Item number	Title/reference *(academic style) name initials (year) title, publisher, volume, pages*	Name of reviewer
4	Sauermann, H., Vohland, K., Antoniou, V., Balázs, B., Göbel, C., Karatzas, K., Mooney, P., Perelló, J., Ponti, M., Samson, R. and Winter, S., 2020. Citizen science and sustainability transitions. *Research Policy*, *49*(5), p.103978.	Cuiablue OÜ

Review of findings / main outcome

This paper is about the involvement of the public in scientific research (Citizen science) in relation with sustainability problems both from a natural and socio-economic point of view. According to many opinions, CS can serve to increase scientific knowledge production the as called "productivity view" although many others state that may bridge a perceived gap between science and the broader society ("democratization view"). Moreover, CS aims to support complex sustainability transitions in areas such as renewable energy, public health, or environmental conservation. Three pathways can be identified through which such impacts can occur: (1) Problem identification and agenda setting; (2) Resource mobilization; and (3) Facilitating socio-technical co-evolution.

Citizen Science has raised great hopes among scientists, civil society groups, and policy makers. For example, the European Citizen Science Association's (2015) strategy sets an explicit goal to contribute to sustainability transformation, the European Commission (2017) recommends to mobilize citizens for research in order to enhance the impact of EU research and innovation programs

The benefits of citizens' involvement can be measured in terms of hours worked, the volume of data processed, or the number of publications written based on CS data **(Burgess et al., 2017; Follett and Strezov, 2015; Sauermann and Franzoni, 2015**). In this view, Citizen Science does not question the supremacy of professional expertise and does not challenge the norms and performance standards of professional science; science remains a distinct institutional sphere. Central aspects of this productivity view are reflected in many of the case reports written by professional scientists as well as analyses by economists and management scholars (e**.g., Bonney et al., 2009; Christian et al., 2012; Khatib et al., 2011; Sauermann and Franzoni, 2015**). Second, a "democratization view" sees Citizen Science as the contextualization of research in society and challenges the separation of science from society.

The article suggests that Citizen Science can play an important role in identifying and structuring problems as well as in setting research agendas based on diverse stakeholder needs. For example, scientists from the University College of London spent considerable time with the local community to discuss what problems it faced and to brainstorm how the available UCL technical infrastructure for data collection and monitoring might help citizens to study and address their problems. To achieve these results is it important to consider that Resource mobilization Sustainability transitions require significant human and financial resources for scientific research and technological development but also for the socio-political processes that are an integral part of transitions.

The importance of participation Our discussion thus far was based on the premise that projects involve citizens from diverse parts of society (e.g., with respect to socioeconomic status, race, and gender) who make contributions that are significant in volume and sustained over time. It is crucial to have a diversified and active participation because Limited participation can also reflect low interest and motivation, e.g., because participants see no personal relation to a scientific problem (Bela et al., 2016).

The paper ends by briefly noting implications for important actors such as citizens, professional scientists, administrators, as well as policy makers and funding agencies.22 First, citizens and professional scientists should reflect on their respective goals in CS projects and consider the benefits of integrating the "productivity" and "democratization" views. By discussing their goals and corresponding personal roles with each other, scientists and citizens may identify opportunities for their projects to have impacts beyond those originally intended. Implication should also reflect the scholarly community. At the same time, citizens need to accept additional responsibilities and may have to invest more time and effort than in typical contributory CS projects.

Quotes / very useful statements

1*) While some see CS primarily as a means to increase the productivity of traditional scientific research, others see it as an opportunity to democratize science by opening traditional institutions (Irwin, 1995; Nielsen, 2011)*

2) Diversity among participants is also likely to increase the diversity in knowledge resources and thus creativity in generating problem solutions, as well as the alignment between technical and social aspects (Cigarini et al., 2018; Horwitz and Horwitz, 2007)

Key references *(academic style) name initials (year) title, publisher, volume, pages*

1) Irwin, A., 1995. Citizen science: a study of people. expertise and sustainable development. Routledge, London and New York.
Nielsen, M., 2011. Reinventing Discovery: The New Era of Networked Science. Princeton University Press.

2) Cigarini, A., Vicens, J., Duch, J., Sánchez, A., et al., 2018. Quantitative account of social interactions in a mental health care ecosystem: cooperation, trust and collective action. Sci. Rep. 8 (1), 3794.
Horwitz, S.K., Horwitz, I.B., 2007. The effects of team diversity on team outcomes: a meta-analytic review of team demography. J. Manage 33 (6), 987–1015.