Change – The transformative power of citizen science

CROPS: changing the scale of citizen science towards the transnational level

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Abstract

Citizen science has become a proven method across a range of scientific disciplines, able to collect new and complementary data which enhances and adds context to existing scientific methods. By upscaling to a transnational level, citizen science could collect, analyse and exploit a vast amount of data across Europe and beyond, achieving a higher impact through creating a multinational community of citizen scientists. However, many citizen science initiatives start at a small-scale, facing technical and practical challenges when attempting to upscale to a wider level, with current EU mechanisms not providing the support or resources required to assist their effort. The CROPS project (crops-cs.eu) will evolve the EU Research & Innovation system so that it can support the transition of citizen science from small-scale to a Europe-wide level, changing it towards a modern, open-science approach. CROPS consists of four activities: (i) appraisal of existing citizen science, their activities and their suitability for upscaling; (ii) creation of protocols and guidance for the upscaling of citizen science, replicating and building on best practice that exists; (iii) providing guidance regarding practical considerations such as open data sharing, sustainability, RRI and diverse funding opportunities; and (iv) development of transnational citizen science communities, including establishing societal coalitions and prospective citizen science champions to raise awareness of the potential of citizen science when addressing Horizon Europe EU Mission goals.

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Introduction

In the past decade, the advance of modern-day digital technology has made the world a more connected place resulting in a surge of citizen science (CS) projects. Supported through either traditional funding systems (Horizon 2020: Science with and for Society for instance) or as part of larger initiatives, CS activities have made a significant scientific contribution in creating new and complementary datasets that enhance existing methods (Fraisl et al. 2020). This contribution goes beyond the science addressed, having the potential to impact on a number of societal needs and foster open, inclusive, and democratic science approaches (Wildschut 2017). As such, citizen science has been touted as method to support larger frameworks, for instance in providing data, public engagement, and the societal changes needed to make the Horizon Europe EU Mission goals achievable.

However, whilst existing support mechanisms have proven adequate for the needs of larger CS initiatives, they have not proven suitable for all. Many citizen science activities are small-scale and experimental, and with current financial processes not well adapted to their needs, have failed to upscale over the longer term. The effect of this is exacerbated as such projects are often those that can have the greatest societal impact, lending themselves to consider broader, EU Mission needs. Furthermore, whilst the potential of citizen science towards bridging the gap between science and society is well-known, it can be difficult to fully realise in a measurable way. Despite demonstrating the will to do so, CS practitioners often do not fully appraise their activities' full impact beyond the science involved, due to a lack of expertise, supporting resources, and time (Sprinks et al. 2021).

The aim of CROPS is to recognise the potential of citizen science activities' up-scalability, and invest in their long-term sustainability. It will help CS projects learn from the success of other initiatives that have already upscaled, and provide support kick-starting their own journey. Tools, guidance and best-practice resources will be assimilated from existing research, and openly disseminated to CS activities and their communities in order for them to fully realise their potential in bridging the gap between science and society.

The CROPS Concept

To achieve the CROPS vision of ensuring the next generation of CS activities fully realise its potential at a transnational level, with shared objectives targeted towards EU Mission goals, the following conceptual approach has been developed (Figure 1):

At its roots, the CROPS concept is fed by learning from the best-practice of existing citizen science projects that have successfully upscaled beyond their original scope. Experiences and knowledge from existing initiatives will be used to inform a thorough screening process to identify CS projects with the potential to upscale to a transnational level. CROPS will support the growth of CS activities that have been identified as suitable for upscaling to a transnational level. It will do this by adapting and utilising existing tools that have been developed through previous EU and other projects and activities. Protocols and strategies relating to communication, stakeholder engagement, training resources, mobilisation of funding, data management,
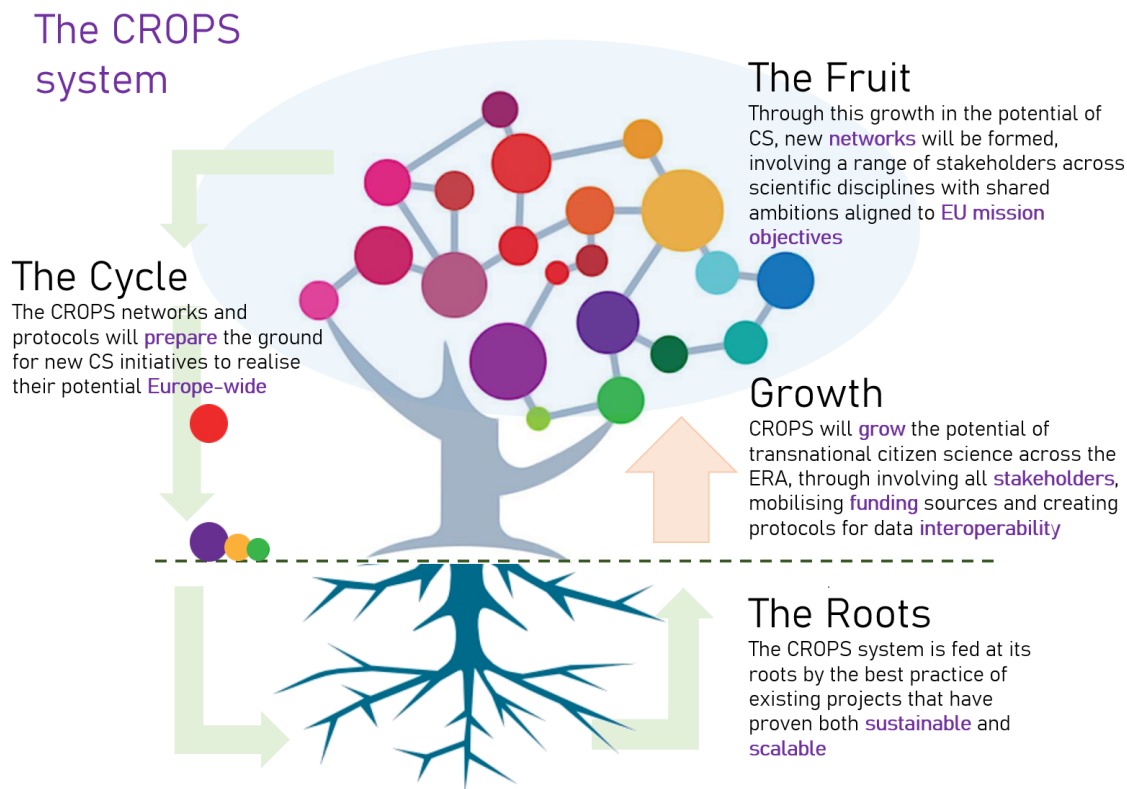
Figure 1. The CROPS concept and approach

and design will be developed as part of a user-centred process. The fruit of the CROPS concept, resulting from the screening and support actions and more specifically the user-centred, multi-stakeholder approach taken, is the creation of transnational CS communities and societal coalitions. Shared spaces will be created in conjunction with existing platforms such as EU-Citizen.Science to foster the creation of communities linked with each of the EU Missions, helping to foster alignment of actions and their objectives.

CROPS Methodology

The cornerstone of CROPS will be assessing scalability potential of citizen science projects and selecting those to focus on more in-depth accordingly. To do so, CROPS will be informed by an established framework developed by Ideas for Change and the JRC to understand and subsequently guide efforts in this way (Maccani et al. 2020), and also by subsequent work expanding on this method (Radicchi et al. 2023). In its nature, the upscaling phenomenon entails an initial citizen science project, initiative, action or intervention in a given context and its replication (in its entirety or of some of its parts) in another context where some or all parts of the original project are adopted. The framework therefore draws upon three relevant theories: i) adoption of innovations, ii) diffusion of innovations (Rogers et al. 2008), and iii) the concept of infra-

structure from the Participatory Design discipline. The framework has been tested empirically and includes nine enablers for scaling citizen science projects or interventions. These can be divided into three clusters: (1) intrinsic elements of a given citizen science initiative (i.e. elements about the initial intervention to be scaled); (2) elements supporting the scaling process; and (3) level of alignment with the target context. In summary, the framework outlines nine empirically and theoretically grounded constructs that, if in place, foster scalability of a given citizen science intervention.

Informed by this methodology, CROPS will evaluate projects in terms of their scaling potential based on: (i) Elements intrinsic to the original project – proof of value, ease of understanding and level of openness in terms of resources and governance; (ii) Elements, when appropriately addressed, enable and substantially support the upscaling process – development and dissemination of narratives and consistent communication, existing community and champions, and potential for knowledge sharing and transfer of resources; and (iii) Alignment of the original citizen science initiative with other potential target contexts across the ERA (specifically the EU missions) – legal alignment, alignment of matter of concern (considering all quadruple-helix stakeholders), and alignment of social values (compatibility with the ethical values of the target context).

Conclusions

The CROPS project has ambitious plans in identifying CS activities suitable to upscale to the European level, and in creating transnational spaces and societal coalitions to share knowledge and foster alignment towards the EU Mission goals. Due to the broad types of CS covered, and the large number of projects engaged by CROPS actions, there is a risk that project support and communication becomes disparate in nature. To prevent this, the support and guidance offered by CROPS will be designed not only to be top-down, but also peer-to-peer in nature. The communities and coalitions created will be designed to be places of shared learning, formed through community events, workshops and online shared spaces, allowing projects and their associated communities to learn from each other.

Acknowledgement

References

Fraisl D, Campbell J, See L, Wehn U, Wardlaw J, Gold M, Moorthy I, Arias R, Piera J, Oliver JL, Masó J, Penker M, Fritz S (2020) Mapping citizen science contributions to the UN sustainable development goals. Sustainability Science 15: 1735–1751. https://doi.org/10.1007/s11625-020-00833-7

Maccani G, Goossensen M, Righi V, Creus J, Balestrini, M (2020) Scaling up Citizen Science. Publications Office of the European Union, Luxembourg, 2020, ISBN 978-92-76-25158-3, doi:10.2760/354206, JRC122219.

Radicchi A, Leo G, Haklay M (2023) Mutual learning exercise on citizen science initiatives – Policy and practice. Fifth thematic report, Scaling up citizen science. European Commission, Directorate-General for Research and Innovation. https://data.europa.eu/doi/10.2777/527361

Rogers EM, Singhal A, Quinlan MM (2008) Diffusion of Innovations. In: An Integrated Approach to Communication Theory and Research. Routledge.

Sprinks J, Woods SM, Parkinson S, Wehn U, Joyce H, Ceccaroni L, Gharesifard M (2021) Coordinator Perceptions when Assessing the Impact of Citizen Science towards Sustainable Development Goals. Sustainability 13: 2377. https://doi.org/10.3390/su13042377

Wildschut D (2017) The need for citizen science in the transition to a sustainable peer-to-peer-society. Futures 91: 46–52. https://doi.org/10.1016/j.futures.2016.11.010