EUROPEAN POLICY BRIEF

Science Transformation in EuroPe through Citizens involvement in HeAlth, coNservation and enerGy rEsearch

INTRODUCTION

Step Change is a Horizon 2020 **Citizen Science (CS)** project, which is an emerging field that refers to the active engagement of the general public in scientific research. In fact, during last decades, CS has become increasingly relevant, as witnessed by the rapid diffusion of CS in different research fields, the use of platforms and apps or the establishment of European and national funding programmes aimed at supporting CS projects. This turn is connected to the profound changes affecting science by making it more aligned with the European's Union (EU) Open Science policy and the European Research Area (ERA), which intends to position open science as the *modus operandi* of modern science, and seeks as an ultimate goal that "the general public should be able to make significant contributions and be recognised as valid European science knowledge producers".

However, **the potential of CS is still partly to be discovered**, both as a specific research approach and, more generally, as a policy tool to strengthen the often difficult and even conflicting relations between science and society. Challenges such as data quality and validation, scientific recognition, demonstrated impacts and sustainability, among others, seem to hold back the whole potential of CS. **Step Change has been precisely conceived to provide a great contribution** by generating new knowledge useful to explore the potential, but also the critical issues, limitations and recurrent obstacles of CS as a research approach and evidence informed-policy tool.
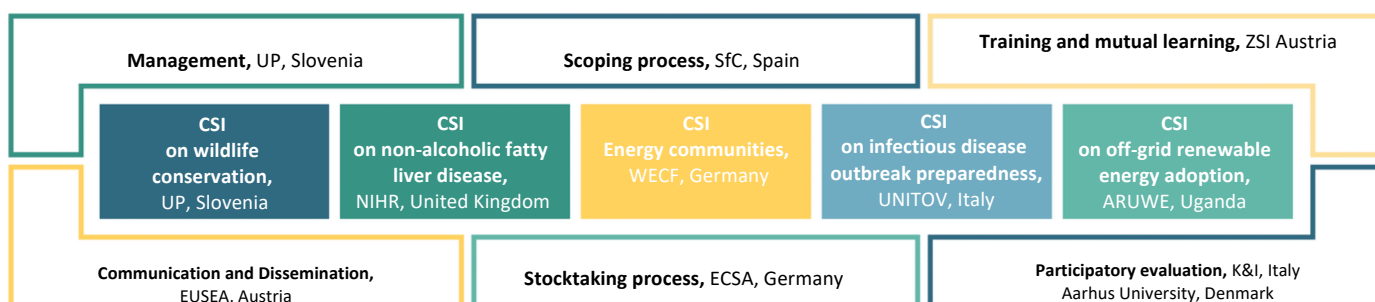
Step Change builds on the assumption that CS can play an even broader societal and scientific role than is generally acknowledged. The project implements **five Citizen Science Initiatives (CSIs)** in the field of health, energy, and environment. The CSIs tackle the issues of wildlife conservation in Slovenia, non-alcoholic fatty liver disease in the UK, energy communities in Germany, infectious disease outbreak preparedness in Italy, and off-grid renewable energy in agriculture in Uganda.

The five CSIs have been planned also to provide an empirical basis which allows the formulation of **recommendations** and the production of **instruments** for better cementing CS within Research & Innovation institutions, as well as changing researchers' mindsets on its value.

How the project works

Step Change is a collaborative project where the five CSIs -in colours-, are researching with the support of the six-expert organizations throughout the whole lifecycle of the project, in order to take the best out of the transdisciplinary CS approach.

Management, UP, Slovenia	**Scoping process,** SfC, Spain	**Training and mutual learning,** ZSI Austria

CSI on wildlife conservation, UP, Slovenia	**CSI on non-alcoholic fatty liver disease,** NIHR, United Kingdom	**CSI Energy communities,** WECF, Germany	**CSI on infectious disease outbreak preparedness,** UNITOV, Italy	**CSI on off-grid renewable energy adoption,** ARUWE, Uganda

Communication and Dissemination, EUSEA, Austria	**Stocktaking process,** ECSA, Germany	**Participatory evaluation,** K&I, Italy Aarhus University, Denmark

The three levels of participation in the Step Change CSIs

The way that stakeholders participate in Step Change ranges from an extra pair of hands to gather data to a much more equal partnership where citizen scientists can help and take the initiative in activities, or do analytical work, and interpret and assess the results. It is paramount to be **flexible and give stakeholders the scientific tools and the freedom to engage at different levels/ time over the lifecycle of the project**. For this purpose, Step Change has established three levels of participation: the Core Teams are the centrepiece of each CSI, the Citizen Scientists are the stakeholders that are highly engage and communicate directly to the Core Team, and the Extended Participants are those stakeholders that participate in CSIs in specific tasks or activities. Any stakeholder can engage at one level and move to another one according to their willingness and availability.

Core Team Members	Citizen Scientists	Extended participants

Stakeholders Engaged

Step Change scientific data is co-produced by the quadruple helix (4H) stakeholders which are: citizen scientists, academia, policymakers and the private sector. All stakeholders of the 4H are participating in co-creating activities, designing, implementing and evaluating in each CSIs.

Private sector	Policymakers	CSO's	Academia

The project is currently implementing 5 CSIs in the areas of Energy, Environment, Health and infectious Disease, and are described below:

1. Wildlife conservation in Slovenia

An application for wildlife data collection is being developed as a friendly tool for the involvement of non-professional citizens. The CSI will improve the capacity to produce evidence of wildlife presence while contributing to raise awareness on biodiversity and conservation issues in the Slovenian forests.

2. Non-alcoholic fatty liver disease in the UK

A translational research experiment in the metabolic endocrinology field is being carried out via CS approach. This CSI will contribute to develop new screening tools and novel interventions with the ultimate aim of improving patients care in this field.

3. Energy communities in Germany

This CSI is assessing the potential benefits and the main setbacks of neighbourhood electricity sharing. The initiative tackles this issue in an energy citizenship perspective, namely focusing on three different dimensions: energy consumptions, energy-related lifestyles, and energy culture.

4. Infectious disease outbreak preparedness in Italy

This CSI is co-designing a CS strategy for infectious disease preparedness in Italy. It also raises awareness on the role of CS as a relevant tool to be incorporated into different institutional and scientific practices for a better management of infectious disease outbreaks.

5. Off-grid renewable energy in agriculture in Uganda

This CSI is exploring to what extent the adoption of off-grid renewable energy in agricultural production can be a useful way of responding to the increasing energy demand of the sector. The CSI also aims at promoting social and environmental sustainability in rural contexts.

Horizontal Activities

As individual researchers cannot have expertise in all the required fields to successfully implement a CS project, the promotion of **interdisciplinary work** to strengthen CS research as a powerful and replicable scientific field is extremely beneficial. With this in mind, the Step Change project horizontal activities were designed from the beginning to help the five CSIs in their endeavours through ad-hoc support from horizontal partner's expertise. The interdisciplinary support inside Step Change consisted in four different but interrelated activities:

Scoping Activities

At the beginning of Step Change, the CSIs have been supported through a scoping exercise that has prepared the ground for their implementation. This has been designed to ensure that the synergy between each CSI and the territory where it takes place is well established, thus fostering the societal anchorage of the CSIs, and increasing their relevance, significance, feasibility and sustainability from the very beginning. The materials provided CSIs with practical tools to better design and manage the starting process of the CSI. It includes, but not limited, a protocol for citizen scientists' recruitment, tools for stakeholder mapping and engagement, and a checklist of legal and ethical requirements. These materials will be available in the CS Navigator.

Mutual Learning and Training

A set of supporting actions consisting of training and mutual learning activities were designed to facilitate transdisciplinary work all over the implementation of the CSIs. Different training formats targeting the CSIs research teams were produced according to their needs. They have been compiled into an online booklet made available in the Step Change website. At the same time, capacity building of citizen scientists and extended participants are being fostered, as well as the creation of mutual learning spaces involving the five CSIs and other projects from the CS ecosystem.

Participatory Evaluation

The evaluation component of the project is applying a participatory and development approach to identify the most valuable dimensions of the research conducted within the CSIs, and indicators taking into account the diverse perspectives of involved stakeholders and citizen scientists. The evaluation of the CSIs is designed and implemented as a Citizen Social Science Initiative, which can be considered as an additional and cross-cutting CS experiment within Step Change. This evaluation model has a double aim of supporting the five CSIs and generating fresh knowledge about recurrent patterns and dynamics emerging in CS.

Stocktaking Process

In the final months of Step Change, a stocktaking exercise will be conducted with the aim of ensuring long-term support to CS as a field, as well as to support a better institutional anchorage of this practice in the scientific community. A CS Navigator will be developed to support interested researchers in starting and developing a CSI. The Navigator will feature conceptual, methodological and practical aspects of CS.

EVIDENCE AND ANALYSIS

Usually, projects' impact is divided in five dimensions: scientific, social, economic, political and environmental impact. Step Change will potentially have impact in all of the dimensions, and in order to maximise it, the Consortium adopted a multifaceted methodology that fosters alignment with local contexts, encourages self-reflection, and supports the collection and analysis of data and information. These activities, while providing a diversified set of services to the CSI teams, are also functioning as a **network of sensors** aimed at producing a better understanding of CS in general, by identifying recurrent obstacles, hindering factors, coping strategies, and potentially long-term impacts.

Scientific Impact: Interdisciplinary and new knowledge resources	Social Impact: Community building and changes in way of thinking	Environmental Impact: In ecosystems, biodiversity and health	Economic Impact: Cost savings and economic impact on the local communities	Policy Impact: On policies and policymakers' participation

The project is ongoing, but some first elements for an analysis of CS are emerging.

- **Diversification**. Step Change is experiencing the extreme diversification of CS initiatives. CSIs and, more generally, CS projects vary widely in terms of the number of citizens involved, the activities in which they are involved, the degree and intensity of their involvement, and the motivations and interests that bring them to get involved. Furthermore, the CSIs are different depending on the importance attributed to the research component and the political/social component. As a result, each team has chosen its own path (of phases, engagement tools and levels of engagement) to implement CSI, which makes the CSIs hardly comparable with each other. This suggests that CS is a research strategy inspired by some general principles that, however, cannot be encapsulated in specific methods and tools.

- **Learning processes**. CS projects cannot be based on well-established protocols and procedures as it happens in conventional science. The involvement of citizens and stakeholders exponentially increases the level of variability, making the research process more complex but potentially more impactful in both scientific and social terms. In this sense, leading a CS project requires a high level of analysis and reflexivity as well as the activation of learning processes mainly through a trial-and-error mode.
- **Citizen mobilisation.** In the early stages of the implementation of the CSIs, the issue of citizen mobilization appeared to be the most critical to be addressed. A hidden assumption is that stakeholders and citizens, by definition, want to participate. This is not necessarily true. In an even more individualistic context, many people and stakeholders do not want to participate for different reasons (lack of time, fear to take on responsibilities, lack of trust in the promoters, tensions with other stakeholders, lack of skills and capacities, etc.). Identifying effective mobilisation strategies tailored to the context and the types of citizens and stakeholders is challenging and requires time and interdisciplinary teams.
- **Evaluation.** Generally speaking, conventional science products are usually evaluated in terms of scientific quality. This one-dimensional view has been also questioned (scientific products could be also evaluated from other angles, such as innovation and socio-political potentials). Conversely, CS projects can be evaluated from many different standpoints, including, e.g., scientific quality, social and economic transformative capacities, inclusive impacts on citizens and stakeholders, or long-term institutional changes. This makes the evaluation of CS projects particularly difficult to develop and requires a priority-setting process. In the case of Step Change, a participative approach has been adopted, allowing to adapt M&E to the evolution and features of the CSIs. However, this requires great cooperation between evaluators and teams and a high level of flexibility.

RECOMMENDATIONS

Based on the experiences made in the first phases of the project, some aspects can be highlighted.

- **Institutional support is needed**. CS activities need institutional support to be implemented. In the case of Step Change, this support was provided by the project. However, professional researchers who engage in CS projects hardly have all the necessary skills to make them happen. Research organizations and universities should equip themselves to provide them with full support, as well as building interdisciplinary teams. Despite countless improvements, some academic actors remain reluctant to recognise CS as a legitimate scientific approach. This is something fuelled by a lack of sufficient knowledge about CS real contributions and a preference for data collected by scientists. Additionally, if academic career paths still rely on publication records, the immense time and resources invested in building relationships and co-creating scientific processes with citizens will be always undervalued. Step Change recommend to incorporate CS in university curricula.
- **The launch phase of the CS project takes time**. Activating CSIs proved to be a time-consuming stage, especially for teams with no previous CS experience. This phase requires, many learning activities, the activation of multiple contacts with potential citizen scientists and stakeholders, and the design of all aspects of the project with a high level of uncertainty. When preparing CS projects this element must be taken into account, as well as always considering the gender balance and the inclusion of underrepresented citizens in CS.
- **Knowledge of the context plays an essential role.** CS projects are more context-sensitive than conventional research projects. It is not just a matter of having a knowledge of the scientific aspects, but also of having adequate knowledge of who the stakeholders are and their interests and motivations, how the problems addressed arise in the local context, or the policy implications of the project. Besides, CS projects tends to focus more on research questions that matters to people aligning the public agenda to the research project.
- **Participation must be modulated as needed**. Participation in CS projects is a process, which develops over time with different levels of intensity. Engagement strategies and participation should be valued at many levels, from occasional contributions to deep engagement in all phases of research, depending on the project objectives and expected impacts. Different people with different life experiences,

responsibilities and interests can add value to different phases in CS projects. This also helps prevent approaching participation in a tokenistic way.

- **Special attention should be given to the trans-epistemic dimension.** The distinctive characteristic of CS compared to other types of participatory activity is the recognition of knowledge (experiential, political, practical, and professional) other than scientific knowledge in giving greater effectiveness and quality to scientific activity. However, trans-epistemic practices are still underdeveloped and are even more difficult to evaluate. This is therefore an aspect that probably requires more attention and more research, also to avoid that citizen scientists are prevalently used simply as low-cost data collectors.

- **Adequate infrastructures** (as Observatories or Platforms) to build-up networks of CS initiatives have become increasingly important in providing support to the projects and its participants. These infrastructures make CS projects more visible and accessible for the stakeholders who want to get engaged, and are very useful to support CS newcomers, as well as it promotes mutual learning experiences among CS teams. National infrastructures and networks can also be used to provide local, regional and national policymakers with necessary information on key and emerging topics affecting public agendas.

SUSTAINABILITY AND LEGACY

The sustainability and legacy of any CS project is the most challenging part, for this reason, Step Change envisaged from its inception a stocktaking exercise, which will be carried out during the final stages of the project. **Step Change will promote institutional agreements within the involved research organizations to ensure long-term support to CS**, as well as to support a better institutional anchorage of this practice in the broader scientific community.

Building on the outcomes of the project, the legacy of Step Change will consist on producing a model of R&I socialization through CS to be addressed to the 4H. It will consist of both analytic and operational components. Besides, a **CS Navigator will be developed to support interested researchers, CS practitioners and newcomers in the development of CSI in any field**. The Navigator will feature conceptual, methodological and practical aspects of CS and will be build from the already available training materials aimed at supporting the implementation phase of CSIs; the Scoping Tools aimed at socially rooting CSIs; and the evaluation frameworks which enable CSI to monitor their progress and results and adapt to the local setting. Besides, the Wildlife Monitoring App is currently being evaluated in order to **integrate its citizens-generated data into the national monitoring of wildlife in Slovenia**.

The Step Change Consortium is an active member of the EU-citizen.science platform and is committed into sharing all materials and tools into the platform.

PROJECT IDENTITY

Step Change partners from EUSEA in charge of the Communication and Dissemination of the project, created together with the Consortium and graphic designers the branding and visual identity of Step Change, and its social media channels and website. The branding guidelines have also been used to create a variety of promotional material for the project, including roll banners and factsheets that have been used at networking events to communicate the project goals in an accessible way. You can find all these materials in https://stepchangeproject.eu/knowledge/publications/

3	2.2	11	7	24	5
Years, runs from March 2021 to February 2024	Million, funded by the European Commission	Partners	European countries and Uganda	Supporting entities	Citizen Science Initiatives (CSIs)

- University of Primorska (Slovenia)
- Knowledge & Innovation (Italy)
- Oxford University Hospitals NHS Foundation Trust (UK)
- Women Engage for a Common Future (Germany)
- European Science Engagement Association (Austria)
- Science for Change (Spain)
- University of Aarhus (Denmark)
- University of Rome Tor Vergata (Italy)
- Centre for Social Innovation (Austria)
- Action for Rural Women's Empowerment (Uganda)
- European Citizen Science Association (Germany)

The project is coordinated by the University of Primorska (Slovenia)

Science Transformation in EuroPe through Citizens involvement in HeAlth, coNservation and enerGy rEsearch

PROJECT NAME	Science Transformation in EuroPe through Citizens involvement in HeAlth, coNservation and enerGy rEsearch (**STEP CHANGE**)
COORDINATOR	Elena Buzan, University of Primorska, Koper, Slovenia, elena.buzan@upr.si
CONSORTIUM	Aarhus Universitet, Aarhus, Denmark Action For Rural Women's Empowerment, Kampala, Uganda Conoscenza e Innovazione scrl, Rome, Italy European Science Engagement Association, Vienna, Austria Oxford University Hospitals NBS Foundation Trust, National Institute For Health Research Oxford Biomedical Research Centre, Headington, UK Science for Change, Hospitalet De Llobregat, Spain Università degli Studi di Roma Tor Vergata, Department of Biology, Rome, Italy Univerza na Primorskem Università del Litorale, Koper, Slovenia Verein Der Europaeischen Burgerwissenschaften E.V. Berlin, Germany Women engage for a common future, Munich, Germany Zentrum Fur Soziale Innovation GMBH, Vienna, Austria
FUNDING SCHEME	Horizon 2020: SwafS-27-2020 Hands-on citizen science and frugal innovation
DURATION	March 2021 – February 2024 (36 months)
BUDGET	EU contribution: 2 200 000 €.
WEBSITE	https://stepchangeproject.eu/
FOR MORE INFORMATION	Contact Elena Buzan elena.buzan@upr.si or stepchange@famnit.upr.si
FURTHER READING	D'Andrea, L., Kalpazidou Schmidt, E., Bužan, E., Vidal Merino, M., Dall, E., Colonnello, C., Graversen, E. K., Cerri, J., Iacolina, L., & Feudo, F. Evaluating citizen science initiatives through a citizen science-based approach. Fteval JOURNAL for Research and Technology Policy Evaluation. 2022, 54, 43–50. doi: 10.22163/fteval.2022.570