranger app. (credits: Blue World Institute)

### Protection of animals

Another important aspect is protecting the animals while at the same time keeping track of them on the app. When users go to the app they can see a map with sightings. In turn, the app can also be used by tourists to find spots where dolphins and sea turtles are often sighted. To protect the animals and avoid everyone rushing to the same spot at the same time, the app is not reporting in real time but with a delay of 24 hours.

### Broader impacts and future directions

The Blue World Institute in Croatia exemplifies how tailored citizen science initiatives can effectively engage traditional communities, transform environmental data collection, and foster ecological awareness and conservation.

The collected data are regularly reported to the Croatian public administration to provide policy-makers with high quality data and insights that shape future policies. Based on the Blue World Institute efforts, the waters of the

Kvarneric region were declared the first Dolphin Reserve in the Mediterranean Sea in 2006 and later became one out of six European Natura2000 sites for bottlenose dolphins. These are protected areas, some of them being part of existing nature and national parks. For those sites outside of nature or national parks, rules have still to be set on how to effectively protect the dolphins, and here again fishing communities are an important group to involve in creating ownership and stewardship for the conservation of these Natura2000 sites.

**Natura 2000** is a network of protected areas covering Europe's most valuable and threatened species and habitats. It is the largest coordinated network of protected areas in the world, extending across all 27 EU Member States, both on land and at sea.

Another exciting outcome of the citizens-researchers collaboration is the detection of other cetacean species and an overview of their sightings. Finally, the citizen science approach not only enriched the collection of research data, but also cultivated a sense of stewardship amongst participants, which is especially important for the group of fishers. There is a slowly but steadily increasing interest and engagement amongst fishing communities observable over the last 10 years that is now facilitated by one more tool – the Marine Ranger app.

The success of the pilot project in Croatia serves as a promising model for other conservation efforts worldwide, demonstrating that with the right tools and community-focused strategies, citizen science can play a pivotal role in environmental stewardship and sustainable development. By continuing to adapt and refine their approaches, such initiatives can significantly enhance both scientific understanding and community participation in conservation efforts.

# Providing Greenland's hunters and fishers a voice through citizen science



In the communities along the coast of Western Greenland, hunter and fisher communities have established a programme to document trends in the living resources and to propose actions to improve natural resource management. The community-based environmental monitoring programme PISUNA can create links between people residing in the rural areas who depend on living resources for their subsistence, and the authorities who are in charge of managing them. As one of the inclusive pilots of the ECS project, it shows the transformative potential of citizen science when it is driven by local communities, as Finn Danielsen, co-founder of the ECS partner Nordeco, stresses in an interview conducted to create this impact story.

## Project design and implementation

Initiated by the Greenland Ministry of Fisheries and Hunting with the assistance of Nordeco and many partners, the PISUNA programme began in 2009 when there were increasing frustrations about the disconnect between the scientific advice on sustainable hunting quotas, the quotas set by the decision-makers, and the actual practices of hunters. At the time, there were limited efforts to listen to the observations, knowledge and perspectives of the hunters and fishers, and scientists' recommendations were often disregarded. To bridge this gap, PISUNA was designed to incor-

porate the firsthand observations and knowledge of hunter and fisher communities into the decision-making process and enhance the opportunity to come to agreements that are supported by all involved.

The goal of the **PISUNA** (Piniakkanik Sumiiffinni Nalunaarsuineq) Programme is to optimise the monitoring of living resources to inform decision-making through enhanced cooperation between fishers and hunters, government managers, and scientists, as well as through increased involvement of local community members in the monitoring. Observations and recommendations from PISUNA's Natural Resources Councils can be read in the searchable, web-based database PISUNA-net (<https://eloka.nsidc.org/pisuna-net/en/>) <https://pisuna.org/>

**Nordeco**, the Nordic Agency for Development and Ecology, is a Denmark-based social enterprise founded in 1990. It is wholly owned by the non-profit Nordisk Fond for Miljø og Udvikling, which promotes development and protection of natural resources through support of local, innovative initiatives. The organisation acts globally and conducts research, capacity building, and support of on-ground interventions to help protect and sustainably natural resources and the environment.

<https://www.nordeco.dk/>

Community monitoring groups, termed Natural Resource Councils, were established in various villages along the coast. These councils enable local hunters and fishers to systematically record and discuss their observations about wildlife and fish populations and environmental changes. They compile their insights on a quarterly basis and share their findings and recommendations with the municipal office as well as the Greenland association



of fishers and hunters (**KNAPK**). In this way, the hunters and fishers have an opportunity to have a 'voice' and directly influence policy and decisions on for example quota-setting and hunting seasons.



**Figure 19.** One of the village around the coast of Greenland participating to Greenland association of fishers and hunters (credits: Martin Enghoff)

“Every three months they sit down around a table in the village and discuss how it is going with the living resources, — explains Finn. — They compare observations of the same species from the same area one year ago and discuss if there is a change and if the change is important. If yes, they discuss what could be the reason for the change and if there is something to be done about it and who needs to do what and when. Then, they communicate this to the local, municipal office as well as to the association of fishermen and hunters in Greenland.”

### Motivation, achievements and impact

The participation of hunters and fishers in PISUNA is entirely voluntary. Participation is driven by their own interest in having a say in important decisions regarding the living resources management.

“It is critical to this work that the incentive for the fishers and the hunters to engage is really to influence how living resources are managed, like quotas, hunting and fishing seasons or equipment they can use. — Finn states. — All these things are very important for the hunters and fishers. Being part of this process of management of living resources is so important. Instead of just being on the other side and receiving the quota, by being involved in the process, they can also have a say in what is happening.”

Some of the 500+ management proposals from the hunters and fishers have been used by the authorities but many have not yet. The success of community-based monitoring programmes like the PISUNA programme ultimately depends on whether the government uses the management proposals from the hunters and fishers, and when they don't, that the government staff report back to the hunter and fishers why they have not used their proposal. Finn explains: “What we typically see is that when community members are given responsibility, they become more restrictive about their own and others' use of resources, compared to when it's the government telling them.”

The program's efforts was internationally recognized when in 2018, local fishers and hunters of Attu community were awarded with the prestigious Nordic Council Environment Prize for their contributions to environmental monitoring and resource management. This acknowledgment not only celebrated their efforts, but also increased the visibility and credibility of the

community-driven natural resource management initiative. In the summer of 2024, this culminated in a visit to the village by Denmark's new king, Frederik X.

### **Sustainability and future directions**

Despite its international recognition, institutionalisation of community-based monitoring into the Greenland government's governance processes remains a significant challenge. "If community-based monitoring is to be sustained, it will require that the government sets aside employee time and money and this is a long process," details Finn.

The PISUNA programme's approach can serve as a model for other regions, demonstrating the value of cross-weaving local knowledge and scientific research to enhance the ability of small rural communities to survive economically within environmentally sustainable limits. The initiative also underscores the importance of co-created citizen science, where community members are not just data collectors, but active participants in interpreting their own observations and contributing to decision-making. This approach can foster a deeper connection between communities, their environment, authorities and scientists and lead to more inclusive and sustainable resource management.

"There is a huge potential for engaging citizens much deeper in citizen science than we do today. The experiences from the Arctic could be used in many natural resource management initiatives — for example for an inclusive and effective operationalization of the EU Nature Restoration Law — in continental Europe," stresses Finn.

The PISUNA programme exemplifies how citizen science can be used to enhance the capacity of communities, influence policies, and promote long-

term environmental sustainability. Through adaptation of approaches like this, successes can be achieved in other regions, where community members have a close relationship with the environment enhancing sustainable development and environmental conservation.

### **Community-based monitoring in the Arctic**

A review of the capabilities, good practices, opportunities, and barriers of 30 community-based environment-monitoring programmes in the Arctic, with a focus on decision-making for resource management, is provided in the monograph *Community-Based Monitoring in the Arctic*, published by University of Alaska Press.



# Section 2



## Growing citizen science across Europe

How citizen science is requesting  
its place in national science and  
innovation systems



# Romania: a successful launch of the first national citizen science platform



In Romania the citizen science landscape is still characterised by scattered groups of researchers and practitioners who are involved in first citizen science initiatives, but links between these people and to the international and European citizen science community are rare. This situation is starting to significantly change in Romania with the launch of the nation's first dedicated citizen science platform in May 2024, initiated by the Romanian ECS ambassador, Lucrina Ștefănescu, a researcher at the Babeș-Bolyai University. In this story we will introduce the first steps in forming a citizen science community in Romania, supported by the national funding agency Executive Agency for Higher Education, Research, Development and Innovation (UEFISCDI) and the establishment of strong links to the international citizen science community.

Figure 20. Online presence of the UEFISCDI representative at the launch event (credits: Babeș-Bolyai University, Rector's office, UBB patrimony)

## Launching the citizen science platform and building a community in Romania

The creation and dissemination of Romania's first citizen science platform (<https://citizenscience.openscience.ubbcluj.ro>) represents a critical milestone in the country's scientific landscape. Led by Lucrina Ștefănescu and her team, the platform was developed over a year starting in April 2023 and serves as a central hub for citizen science activities, providing an essential resource for researchers and the public to engage with and expand citizen science projects.

"Once the idea of the platform was born, we went to every faculty of the university and presented it, along with the ECS platform and the European interest in citizen science," tells Lucrina about the first steps taken. And she adds: "Since I have been working in citizen science I have been trying to find other academic groups in Romania working in this area. I have found some separated and isolated projects and initiatives but no developed community on citizen science in Romania."

But this will change with the new platform that is also supported by the Executive Agency for Higher Education, Research, Development and Innovation (UEFISCDI), with project expert Alexandra Roman being present at the platform's big launch event, reflecting a growing institutional acknowledgment of citizen science's value.

Executive Agency for Higher Education, Research, Development and Innovation (UEFISCDI) is the main funding agency for research, development and innovation in Romania.

<https://uefiscdi.gov.ro/>



**Figure 21.** The launch event of the Romanian citizen science platform  
(credits: Babeș-Bolyai University, Rector's office)

The new platform aims to unify the disparate citizen science efforts in Romania, creating a network that spans across universities and research institutions. The support from UEFISCDI is pivotal as it has the potential to connect to all Research Funding Organisations (RFOs) in Romania and promote the new national platform across universities and research organisations. This support is in line with UEFISCDI's efforts and mission, as well as with the objectives and the vision included in Romania's strategic document *White paper on transition to open sciences (2023-2030)*, drafted by the Ministry of Research, Innovation and Digitization and the Executive Agency for Higher Education, Research, Development and Innovation Funding (UEFISCDI). This strategic document aligns the Romanian National Strategy on Research with the international Open Science policies and recommendations, among which is developing a national network dedicated to citizen science at the RDI community level in Romania.

## Institutional and international engagement

The establishment of the citizen science platform has been accompanied by a significant expansion in international and institutional relationships. Lucrina's team at the Babeș-Bolyai University composed of both social and humanities experts and of natural scientists, initially unfamiliar with the global citizen science community, has rapidly integrated into international networks, becoming institutional members of both the European Citizen Science Association (ECSA) and the Association for Advancing Participatory Science (AAPS). This global integration has provided rich opportunities for mutual learning, broadening the local perspective on citizen science and introducing Romanian projects to a wider audience and fostering collaborative opportunities.

The **European Citizen Science Association (ECSA)** is a membership organisation set up in 2014 that aims to encourage the growth of citizen science in Europe and support the participation of the general public in research processes.

<https://www.ecsa.ngo/>

The **Association for Advancing for Participatory Science (AAPS)** is a member-driven organisation situated in the United States, that aims at sharing insights from across many related approaches and traditions, like citizen science, community science, and volunteer monitoring.

<https://participatorysciences.org>

## Enhancing visibility and collaboration

One of the platform's key roles is to increase the visibility of various citizen science projects across Romania. Plans are underway to make the platform multilingual, offering content in Romanian, German, Hungarian, and Engli-

sh, which will extend its reach and impact. Moreover, discussions with the ECSA Working Group on the “European Citizen Science Platform” and the ECS development team aim to streamline the integration of Romanian citizen science activities into the eu-citizen.science platform, enhancing both visibility and collaborative potential.

The **ECSA Working Group on the “European Citizen Science Platform”** aims to be the central place of exchange for those interested in sustaining the EU-Citizen.Science platform, building it further and expanding it (e.g. adopting/making use of the platform source code, freely available, to set up a national/regional platform). By continuing to develop the European Citizen Science Platform we aim to contribute to the goal of establishing citizen science as a recognized, promoted and funded approach, one that fosters scientific literacy and the democratisation of science.

<https://www.ecsa.ngo/working-groups/european-citizen-science-platform/>

### **Institutional support and sustainability**

The sustainability of the citizen science platform is supported by an emerging working group for Open Science at Babeş-Bolyai University, which aims to integrate citizen science as a key component of Open Science practices. This group has recently merged into an Office for Open Science, whose citizen science branch is led by Lucrina. The office is expected to secure ongoing funding and support for the platform, ensuring its long-term viability and effectiveness.

### **Impact on researchers and the public**

The most immediate impact of Lucrina’s efforts as a ECS citizen science ambassador and the establishment of the new citizen science platform has

been on the researchers and faculty of her university, as well as others involved in citizen science in Romania. The continuous outreach and exchange on citizen science practices in Romania have not only introduced researchers to international citizen science initiatives but has also created opportunities for funding and collaboration, evidenced by the formation of the dedicated group of researchers engaged in or interested in citizen science. Furthermore, the platform's development has stimulated interest in citizen science among the general public, with initiatives aimed at involving citizens directly in scientific research and decision-making processes.

### **Future directions and challenges**

Looking ahead, the main challenge remains integrating more stakeholders and securing the involvement of governmental bodies in citizen science activities. The strategy to engage UEFISCDI in opening the platform to all RFOs is a critical step towards achieving national-level integration of citizen science. Additionally, there are plans to host the first Romanian citizen science conference, which will further promote citizen science and foster a stronger community of practice. “To get more people on board we need more networking activities to get to know each other. And we need a bigger, institutional and strategic project that allows us to have financial and human resources”, explains Lucrina.

The launch of Romania's first citizen science platform marks a significant advancement in integrating science with societal needs. By fostering national and international collaborations, enhancing the visibility of citizen science projects, and supporting the development of a cohesive citizen science community, Romania is setting a strong foundation for the future of citizen science, with the potential to influence policy, research, and public engagement across the country and beyond.

# Malta: consolidating the citizen science community

In Malta, citizen science has undergone a remarkable transformation, championed by individuals like Simone Cutajar and Arthur Lamoliere, whose dedication and innovative approaches have significantly advanced the field. Their recent projects have catalysed a consolidation of the citizen science community, influenced policy, and enhanced scientific research, establishing citizen science as a vital component of Malta's scientific landscape. This article is based on an interview with Simone Cutajar and Arthur Lamoliere, who talked to us about their citizen science endeavours.

## Foundational activities and community growth

Simone Cutajar, a biologist, chemist, environmental activist, and ECS citizen science ambassador for Malta, has been instrumental in evolving citizen science on the island from its nascent stages to a more structured and impactful initiative. Over a decade ago, driven by environmental concerns, she launched grassroots data collection projects focusing on orchids, pollinators and bats. These projects have grown to involve more topic areas and a growing community of citizen scientists, to systematically engage and train volunteers to collect data in a standardised manner. Eventually, this led to significant national contributions in biodiversity data.

Arthur Lamoliere, an ecologist, has been a close collaborator of Simone's, providing both his expertise and immense enthusiasm. He initiated Malta's first Bioblitz on invasive species, further diversifying the types of citizen

science activities available on the island. Their partnership was rejuvenated with funding from the IMPETUS project, which allowed them to rebuild their citizen science community in a more structured manner, and also provided a springboard for Simone to take on the responsibility of ECS ambassador. Simone explains: "Arthur heard about this funding initiative, IMPETUS, which allowed us to start rebuilding and putting together a first networking event. And through the IMPETUS mentoring, we heard about the call for ECS citizen science ambassadors."

Arthur adds: "This event, where we tried to connect all the citizen science organisers in Malta was really a success. We got representatives of about 15 different citizen science campaigns together in a room, most of them pitched their projects to everyone. And we saw some common methodologies, some common approaches, and while some of them were in our fields, we also had other types of initiatives, seismology, marine biology, etc. And it was really impactful for me because I felt there is real potential for networking and collaboration."

**IMPETUS** is a project funded by the European Commission that gives recognition to citizen science by enabling a wider range of citizen science initiatives to access innovative funding. With this aim the project offers funding to kickstart new citizen science initiatives and to sustain existing ones.

<https://impetus4cs.eu>

A BioBlitz, or bioblitz, is an event that focuses on finding and recording all the living species within a designated area and thus an opportunity to take a snapshot of the biodiversity of a place. It is normally conducted by groups of scientists, naturalists, and volunteers, who learn techniques for observing and collecting plant and animal data within the specific area and time frame.





**Figure 22.** Participants ready for the BioBlitz in Malta (credits: Sarah Anne Abela)

After getting the ball rolling, both on their individual citizen science initiatives and the broader networking activities, Simone and Arthur are now looking to scale their efforts, connect the different existing Maltese citizen science communities, and engage more comprehensively with policy actors like the local environmental agency.

### Institutional and policy engagement

The success of these initiatives caught the attention of Malta's Environmental Resources Authority (ERA). ERA expressed interest in expanding citizen science data collection beyond biodiversity to include other scientific disciplines, recognising the value of citizen science data in legal and environmental planning contexts, but also to fulfil reporting duties on a national and European level that

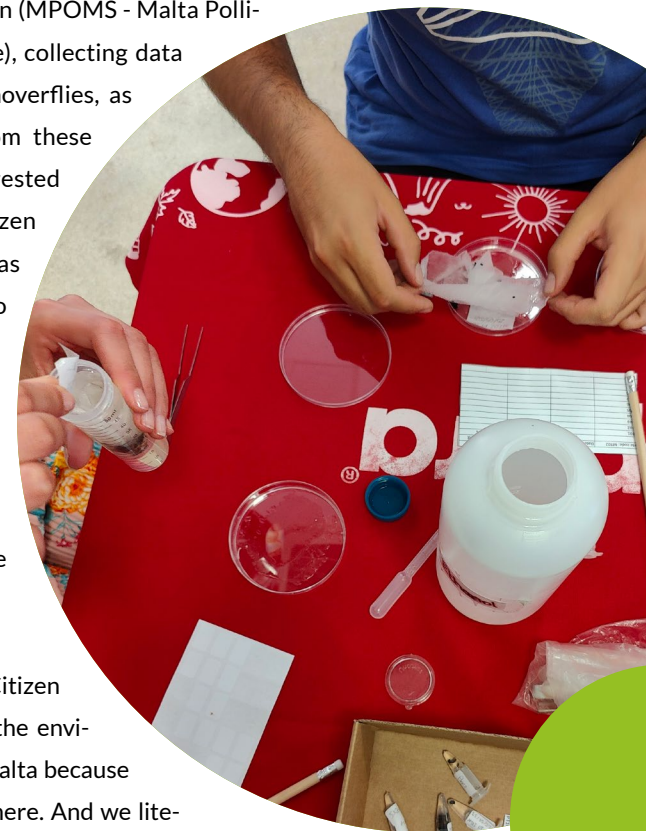


**Figure 23.** Vanessa cardui observed during the BioBlitz in Malta (credits: Sarah Anne Abela)

could not otherwise be met. It even showed willingness to financially support these efforts on a broader scale.

As Simone puts it: “I’m helping ERA set up a long-term national citizen science pollinator campaign (MPOMS - Malta Pollinators Monitoring Scheme), collecting data on butterflies, bees and hoverflies, as paid work. And aside from these little funds, ERA is interested in data from our other citizen science initiatives, such as the orchids campaign, to the point that they want to negotiate buying it. We have agreed that they will fund the campaign to keep it going and in return, we licence them access to the data.”

Arthur expands on that: “Citizen science is really good for the environmental authorities in Malta because that’s really underfunded here. And we literally had ERA telling us ‘You guys are doing a better job collecting data by running a citizen science campaign than us hiring professional ecologists’, because we diversify the sampling, we just produce much better quality data for a fraction of the price. We really have the chance to make a difference here.”



**Figure 24.** Participants analysing specimens after the BioBlitz in Malta (credits: Sarah Anne Abela)

ERA's engagement has also manifested in plans to develop a comprehensive citizen science data collection strategy across all Maltese islands — a move that underscores the growing institutional recognition of the utility of citizen science. The close collaboration with ERA and the alignment on conservation efforts between the agency and the citizen science practitioners also showed benefits beyond the collection of data, leveraging the existing relationships and direct communication channels to contribute to larger conservation goals.

"In years past, we had situations where there was illegal development happening in areas where volunteers were collecting data on orchids and bats. Volunteers saw these development projects in the field and informed our citizen science organisation, which in turn contacted ERA, who went to check what was happening. And they saw that there was illegal development and had it stopped," says Simone.

### Community building and educational Impact

A key component of Simone and Arthur's approach is their focus on community building and education. Their pollinator and orchid data campaigns, which involved training citizens to identify various species, not only facilitated scientific data collection but also allowed participants to gain new knowledge and skills, and fostered a sense of community among citizen scientists from highly diverse backgrounds. This initiative has been particularly successful, evidenced by the return of participants year after year, who are now knowledgeable enough to train newcomers, thereby sustaining the project's momentum and impact. Their highly diverse community is nurtured mainly via word of mouth, with communication facilitated through messenger apps. Of special note are the young science students who can be part of a real research project and gain experience while Simone and Arthur made sure they could also earn qualification credits for colleges and universities and contri-

bute to scientific publications. A participating scout leader also took the initiative on collaborating with the scouts and designing a new "orchid heroine" badge and thus engaging young people in a more systematic way. This will be up and running with the next orchid season coming up in October/November 2024. Such examples demonstrate how much ownership community members feel over these citizen science initiatives. Simone recounts:

"I absolutely, utterly enjoy mornings with citizen scientists where we spend 3 hours together identifying pollinators where you see real community building happen. Even after a break, the same faces return and they're so happy to see each other again, and now they're coming with experience and they can lead a group of new citizen scientists. And you get such huge diversity, older people coming on their own, families, young children coming with their friends, students. People who just moved to Malta and want to be involved in stuff. And they're just so keen, so interested. Now, unfortunately, we needed to start limiting the numbers and you get people messaging like 'Oh no, I should have booked before.' So they pre-booked for next month. Or if someone cannot make it, they message ahead to inform you."

The team also makes quality control an integral part of their efforts, having all data validated by involved experts, collecting their feedback to make sure that the science is being done well, and collecting feedback from citizen scientists after every session to adjust the process according to the lessons learned during each implementation cycle.

### Challenges and institutional barriers

Despite these successes, Simone and Arthur have encountered significant challenges, particularly in the form of institutional barriers within the university setting that hindered administrative and financial processes. Arthur also points out problems he sees as somewhat specific to Malta: "Collabo-

ration is not that easy around here. People are really individual, especially when it comes to research.” This fact makes the progress towards more interconnected citizen science networks especially important – and encouraging. Arthur also identifies a clear hierarchy of needs in achieving scientific impact: “We can have a good impact on science. But unfortunately, we have to make a political impact before we can have a scientific impact. So it's really important to prioritise communication. This is also what happened at ERA, the politics had to be involved to get funding to then make scientific progress.”

Funding is an overall difficult topic, and tensions between the academic (funding) system and the concrete goals sought by the citizen science initiatives helmed by Simone and Arthur leave them with some precarity for the future. Any potential Maltese citizen science network would for instance have to find an institutional home while still maintaining its independence. These challenges underscore the need for better support systems for citizen science within academic and governmental structures. However, the proactive approach by ERA, including direct contracting and support for citizen science initiatives, signifies a potential shift towards more institutional backing for citizen science activities.

### Strategic impact and future directions

Looking towards the future, the impact of citizen science in Malta is poised to expand significantly. Plans for annual networking meetings and national citizen science activities, hosted in turns by relevant institutions such as ERA, the University of Malta, other educational institutions, and NGOs, will enhance visibility and integration of citizen science across different scientific disciplines and policy areas. The enthusiastic involvement of communities and NGOs, coupled with increasing political and institutional support, suggests a potentially bright future for citizen science in Malta.

The evolution of citizen science in Malta, driven by passionate individuals like Simone Cutajar and Arthur Lamoliere, exemplifies how dedicated efforts can transform an initially modest initiative into a powerful tool for science and society. With ongoing community engagement, institutional support, and policy integration, citizen science in Malta is set to become an indispensable part of the national scientific infrastructure, impacting a wide array of stakeholders from local communities to national policy-makers.

We leave the final word to Simone, who already has a clear vision for the next steps: “For the national citizen science strategy, we’re starting off with biodiversity and then move on to a bigger discipline. ERA wants me to lead it. They said Sim, we'll leave it up to you to bring in whoever you think should be brought in to make sure everyone is represented at the table. Of course, once that happens, we will bring in different representatives of citizen science that's happening in Malta but also citizen science that might not yet be happening in Malta but could start happening. So it would be an opportunity to kind of open up different fields of citizen science. Currently, we don't really see things like medical citizen science over here yet for example.”



# Ireland: a shift towards an integrated vision for citizen science



**The combined efforts of the Trinity College Dublin (affiliated partner of the ECS project) and the ECS citizen science ambassador for Ireland resulted in a first network meeting of researchers and practitioners involved in citizen science. Concerted efforts towards policy-makers and funders enable a growing recognition of the value of integrating public participation in scientific research and decision-making processes, poised to shape the future of science and society in Ireland and beyond.**

In the dynamic landscape of citizen science in Ireland, recent developments have marked a significant shift towards a more integrated and policy-focused approach to science and public engagement. In this impact story we summarise the insights of Joseph Roche and Aoife Taylor from the Science and Society Research Group of Trinity College Dublin, an affiliated partner in the ECS project, who has already started to promote citizen science in the research community of Ireland during the EU-Citizen.Science project ended in 2021.

Joseph explains how this consistency leads to tangible benefits: "One of the people designing the strategy for the new national research funding agency for Ireland reached out to me and said: 'We are thinking about incorporating citizen science into our funding strategy, would you be willing to speak to us?' And that is another example of the soft power that comes from the ECS and EU-Citizen.Science project projects. I'm sure those government of-

ficials did their homework and looked at what's happening in Europe and then found my name."

## The ECS citizen science ambassador initiative: catalysing change

Another important factor positively impacting the advancement of citizen science in Ireland are the synergies of Joseph's work with the ECS citizen science ambassador programme. Since Joseph is a professor and as such an academic voice in the community, the collaboration with Irish ECS ambassador Oscar Diaz, who operates from the Creative Spark Enterprise Fab Lab in Dundalk, has been key in creating bridges between more academic research and practical, community-based science. Their cooperation allows them to maximise the impact of both hands-on, community-driven projects and strategic networking events.



**Figure 25.** Welcoming attendees to the first event around establishing a citizen science network in Ireland (credits: OscarDiaz)

Creative Spark Enterprise Fab Lab provides professionals, SMEs, innovators and makers in the North East region of Ireland with access to equipment, support and training in digital design and advanced fabrication. It is a dynamic centre for digital design and fabrication, knowledge-sharing and innovation.

<https://creativespark.ie/fablab.html>

Joseph sees Oscar's proactive approach and connection with grassroots movements as instrumental in galvanising the citizen science scene and, in the end, establishing a formal citizen science network in Ireland, promising

a structured platform for citizen science activities across the country: “I have a public role and that can be very valuable sometimes, but I think for a fledgling citizen science network like we're building towards in Ireland it's better to have someone more independent and Oscar just really fulfils that role. So we're trying to support him through the ECS project, we're organising events, we're booking the venues and catering, we have an extensive mailing list, all that kind of stuff. But it's Oscar who is going to be the voice. And in the upcoming event we'll have some workshops for people to get involved in citizen science activities, but also a session on citizen science policy in Ireland and that's going to be led by my colleague Aoife Taylor and myself.”



Figure 26. Setup for the Soil Your Scarf workshop at the CitSci Event (credits: OscarDiaz)

## Networking and policy engagement

A key event in the Irish citizen science calendar this year was the inaugural citizen science networking event on 4th of July, hosted in "Unit 18", a community space located on the East campus of Trinity College Dublin. This event, aptly titled Establishing a citizen science network in Ireland, gathered stakeholders from various sectors to discuss the current state and fu-

ture of citizen science in Ireland. The networking event focused on building connections between researchers and practitioners of citizen science while also delving into policy discussions, reflecting a strategic shift in discussions towards the influence of data generated by citizen science initiatives on policy-making. The discussions were also set to bridge grassroots initiatives and top-down policy approaches, highlighting projects like Soil Your Scarf, which engages citizens in environmental monitoring through innovative means inspired by preceding Soil Your Undies citizen science campaigns.

**Soil Your Scarf** (based on the popular citizen science soil health project "Soil Your Undies") is an initiative led by Jessica Leonard and supported by Fibreshed Ireland, a non-profit organisation that is focused towards fostering ecosystem and community health through the development of regional fibre systems.

<https://fibreshed.org/affiliate/fibreshed-ireland/>

The final workshop is on citizen science and policy in Ireland, so we'll talk a bit about our experience of trying to get politicians in Ireland to listen to our thoughts and citizen science, to try and make citizen science more of an item on the political agenda," adds Joseph. "We are lucky enough to have a platform and a privilege in terms of people listening to us, including government ministers. We'll see how we can affect policy and act as agents of this citizen science network in Ireland."

As mentioned in the beginning, continuous engagement with policy-makers and funding agencies on citizen science has been key in capitalising on opportunities for its advancement in Ireland. Joseph outlines ongoing high-level structural changes in the Irish science

Figure 27. Attendees took part in workshops like 'Soil you Scarf', led by Jessica Leonard and supported by FibreShed Ireland (credits: OscarDiaz)



system in the forthcoming integration of the Science Foundation Ireland (SFI) and the Irish Research Council (IRC) into a new entity, called Taighde Éireann (Research Ireland). This integration offers a fresh opportunity to embed citizen science into a national funding strategy, facilitated by the continuous work done by Joseph and the citizen science community and supported by the efforts of broader, EU-funded projects. Another example comes from Joseph's work with County Councils, which govern Ireland's counties. His efforts on local engagement pushes to amplify the impact of citizen science while ensuring that it is recognised as a valuable element in regional and national development plans.

"While it's sometimes difficult to connect with policy-makers, one area where we had some success is with County Councils. We shared some of our work from the ECS project and the eu-citizen.science platform with some of the Councils, and Kildare County Council actually contacted us and asked us to come present on citizen science. And they followed up with me, they asked me for resources, and they then committed to trying to have citizen science as something that they fold into their next strategy." Joseph explains.

**Figure 28.** Attendees had the chance to know their own scarfs as part of the 'Soil Your Scarf' initiative (credits: Alison Zobenko)

## Broader impacts and future prospects

Beyond the impacts of these activities already outlined, the wider citizen science community stands to gain from the increased visibility and legitimacy that these efforts confer. Direct beneficiaries include networking partners, project participants and policy-makers engaged in these discussions, yet we already see first indications of these stakeholders' willingness to leverage their positions into a broad establishment of citizen science in Ireland. Looking ahead, the integration of citizen science into academic curricula and funding strategies promises to sustain and expand its influence and visibility in Ireland, empowering a new generation of researchers and citizen scientists. The evolving narrative of citizen science in Ireland also highlights a growing recognition of the value of integrating public participation in scientific research and decision-making processes, poised to shape the future of science and society in Ireland and beyond.





# Italy: a success story of pioneering citizen science

The Italian citizen science community has triggered concerted efforts to develop the field in Italy and demonstrates a successful model of multi-stakeholder engagement, collaboration, and impact generation. The establishment of the National Citizen Science Association, strategic initiatives under the National Recovery and Resilience Plan, and influential roles in global platforms are collectively driving Italy towards a robust and sustainable citizen science future.

Italy has made remarkable strides in establishing the field of citizen science, setting an inspiring example for other countries. This story highlights the efforts of various stakeholders, particularly Andrea Sforzi, Director of the Maremma Natural History Museum and representative of the ECS partner organisation Fondazione Grosseto Cultura, together with the members of the CSI steering committee. With a background in wildlife biology, Andrea's work with the Museum was instrumental to this achievement through its contribution to the set up of the National Citizen Science Association, the National Recovery and Resilience Plan, and its active participation in global initiatives like the G7 Science Communication Working Group. Andrea has been an active promoter of citizen science in his country and amongst the European citizen science community from the onset — being one of the founders of the European Citizen Science Association (ECSA). Already during the runtime of the ECS predecessor project, EU-Citizen.Science project, he was key in reaching out to other researchers in Italy to promote citizen science and liaise with those who engaged in first citizen science ini-

tiatives. This work continued very actively during the ECS project, with a strong focus on the relationship to political decision-makers.

Maremma Natural History Museum is located in Grosseto and mainly **dedicated to the environment of southern Tuscany**. The museum is a cultural centre and a place for dialogue between the scientific community and the public, through e.g. guided tours, educational activities, special projects, and exhibitions.

<https://www.museonaturalemaremma.it/>

**Fondazione Grosseto Cultura** is a non-profit organisation aimed at protecting and promoting cultural activities of the performing arts, higher education and scientific research. It was established by the Grosseto Municipality to manage the Maremma Natural History Museum, the Istituto Musicale Comunale Palmiero Giannetti and the House of Arts Polo Culturale Le Clarisse, in Grosseto.

<https://www.fondazionegrossetocultura.it/>

## Establishing the National Citizen Science Association

In 2023 the Maremma Natural History Museum was amongst the main drivers in founding the National Italian Citizen Science Association, which has been key in promoting citizen science across Italy. The association's first national conference in November 2023 was a resounding success, attracting more participants than the venue could accommodate.

Figure 29. Group picture at the Citizen Science Italia national conference 2023 (credits: Alessandro Oggioni)



The **Italian Association of Citizen Science** was founded in February 2023 with headquarters at the Natural History Museum of Maremma in Grosseto. It has the goal of fully developing Citizen Science in Italy and building inclusive and collaborative tools and solutions in close contact with the other international networks.

<https://www.citizenscience.it/>

**Figure 30.** The marketplace at the Citizen Science Italia national conference 2023. An ideal occasion for discussion and networking (credits: Alessandro Oggioni)



“The idea was to showcase different Italian projects and to set up the conference not only as a place to showcase our own projects, but to have some slots to discuss general questions, like the relevance of citizen science data and the role of citizen science in European funded projects”, states Andrea.

One of the significant outcomes of the conference was the engagement of the Ministry of University and Research (MUR). A delegate from the ministry attended the conference, indicating a positive, albeit initial, interest in collaborating with the association. The long-term vision includes establishing a National Citizen Science Centre, akin to Austria's model, with formal ministerial support. This centre would serve as a hub for coordinating citizen science efforts, enhancing Italy's capacity to contribute to the ECSA and its goals.

The November conference also saw the formation of two working groups: one focused on creating a network of researchers and teachers interested

in developing citizen science activities in schools and another dedicated to young citizen scientists (intended both as early career researchers and young volunteers actively taking part in citizen science projects). With 120 members and an expert on science communication employed, the association is gearing up for its next conference in April 2025 in Bologna, aiming to include international participants through English-language workshops.



**Figure 31.** The marketplace at the Citizen Science Italia national conference 2023 (credits: Alessandro Oggioni)

### Advancing through the National Recovery and Resilience Plan

Another important cornerstone driving citizen science in Italy is Italy's National Recovery and Resilience Plan, funded by the European Commission. It has allocated substantial resources to reinforce biodiversity research. This initiative led to the creation of the National Biodiversity Future Center (NBFC), comprising 38 institutions working over three years. A key component of this centre is citizen science, which is envisioned to continue beyond the project's lifespan of three years. The centre's scientific coordinator recognises the potential of involving hundreds of citizens in research, thereby strengthening the influence of scientific findings on political decision-makers.



**Figure 32.** The policy session dedicated to the proposal of a National Center for citizen science in Italy at the Citizen Science Italia national conference 2023 (credits: Alessandro Oggioni)

A citizen science working table was launched at the First National Forum dedicated to Biodiversity in Palermo in May 2024, coordinated by Andrea, to develop concrete activities supporting citizen science within the next 18 months.

"The Center is divided into eight different spokes," explains Andrea, "The table on citizen science spans over all of them and has one year and a half ahead trying to create something concrete on citizen science in the framework of National Biodiversity Future Center. Among the proposed activities are the coordination of researchers already engaged in citizen science and the development of training and networking opportunities for those interested in the topic, but with little or any experience of citizen science".

Most remarkably, this includes also creating a national platform for citizen science projects, to be built up through the open source software of eu-citizen.science, and supporting citizen science initiatives by cascading grants ranging from 10,000 to 30,000 Euros for institutions outside the National Biodiversity Future Center.

### Advancing global policy on citizen science

Andrea's appointment to the Science Communication G7 Working Group marks another significant milestone for Italy in the global citizen science arena. By advocating for citizen science in formal documents, Andrea is trying to position it as a central theme for future scientific endeavours at the G7 level. This high-level policy engagement offers Italy a unique opportunity to contribute to international discussions and foster greater integration of citizen science in global scientific and policy frameworks.

### Contributing to sustainable change

The impact of these initiatives spans multiple levels: individual citizens can contribute to and make their voices heard through an ever-growing multitude of citizen science initiatives in Italy. Through the establishment of more sustainable citizen science infrastructures, small associations to universities and research institutions are able to collaborate with citizens and communities to address complex scientific and societal issues. The inclusive approach ensures that anyone interested in citizen science in Italy can benefit from the resources and support provided.

"I was not aware how important the policy work was, some years ago. But now I want to create something useful that will stay. We have to create the need and have people see the relevance of it." says Andrea.

The primary driver of these achievements is the growing awareness within science, society, and among policy-makers of the importance of public engagement in scientific research. However, the increasing popularity of citizen science also brings challenges. There is a risk of the term being misused or misunderstood, leading to confusion about its true essence. To address this, clear guidelines and information is needed, ensuring that citizen science is practised authentically and effectively.

Italy's concerted efforts in citizen science demonstrate a successful model of multi-stakeholder engagement, collaboration, and impact generation. The establishment of the National Citizen Science Association, strategic initiatives under the National Recovery and Resilience Plan, and influential roles in global platforms are collectively driving Italy towards a robust and sustainable citizen science future.

# The Netherlands: catalysing citizen science nation-wide



**The recent developments surrounding citizen science in the Netherlands represent a meaningful step forward in integrating science with societal needs and policy frameworks. The continued growth of the national citizen science network, supported by significant national funding, and policy engagement at various levels, positions the Netherlands as a strong partner in the global citizen science community. As these efforts continue to evolve, the potential for impactful change and enhanced public engagement with science looks promising, setting a benchmark for other nations in the realm of citizen science.**

In recent years, the Netherlands has become home to a plethora of citizen science activities, ranging from grassroots initiatives to high-level policy engagement. These efforts have been shaped by collaborations and funding achievements, showcasing a dynamic shift towards a more inclusive and policy-integrated approach to science. The following impact story summarises insights gleaned from the activities of Leiden University's Citizen Science Lab. For this piece, we spoke to Lab Coordinator Margaret Gold and Researcher and Community Manager Anouk Spelt.

**Leiden University's Citizen Science Lab** was founded in 2018 by three researchers to consolidate and build on knowledge gained in participatory research practices across all faculties of the University.

It serves as a central knowledge and research hub and brings together scientists, citizens and community stakeholders in new collaborations to tackle urgent societal issues in citizen science investigations, Citizen Observatories, and Living Labs.

<https://www.universiteitleiden.nl/en/citizensciencelab>

## From grassroots initiatives to policy engagement

The Citizen Science Lab has a broad portfolio of citizen science projects. One growing grassroots initiative revolves around measuring air quality in locations across the Netherlands. With the long-term goal of improving air quality, the project enhances people's awareness and understanding of air quality issues by making particulate matter measurements visible in a photo, utilising a light-painting technique.

**Luchtkwaliteit in Beeld** (Air Quality in the Picture) deploys a novel "light painting" technique to photograph particulate matter measurements taken by an Air Quality sensor by instructing an LED strip to flash at a higher volume and frequency according to the measurement, and capturing this in the photograph via a long open shutter speed. Originally conceived by artist Robin Price in partnership with environmental scientists at Birmingham University, it aims to make the invisible visible in the 'Air of the Anthropocene' project. The Citizen Science Lab implementation places the kits and instructions to build your own 'Pollution Painter' in the hands of local residents such that they become the photographer and storyteller, as well as the citizen scientist.

<https://luchtkwaliteitinbeeld.nl/>



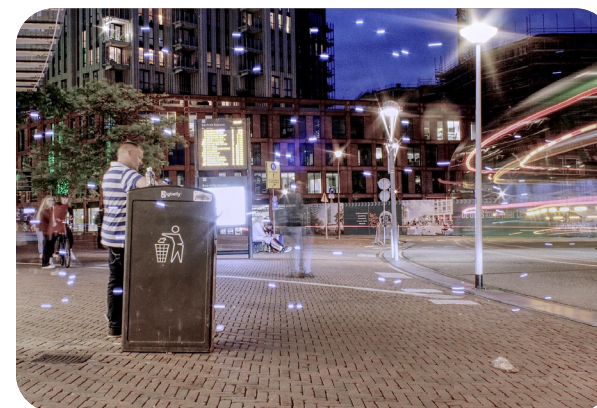
By going on photo expeditions in locations around the city where sources of air pollution may coincide with groups at higher risk of exposure or health impacts (such as day care centres on a busy road) and visualising real-time particulate matter measurements at that location in the photo in juxtaposition with the background, participants are leveraging the storytelling power of the photos for discussions about sources of pollution and potential individual and community-led actions. The photos are also a powerful aid in setting the policy agenda and campaigning for local interventions to improve local air quality in line with the European Clean Air Directive.

Although this project was launched and continues to be facilitated by the Citizen Science Lab, participants have taken ownership of the project and are collectively keeping it alive despite receiving only intermittent funding. The open source / open hardware approach embedded in the project to invite creative innovation and new applications of the technique are already opening up new pathways in the project thanks to the invention of a 'Digital Pollution Painter' variant by one of the participants, which enables day-time photo taking and thus a wider range of storytelling abilities. Another participant chose to spend their under-graduate programme student project within the Citizen Science Lab, enabling Luchtkwaliteit in Beeld to have a high-visibility presence at a city-wide public event that attracted new participants.

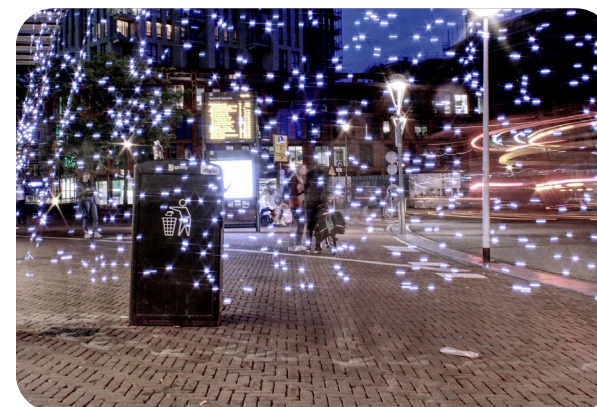
The initiative is supported in its next phase by the EU-funded CitiObs project, as an example of citizen-led action and the impact of citizen involvement in environmental monitoring and advocacy.



**Figure 33.** Two participants in the Luchtkwaliteit in Beeld project setting up for a Light Painting photo in front of the Leiden University Medical Centre (LUMC) (credits: Alessandro Oggioni)



**Figure 34.** Before photo taken using the 'Luchtkwaliteit in Beeld' technique outside the entrance of the LUMC (credits: Marvin Tjon)



**Figure 35.** After photo taken using the Luchtkwaliteit in Beeld technique at the moment a smoker is standing outside the entrance of the LUMC, which visualises the resulting air pollution (credits: Marvin Tjon)

Alongside such grassroots efforts, and the work to embed Citizen Science practices within the Open Science Programme of Leiden University, the Citizen Science Lab has also engaged in high-level policy activities that aim to strengthen support for citizen science at all levels. By working closely with entities such as the National Programme Open Science (NPOS), which is now embedded in the Open Science NL programme of the Dutch Research Council, and the Global Science Forum Citizen Science Working Group of the Organisation for Economic Co-operation and Development (OECD), the Citizen Science Lab has been actively shaping policy recommendations and actionable input for global and national policy-makers. Of particular note here are also efforts initiated together with the Policy Working Group of the European Citizen Science Association (ECSA) to secure dedicated funding for citizen science in the upcoming Framework Programme 10 (FP10) of the European Commission.

The **ECSA Working Group on “Policy, strategy, governance and partnerships”** has been initiated in 2024 with the aim of informing on and advocating for the value of Citizen Science for achieving policy goals such as understanding and enriching the environment, dealing with the effects of climate change, enhancing the public’s relationships with research and with the natural world. It seeks to promote the benefits and impacts of Citizen Science to policy-makers and those who influence them, to collect case studies and research evidence about policy outcomes of Citizen Science activities, as well as to represent policy-related goals and achievements to ECSA’s members and governance structures. <https://www.ecsa.ngo/working-groups/policy-strategy-governance-and-partnerships/>

By approaching citizen science in a holistic manner, supporting a broad spectrum of activities from local community engagement to the integration of citizen science into broader policy frameworks, the Citizen Science Lab

is working to enhance the reach and effectiveness of citizen science in the Netherlands and beyond.

### National Citizen Science Network

Another major advancement in the citizen science landscape of the Netherlands has been the launch of the Citizen Science Netherlands Network (CS-NL), which is currently being co-lead by the Citizen Science Lab and two members of the DesignLab at the University of Twente. The DesignLab facilitates creative collaboration and knowledge transfer between researchers, societal organisations, students, and citizens (<https://www.utwente.nl/en/designlab/>).

The **Citizen Science Netherlands Network (CS-NL)** is a vibrant and active community of Citizen Science practitioners, initiators, researchers and participants who come together to share knowledge and know-how for participatory research and societal engagement practices that partner with and for the benefit of society. <https://www.cs-nl.network/>

Citizen Science Netherlands Network was co-created with various stakeholders and currently hosts both general networking events and thematic working groups, while also sharing information through a monthly newsletter and via social media, with the primary goal of enabling individuals with similar interests to connect and collaborate. Since May 2024, funding has been secured to expand and professionalise this network, and offer tangible support to the growing community of more than 500 members who represent practitioners both inside and outside of academia.

“Over the last couple of years, it’s just been growing and growing and people coming together during different events and organising meetups. As

an example, there were already people who didn't know that they were working on the same topic but they met at a networking day and now they know about each other's projects. It already has so much impact that people are finding other people to exchange ideas, good practices and collaborate on new projects", says Anouk Spelt, researcher at the Citizen Science Lab and Community Manager of the Citizen Science Netherlands Network.

### Policy impacts and funding innovations

All of these activities also tie into and enhance national policy-making efforts. Most prominently, this includes collaboration with relevant decision-makers towards the development of additional and dedicated funding instruments for citizen science research in the Netherlands. Other efforts focus on broadening the eligibility criteria for research funding and exploring alternative funding sources, such as social innovation grants and municipal support: "We have to look at other types of funding bodies and other types of funding. All of the long, ongoing projects are NGO-supported, and I think we are not partnering enough there. Cities, municipalities, environmental agencies, etc., those are the types of funding bodies we need to be reaching," explains Margaret Gold, manager of the Citizen Science Lab.

Furthermore, Margaret acknowledges an opportunity in exploring cultural funding models, which could provide more flexible and adaptable financial support for citizen science activities at the grassroots level. Such models remove many of the current funding application barriers, and acknowledge the dynamic nature of community-led citizen science projects, allowing for more flexible adjustments and evolutions in project goals and methodologies.

### Stakeholder impact and future directions

Margaret and Anouk witnessed the most direct impact of their initiatives on the participants and network partners, who have experienced enhanced agency and collaboration opportunities. Similarly, connecting different stakeholders with and on the policy level — nationally and internationally — on the matter of citizen science has been an essential dimension of the work undertaken by the practitioners of the Citizen Science Lab.

As Margaret puts it: "Probably the single most important thing I've done in the entire piece of work is just connecting ministry representatives with their own national communities of practice. In several cases, they've been unaware of their own local richly active community, and the many examples of existing projects. Improving this visibility requires a stronger connection between the field of practice and the national policy level."



**Figure 36.** Members of the Citizen Science Netherlands Network at the first Dutch national Citizen Science Network Day on November 11, 2022 (credits: Citizen Science Nederland Network)



National networks such as Citizen Science Netherlands Network are crucial for facilitating the exchange of experiences and good practices, and for showcasing how citizen science can be done effectively. But these examples

also highlight an important challenge, in that key stakeholders often don't know each other, don't talk to each other,

or are not even mobilised to begin with. While the Citizen Science Lab

thus serves as an important mediating institution, it also seeks the establishment of thematic working groups within ministries, funding agencies, and

other key institutions to support a more streamlined capacity building process leading to

longer-term expertise — and the establishment of communication channels between the two such that citizen science practitioners can connect to the right people more easily, and evidence from practice becomes more visible at the policy level.



**Figure 37.** Members of the Citizen Science Netherlands Network in discussion about potential Working Groups at the Citizen Science Network Day on November 11, 2022 (credits: Citizen Science Nederland Network)

Overall, the developments outlined in this piece represent a significant step forward in integrating science with societal needs and policy frameworks in the Netherlands and beyond. The continued growth of the national citizen science network, combined with innovative funding strategies and robust policy engagement, positions the Netherlands as a champion of citizen science even on an international scale. As these efforts continue to evolve, the potential for impactful change and enhanced public engagement with science looks promising, setting a benchmark for other nations in the realm of citizen science.

Something to keep in mind in all of this is the plurality of participatory research practices that exists, as stated in the vision document for citizen science in the Netherlands (available on [Zenodo: https://zenodo.org/records/11380411](https://zenodo.org/records/11380411)):

*There are many ways of describing and naming participatory research practices, varying according to the question being researched, the nature of the task or collaboration, and the objectives and motivations of those participating. This can be seen for example in the range of terms that the members of the Citizen Science Netherlands Network use to describe their approaches. We embrace and seek to protect this plurality and diversity of practices in the Netherlands, and aim for balanced representation within the network of initiators and practitioners from all walks of life.*

# Further explorations: the European citizen science platform



This book tells 12 stories that can inspire new experiences and initiatives. But the vast ocean of citizen science is full of unexplored islands and routes that everyone can help make known. That's why the **European citizen science platform** exists.

Born from the EU-Citizen.Science project in 2020, the **European citizen science platform** ([eu-citizen.science](https://eu-citizen.science/)) has now become a frequently used and well-populated platform for the broader citizen science community in Europe. The platform has further thrived within the ECS (European Citizen Science) project that started in August 2022.

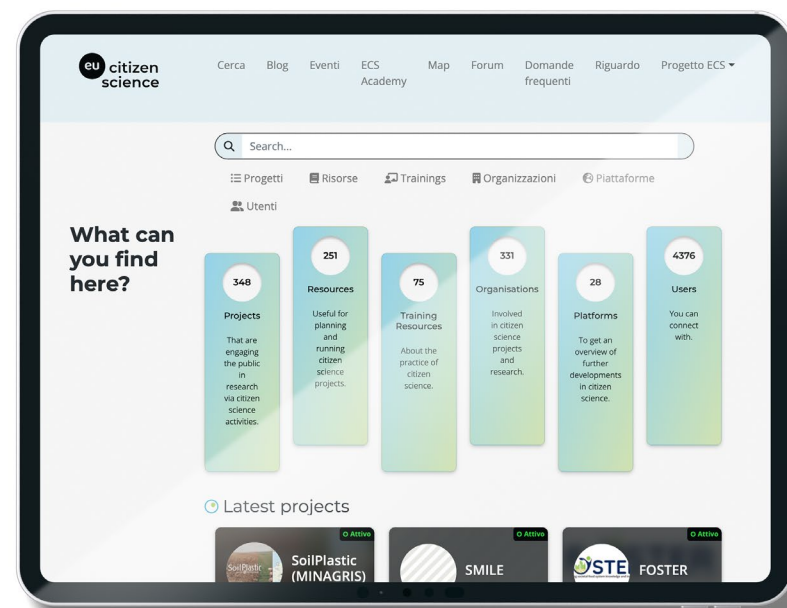
Within ECS, the platform continues to represent the main place to share project profiles, resources, training, ideas, events and more, to connect with and strengthen the community. It is also further evolving as the online counterpart of the association itself. The European Citizen Science Platform has been built by the community and for the community. The platform is open to everybody and parts of it are available in 12 languages.

At the time of the publication of this book (September 2024), the platform gathered more than 240 resources on citizen science and over 75 training resources. The latter are designed to be used for teaching or training on the practice of citizen science. These are self-directed and can be taken any-

time. You can find over 340 profiles of projects that are engaging the public in research via citizen science activities, more than 320 organisations, 29 other platforms and almost 7000 fellow citizen scientists, who may be your exploration companions.

The platform also features a blog collecting stories, interviews and good readings, a forum, the possibility to discover people and organisations to connect with, and a calendar with events on citizen science.

**The European citizen science platform:** <https://eu-citizen.science/>



# The European citizen science platform



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Teresa Schaefer studied Economics at the University of Vienna. Her research work at the Centre for Social Innovation (ZSI) focuses on participation processes in digital social innovations and the assessment of their impact. Teresa was co-author of the *Citizen Science White Paper for Europe*, she contributed to the elaboration of an impact assessment framework for citizen science and has led the work on evaluation and impact assessment in numerous citizen science projects. She has many years of experience in participatory methods for design and evaluation, involving a broad range of citizens in research projects.

## Barbara Kieslinger

Dr. Barbara Kieslinger is a senior scientist at the Centre for Social Innovation (ZSI) in Vienna, Austria. She has been engaged in and studying citizen science for many years, working on evaluation and impact assessment and contributing to the first whitepaper on citizen science in Europe. Her research is concerned with citizen science and citizen innovation, open science, and the relation between technological/digital and social innovations. Barbara is a guest editor of the *Citizen Science in Theory and Practice journal*.

## Stefanie Schuerz

Stefanie Schuerz studied sociology and science and technology studies at the University of Vienna and works as a researcher and project manager at

the Centre for Social Innovation (ZSI). Her primary focus is on evaluation and impact assessment, multi-stakeholder engagement and citizen science, as well as research ethics and integrity. Stefanie has coordinated processes for the co-design of R&I policy recommendations and has collaborated with funding agencies in the development and evaluation of participatory activities. In addition to her work at ZSI, Stefanie also acts as a mentor to citizen science initiatives.



Teresa Schäfer

Barbara Kieslinger

Stefanie Schuerz

**Figure 38.** Teresa Schäfer, Barbara Kieslinger, Stefanie Schuerz at the ECSA2024 conference in Vienna (credits: ÖCSK 2024 / Ouriel Morgensztern)

### Centre for Social Innovation (ZSI)



The Centre for Social Innovation (ZSI) is a private non-profit institute for applied social sciences and a Centre of Excellence for social innovation based in Vienna, Austria. It implements research and application projects on the social embedding and impact of all types of innovations and contributes to the design and diffusion of socially accepted and sustainable innovations to meet global challenges.

**In this book, we  
tell 12 impact stories  
from citizen science  
efforts implemented  
across Europe. They serve  
as examples of how citizen  
science can create change  
with and for our society  
with the aim of achieving  
a more inclusive and  
sustainable future.**



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