



Characteristics of Citizen Science

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Needs for characteristics

- Requests from different stakeholders: policy, scientists, partners on the EU-Citizen.Science project, Open Science Policy Platform (OSPP)
- Need to accommodate a wide range of definitions and emerging criteria that are created for a specific platform, call, or regulation
- Aim: provide a set of characteristics that can be part of a citizen science project, and let people choose which set is fit for their purpose



The Characteristics



It's challenging to have one common definition



There is need for common ground



There should be a pluralistic understanding





Methodology

Factors

Identified 10 factors that influence people's view about an activity being CS

Vignettes

Developed 50 vignettes to provide these factors with more context

Diversity

Reached out to people in research, science communication, policy, and public

Grading

Asked people to grade from 0% (not CS) to 100% (is CS)



Factors of CS

- Development of 10 factors and 60 sub-factors
- Potential ambiguity about the classification of a project
 - 1 Activeness 2 Compensation 3 Purpose of activity –
 - 4 Purpose of Knowledge production 5 Professionalism –
 - 6 Training 7 Data sharing 8 Leadership –
 - 9 Scientific field 10 Involvement in research process

	Table 1 - li	st of factors for the vignettes, with those with higher controversy potential highlighted in yellow
Factor	Туре	Categories and explanation
1 Activeness	Categorical	1.1 Active - requires full cognitive engagement during participation 1.2 Semi-active - limited cognitive engagement (responding to short alerts in a micro-task) 1.3 Passive - no engagement beyond setup
2 Compensation	Categorical	2.1 Volunteer - unpaid participation 2.2 Expenses - only expenses are paid 2.3 Small incentives - minimal payment or partial payment which is indirect to the activity (e.g. for coordinating, providing bikes for community-based monitoring that can be used for other purposes) 2.4 Payment for the activity 2.5 Crowdworking - small payment for tasks 2.6 Subscription fee - when participants pay to participate in a project 2.7 Student - compulsory part of studies
3 Purpose	Categorical	3.1 Scientific/research - scientific or research focused project 3.2 Policy outcome - e.g. environmental management monitoring, action, or other policy actions 3.3 Public engagement - the main purpose is engagement (bioblitz) 3.4 Education- focus on education outcomes 3.5 Game - locus on gaming environment 3.6 Reuse of social media - reuse of images or other information that was submitted in social media
4 Purpose of Knowledge production	Categorical	4.1 Scientific discovery - producing a scientific paper 4.2 Scientific management - producing data for policy 4.3 Personal discovery - personal level learning 4.4 Local Knowledge sharing - sharing local lay knowledge within the community (not necessarily with researchers)

Vignettes table (case descriptions)

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Vignette example - Erik

"Erik is a teacher in Uppsala, Sweden. For the past 15 years, he is running a weather station that is part of the Weather Underground's Personal Weather Station Network with over 250,000 participants who share their observation data, just like Erik. In return for the data sharing, the company is providing tech support, data management services and customised, free-of-charge access to forecasts. The company uses the data to produce a global weather forecast as a commercial service."

Factors considered: 1.1, 2.1, 3.2, **4.6**, 5.1, 6.1, **7.4**, **8.4**, 9.2, 10.5

Potentially controversial:

- **4.6:** Purpose of Knowledge production Commercial knowledge for commercial applications
- **7.4:** Data sharing Commercially aggregated data that is collected by commercial actors
- **8.4:** Leadership led by a commercial company

Vignette or case study research

- Factorial study is a survey method and technique that uses vignettes to explore individuals' beliefs and judgments.
- Creation of 50 examples of research activities (vignettes) with some involvement of the public in one form or another
- Based on the literature on citizen science and public engagement in science, some created specifically for this study

Brauer PM, Hanning RM, Arocha JF, et al. (2009) Creating case scenarios or vignettes using factorial study design methods. Journal of Advanced Nursing 65 (9): pp. 1937-1945.

Brenner M. (2013) Development of a factorial survey to explore restricting a child's movement for a clinical procedure. Nurse researcher 21 (2).

Taylor BJ. (2006) Factorial surveys: Using vignettes to study professional judgement. British Journal of Social Work 36 (7): pp. 1187-1207.

Structure of survey

50 vignettes – 40 with different factors, 5 clear citizen science, 5 clear not-citizen science (as par literature)

Survey design as crowdsourcing – accepting 1 or more answers, randomised order

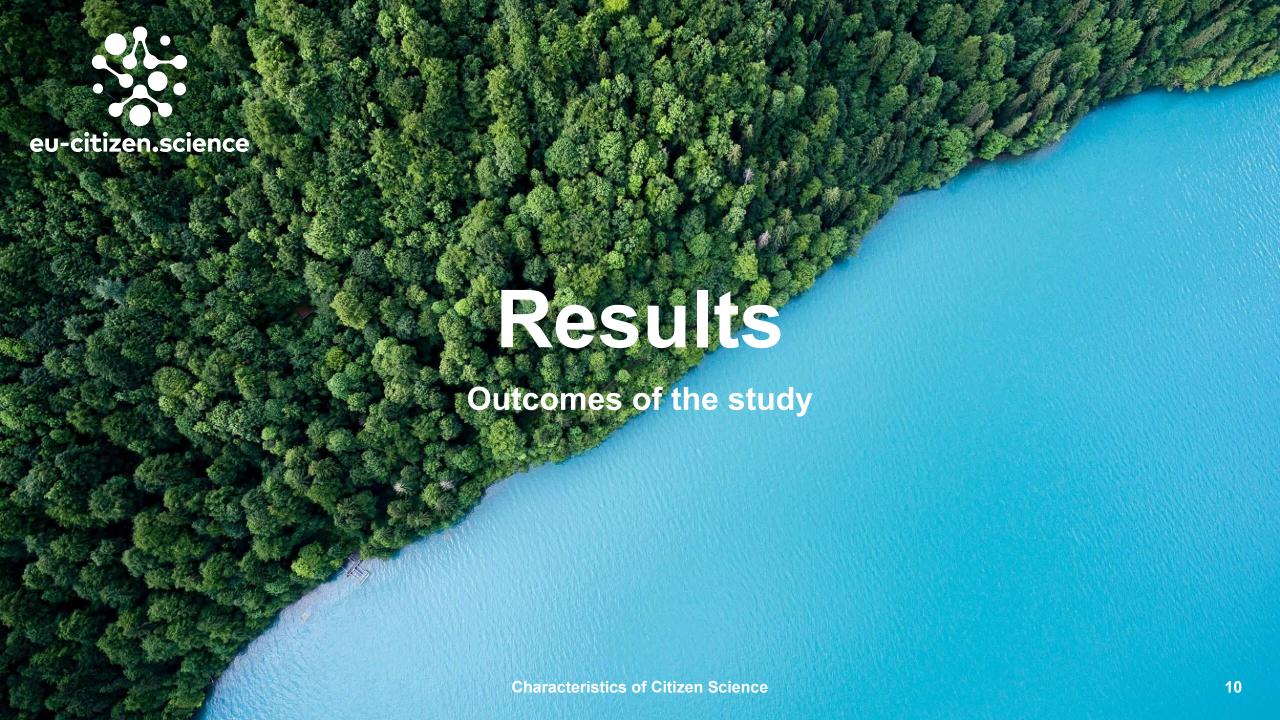
Survey run – mid December 2019



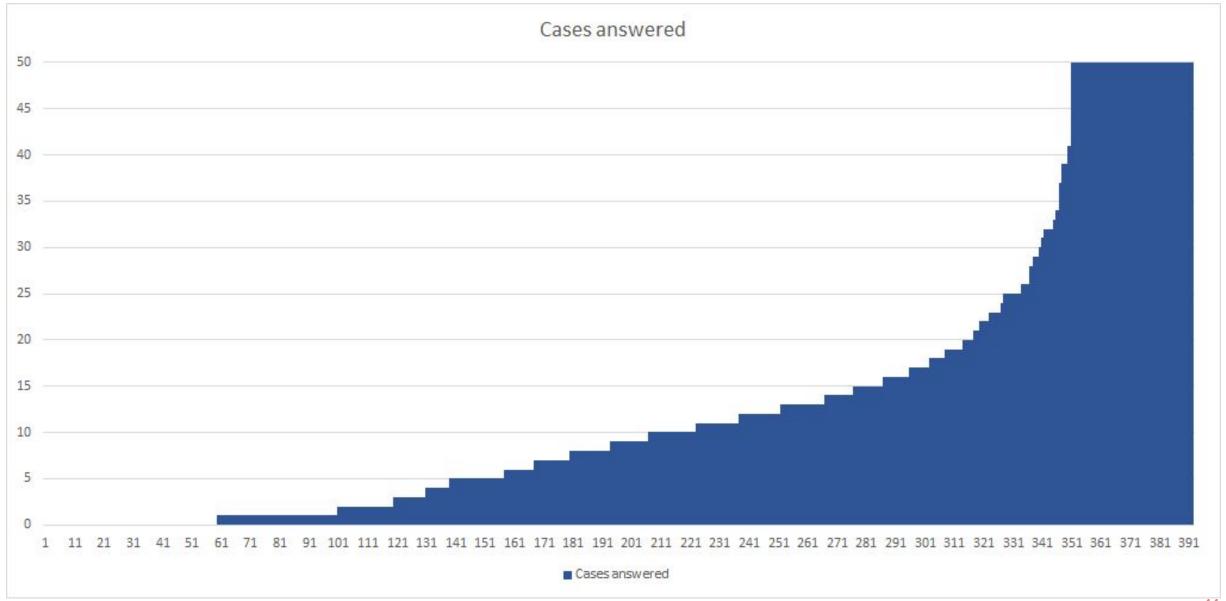
Would you call this a citizen science activity?

Sandra from Birmingham, England, recently had her first child. On a forum that is dedicated to issues of using detergents with cloth nappies, she found a group of other young parents on Facebook, and together they are carrying out a double-blind test of different detergents and their impact on nappies. The results of the study are shared widely through a medical charity and can influence the National Health Service recommendations for using these nappies.

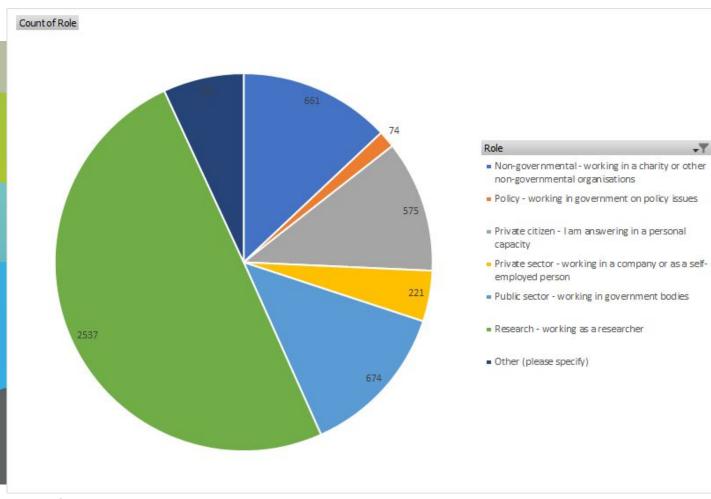
impact on nappies. Th influence the National				rity and can				
* How confident are you	ı about judging this	s case?						
It is easy to decide	It is somewhat complex to decide	I find it difficult to decide						
* To what degree would you identify this as citizen science?								
0%		50%		100%				
How would you call this activity? (optional)								
Why did you give that	rating? (optional))						



Responses (n= 392)



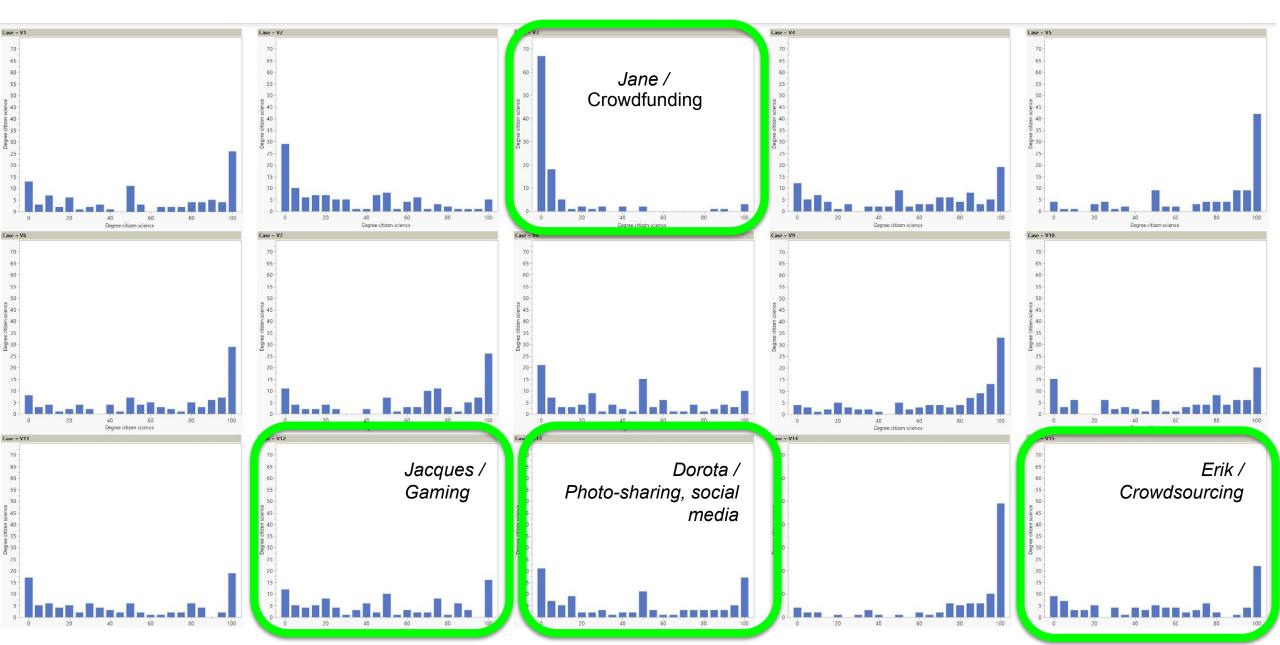
Responses



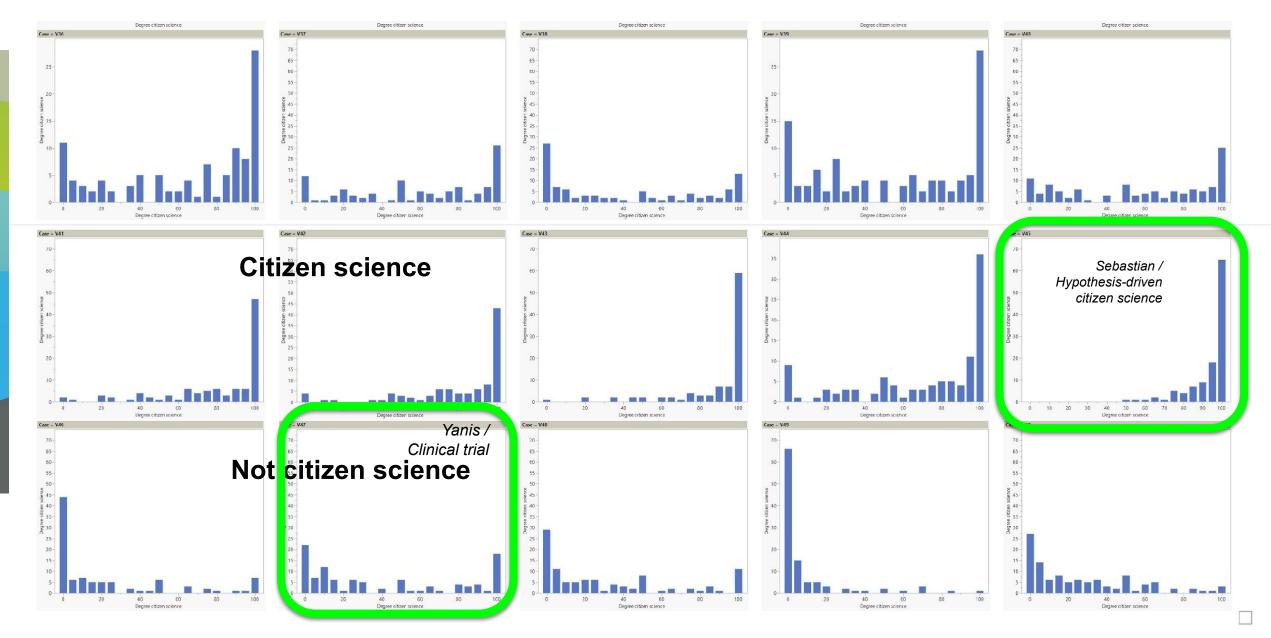


Zambia	1
Nigeria	4
Latvia	5
Brazil	7
Greece	10
Lithuania	13
Canada	14
Denmark	35
Malaysia	50
Colombia	50
South Africa	50
Romania	50
Turkey	50
Switzerland	54
Netherlands	95
Norway	113
Australia	115
Spain	118
France	131
Italy	142
Sweden	153
Belgium	173
Portugal	177
Austria	203
Germany	638
United Kingdom of Great Britain and Northern Ireland	837
United States of America	879
Grand Total	4167

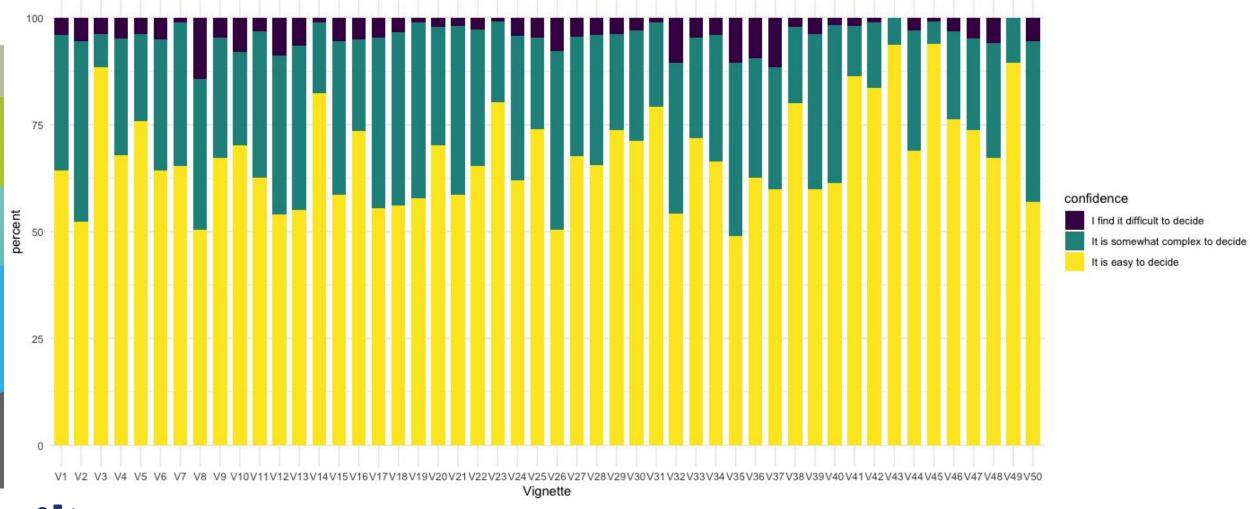
Responses – Ranking cases 1-15



Responses – Ranking cases 36-50



Responses – Confidence and cases







Citizen Not Citizen Science Science





The Characteristics document

Purpose: the aim is not to describe everything that is citizen science but identifying the areas that require attention and guidance.

These are broken into: core concepts, disciplinary aspects, leadership and participation, financial aspects, and data and knowledge.



Version 1 April 2020

ECSA's characteristics of citizen science

Introductio

Citizen science is a common name for a wide range of activities and practices. It is possible to understand it by considering the characteristics of those activities and practices, which are described in this document. These are found in different scientific disciplines – from the natural sciences to the social sciences and the humanities – and within each discipline, the interpretation of citizen science can be slightly different. Yet despite these differences, citizen science is an emerging area of research and practice, with evolving standards on which different stakeholders are developing methodologies, theories and techniques. It is, therefore, useful to establish some level of shared understanding, across disciplines and practices, as to what to expect from an activity or a project that is set out to be a citizen science one.

There is little doubt that a project with an open call to a wide range of volunteers to take part in either data collection or data analysis of a clearly defined research hypothesis will be recognised as citizen science. However, this is only one type within a large set of activities, practices and forms of participation, resulting in diverging views about what is — and isn't — citizen science. Because of these differences in disciplinary and cultural contexts, attempting to define a universal set of rules for exclusion or inclusion is difficult, and might even limit the advancement of the field.

Instead, this document attempts to represent a wide range of opinions in an inclusive way, to allow for different types of projects and programmes, where context-specific criteria can be set. The characteristics outlined below are based on views expressed by researchers, practitioners, public officials and the wider public. Our aim is to identify the characteristics that should be considered when setting such criteria (e.g. a funding scheme), and we call upon readers to determine which subset of these characteristics is relevant to their own specific context and aims.

These characteristics build on (and refer to) the ECSA 10 principles of citizen science¹ ("the 10 principles") as a summary of best practice – and projects are expected to engage meaningfully with them. Where it is especially pertinent, we refer to them in the characteristics below.

The rest of the document covers the characteristics of citizen science under five sections: (1) core concepts; (2) disciplinary aspects; (3) leadership and participation; (4) financial aspects; and (5) data and knowledge. Further explanation and background are provided in the "ECSA"s characteristics of citizen science: explanation notes' document. Note that we use the terms 'scientific research' and 'research' interchangeably – and we explain these terms from the perspective of citizen science practices.

1 See ECSA (2015) 'Ten principles of citizen science', DOI:10.14324/111.9781787352339

1

Haklay, Muki, Motion, Alice, Balázs, Bálint, Kieslinger, Barbara, Greshake Tzovaras, Bastian, Nold, Christian, ... Wehn, Uta. (2020, April 1). ECSA's Characteristics of Citizen Science. Zenodo. http://doi.org/10.5281/zenodo.3758668

Core concepts

- Here we cover terms and concepts that can influence if a project is a citizen science one.
 - Science & Research; What counts as research;
 - intention and framing; purpose and aim
 - hypothesis-driven, monitoring, inductive, exploratory, and database creation;
 - roles and responsibilities;
 - subject or participant;
 - Ethics

Example: reference to SSHs, Medicine and Health research; and Principles of Citizen Science

Disciplinary aspects

Different areas of science will have specific issues with participatory research, we pay attention to these areas.

- Disciplinary views
- scientific/technology
- arts and humanities
- social sciences
- medical sciences and human health

Example: disciplinary methods and standards; context is important, whether there is a medical or commercial motivation

Leadership and participation

Who leads a project and how that influence if the project can be called citizen science?

- Individual, community-led or research-led;
- organisations (RPOs, NGOs, public);
- commercial;
- degree of engagements;
- small vs large scale;
- professionalism and voluntarism;
- science engagement and education;
- links to decision making

Example: a CS project can be conducted by an individual person, small groups or a large number of participants

Financial aspects

Money and its role in the project can lead to different views on what is happening.

- Financial support for scientific research;
- payment to take part in a project;
- incentives to participate

Example: pure financial support via crowdfunding is not considered Citizen Science is not considered Citizen and culture incentive depending on the project and culture incentive advantage on the project and culture incentive depending on the project and culture incentive advantage.

Data and Knowledge

Data and knowledge are at the core of scientific research, and there are multiple notions of them.

- Data and knowledge generation;
- data ownership and use;
- data quality;
- local and lay knowledge sharing and application;
- opportunistic or systematic data collection;
- digital data-collection tools;
- sharing personal and medical data

Example: Citizen Science is considered part

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of Open Science and data should be shared.

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BUT: there might be good reasons (e.g.

BUT: there might be good reasons for not sharing privacy issues, sensitive data) for not sharing the data openly.



Field of application

- Policy advice (e.g. EC, OSPP Open Science Policy Platform)
- EU-Citizen.Science Plattform: part of the selection criteria for projects, resources, trainings
- national Citizen Science funding programmes (e.g. UK)
- Vignettes are included in training units
- Further analysis
- Scientific publications
 - Haklay, Muki, Motion, Alice, Balázs, Bálint, Kieslinger, Barbara, Greshake Tzovaras, Bastian, Nold, Christian, ... Wehn, Uta. (2020, April 1). ECSA's Characteristics of Citizen Science. Zenodo. http://doi.org/10.5281/zenodo.3758668
 - Haklay, M., Fraisl, D., Greshake Tzovaras, B., Hecker, S., Gold, M., Hager, G., ... Vohland, K. (2020, December 31). Contours of citizen science: a vignette study. https://doi.org/10.31235/osf.io/6u2ky





Thank You!

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