PROCEEDINGS OF SCIENCE

Why citizen science cannot answer the question of the democratisation of science

Michael Strähle[a,*] **and Christine Urban**[b,*]

[a] *Wissenschaftsladen Wien – Science Shop Vienna,*
Währinger Straße 59, 1090 Vienna, Austria
https://orcid.org/0000-0002-4011-2619

[b] *Wissenschaftsladen Wien – Science Shop Vienna,*
Währinger Straße 59, 1090 Vienna, Austria
https://orcid.org/0000-0003-1332-9959

E-mail: ms@wilawien.ac.at, cu@wilawien.ac.at

It is a frequent claim that citizen science democratises science. This paper argues that this claim is on shaky ground due to unfounded generalised assumptions about citizen science and unclear notions of democratisation. Therefore, it should be abandoned.

Austrian Citizen Science Conference 2022 – ACSC 2022
28 - 30 June, 2022
Dornbirn, Austria

[*] Authors listed alphabetically

PoS(ACSC2022)001

Some policy makers, scholars, and citizen science practitioners attribute multiple benefits to citizen science (CS). CS is expected to give people a better understanding of science (improve scientific literacy), make larger data collections possible thanks to the efforts of innumerable volunteers ("crowdsourcing"), interest more (young) people in science. And there is a wide-spread claim that CS democratises science (e.g. [4], [5], [6], [10]) Although authors frequently explain their understanding of CS, they do not explain how they use the term "democratisation", as if the term is self-explanatory. As we demonstrate below, how the term is used is far from being self-explanatory. In this paper the authors reflect on the background of this claim, its context and if it is realistic. The question if CS activities democratise science is a most sensitive one, as it is a political question, among other things, a question about distribution of power and resources, and if science in general or some aspects of it can be or even should be a democratic endeavour.

Before one can have meaningful debates if CS has a potential for democratising science or any other benefit, it has to be clear what is meant by CS. Despite of the many claims how CS can benefit society in general and science in particular an extensive review of literature, policy papers and websites on CS has shown that there is no consensus on the meaning of the term "CS" ([12]). In research literature, most sources name Alan Irwin ([9]) and Rick Bonney et al. ([1]) as the first who coined the term "CS", but gave it a different meaning. While Irwin uses the term "CS" mainly in the context of scientists' societal obligations, Bonney et al. use it in the context of citizens volunteering in scientific endeavours like bird counting. So we see huge differences in how CS is conceptualized since the very beginning. Later, the conceptualisation of the term is further broadened by different players, it is extended to school projects, public participation in science policy-making, DIY activities aiming at innovation or development, action research, Science Shop activities and a wide range of science communication ([7]). In their previous work the authors have come to the conclusion that a categorisation or typology would not allow to comprehensibly evaluate the benefits and caveats of CS, because the use of the term has become too broad ([11]). So they developed the Activities Dimension Grid of Citizen Science ([11], [12]) which roughly distinguishes between four areas, which are (1) CS activities aiming at contributions to research policy making, (2) participating in research projects, (3) participating in activities on innovation and development and (4) CS carried out in the context of school education. It makes no sense to ask if CS *per se* democratises science; but one can ask if certain CS activities could have this claimed potential and which characteristics would be necessary.

Similarly blurry as the term "CS" is the concept of "democratisation" in the context of CS. One could investigate which unintended effects it could have on society if a not sufficiently reflected and not consistent meaning of the term "democratisation" is propagated by CS activists. "Democratisation" is a term with clear political connotations, and it is doubtful that it is useful in contexts of public engagement in science (which is a flawed concept too) ([13], [14]). Strasser/Haklay point to how the Merriam-Webster dictionary explains "democratize" apart from the conventional political meaning, namely as "relating to, appealing to, or available to the broad masses of the people" ([3]), and suggest using the term in this sense. This meaning is not found in the Cambridge Dictionary ([2]). Usually, "democratisation" is understood as organisations or political systems becoming democratic in their decision-making. Does involving citizens somehow automatically lead to some form of democratisation of science,

understood as participation in decision-making in science? On what concepts of democracy is this idea based? Maybe the misunderstanding that CS democratises science lies in quantities, maybe there is a belief that the more people are participating in an activity the more democratic it is. This logic forgets that a big number is still a small selection of society. Also, a broad spectrum of participants does not make them "representative", neither in a statistical sense nor in the sense of being "typical" for a group. When the claim is made that a group is representative, often only a few characteristics are considered, mostly socio-economic classifications like gender, age, education, income, etc. They are relatively easy to evaluate, but only a small fraction of the ways in which people differ from each other. In other words, to give an example, there exists a very broad spectrum of female, 40 years old furniture dealers with different interests, habits, opinions, likes and dislikes, and none of them can be taken as a proxy for female, 40 years old furniture dealers. When critical citizens investigate study results that they suspect to be flawed, if they mistrust the outcomes provided by partial sources, if CS organisers try to be more inclusive or give special attention to vulnerable groups, all these are good signs for a functioning democracy or signs of admirable courage in non-democratic societies, but the authors would not call any of them specifically "democratisation of science". Furthermore, the degree and quality of participation does not qualify as an indicator of democratisation either. There is a paradox that the more intensely laypersons participate, and the more hours they spend on participating, the smaller the group of people becomes that can actually participate. Participation depends on time resources (e. g., [13]), which also depend on financial resources. In other words, those who have to worry how to make ends meet are most probably much less likely to volunteer as citizen scientist or to contribute more than tiny tasks So, if volunteers tend to be individuals who are relatively well-off, because their situation allows them to work without payment, giving them influence in publicly funded science projects would be the very opposite of democratisation, it would give more influence to the advantaged. It is well recognized in the CS community that volunteers are probably mostly members of the upper or upper middle class (e.g., [8]), nevertheless seemingly this does not shake the conviction of many that CS democratises science. Last but not least, for many CS activities we do not know who actually participates ([11]). This makes it difficult to assess how democratic they are.

In their Activities & Dimensions Grid of Citizen Science ([11], [12]), the authors distinguish CS aiming at policy making as an area in which the question of democratisation plays a bigger role than in other areas such as participating in research, development and innovation, and CS in schools. Are participatory methods used to engage citizens in deliberation on research policy agendas appropriate for making science more democratic? Democracy needs relatively rigid structures to mitigate inequality and cumulation of power. To make research policy deliberations more democratic, all interested would need to have equal chances to participate or to vote somebody to represent them. Drawing participants by lot can be a solution (sortition). Because time and financial budgets are unevenly distributed among people, inclusiveness would require reimbursements. The influence of the organisation, those of facilitators, information materials or documentation, hierarchies among participants and the framing of issues would have to be minimised. For most of the challenges no satisfactory solutions have been found yet, and the question remains, if any practicable solutions are possible.

For all these reasons, for the time being, the authors are pleading for dropping the term "democratisation of science" in the context of CS.

Acknowledgments

Research for this paper has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 872522 (CS-Track).

References

[1] R. Bonney et al., *Public participation in scientific research: Defining the field and assessing its potential for informal science education. A CAISE inquiry report* (2009). https://eric.ed.gov/?id=ED519688

[2] *Democratize*, *Cambridge Dictionary*, https://dictionary.cambridge.org/de/worterbuch/englisch/democratize

[3] *Democratize*, *Merriam-Webster*, https://www.merriam-webster.com/dictionary/democratic

[4] ECSA, *Vision and Mission*, https://ecsa.citizen-science.net/about-us/

[5] European Commission, *Citizen science and citizen engagement: achievements in Horizon 2020 and recommendations on the way forward*, https://data.europa.eu/doi/10.2777/05286 (2020)

[6] European Commission, *Competence Centre on Foresight: S&T democracy*, https://knowledge4policy.ec.europa.eu/foresight/topic/accelerating-technological-change-hyperconnectivity/si-democracy_en

[7] European Commission, *Horizon 2020: Work Programme 2018–2020: 16. Science with and for Society*. https://ec.europa.eu/research/participants/data/ref/h2020/wp/2018-2020/main/h2020-wp1820-swfs_en.pdf (2018)

[8] M. Haklay, *Citizen Science and Volunteered Geographic Information: Overview and Typology of Participation*, in *Crowdsourcing Geographic Knowledge*, ed. D. Sui et al., Springer, Dordrecht (2013). https://doi.org/10.1007/978-94-007-4587-2_7

[9] A. Irwin, *Citizen Science: A Study of People, Expertise and Sustainable Development*. Routledge (1995)

[10] D. B. Resnik et al., *A framework for addressing ethical issues in citizen science*. *Environmental Science & Policy* **54** (2015). https://doi.org/10.1016/j.envsci.2015.05.008

[11] M. Strähle and C. Urban, *Framework Conceptual Model* (2021). https://doi.org/10.5281/zenodo.5589618

[12] M. Strähle and C. Urban, *The Activities & Dimensions Grid of Citizen Science*, PoS(CitSci2022)087. https://pos.sissa.it/418/087/

[13] B. Strasser and M. Haklay, *Citizen Science: Expertise, Democracy, and Public Participation*. Swiss Science Council. https://www.swir.ch/images/stories/pdf/de/Policy_Analysis_SSC_1_2018_Citizen_Science_WEB.pdf (2018)

[14] B. Wynne, *Public Participation in Science and Technology: Performing and Obscuring a Political-Conceptual Category Mistake*, *East Asian Science, Technology and Society* **1** (2007), https://doi.org/10.1007/s12280-007-9004-7