CITIZEN SCIENCE CENTER ZURICH

A joint initiative by Universität Zürich | ETH zürich

Citizen Science Center Zurich

Criteria for the selection of projects

This document outlines a set of agreed[1] criteria for the transparent selection of Citizen Science (CS) projects wishing to be supported by the Center.

The criteria allow a transparent selection of proposals and guarantee quality and consistency for the projects featured in the platform.

Content:

Agreed Criteria

1. The project is designed around a well-defined scientific question (in any field of natural sciences, social sciences, humanities and medicine) and the aim of the project is phrased as testable hypothesis.
2. The project definition, objectives and outcomes are open and can be communicated in an accessible and comprehensible manner.
3. The presence of scientific goals is a must, i.e. if the project cannot have only educational and social goals.
4. The objectives of the project are impossible - or very hard - to achieve without the contribution of the citizens.
5. The project is open for citizens to participate in multiple stages of the design and implementation of the scientific research process. Projects with high level of potential involvement have priority.
6. The project has wide general appeal for all stakeholders and is not restricted to a small interest group.
7. The project's topic and goals cover issues of proven importance and social interest that can facilitate the recruitment of participants.
8. The project maximizes the values offered to participants by touching on multiple value propositions and benefits.

[1] These criteria have been developed in collaboration with an interested group of researchers at UZH and ETH during a set of discussions (Brown Bag Lunches) held at UZH in the period Apr-Dec 2018.

9. The project's goals are possible to achieve with a clear and easy protocol.
10. The protocol guarantees that the data collected by citizen be of sufficient quality to answer the scientific question (generate a scientific publication) and/or be used to derive indicators for policies.
11. The assignment of tasks and roles in the project (from the project leader to the citizen scientists) is clear and transparent.
12. The technology necessary to perform the tasks is easily available or provided by the project organizers.
13. The project's goals (quantity of necessary data, coverage, required number of participants) are reasonable and achievable within a defined timeframe.
14. The project demonstrates the availability of sufficient resources to achieve the desired goals.
15. The project demonstrates a long-term commitment to fully engage with volunteers.
16. The project management has considered ethical aspects (e.g. diversity, inclusion, gender equality, reflection on in- or exclusion of specific groups) from the early stage of the process design.
17. The projects' data and metadata are made publicly available, provided there are no legal or ethical arguments against doing so.
18. The project has a data management plan which conforms to the European General Data Protection Regulation.
19. The project management has evaluated and reduced all risks related to participation.
20. The results of the project are published in an open-access format, provided there are no legal or ethical arguments against doing so.

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Dimensions of CS projects

1) PROJECT DEFINITION: RESEARCH QUESTION AND GOALS

Research question

As all scientific research projects, a Citizen Science project should be designed around a clear scientific question and hypothesis that can be answered and tested with the project.

The answer to the question may generate new knowledge and/or improved understanding of certain processes, and/or may help to develop new methods or research.

Goals

Citizen Science combines the contribution to scientific research with the benefit of engaging people with science and society. Consequently, the goals of Citizen Science projects typically fall under three main categories: scientific, educational and social goals.

Scientific goals include (but are not limited to):

- Generating new dataset (e.g. taking photos, collecting samples) or combining existing datasets

- Analyzing a dataset (e.g. analyzing images, digitizing text)
- Conducting research on aspects of Citizen Science as a methodology, including ethics, inclusion, etc.

Educational goals include (but are not limited to):

- Helping participants learn about a certain topic (e.g. galaxies)
- Helping participants learn new skills (use of technology)
- Help participants understand the scientific process (e.g. use data to draw conclusions)

Social goals include (but are not limited to):

- Encourage participants to take personal action toward some common goal (e.g. contribute to environmental surveillance and monitoring)
- Use citizen science data to derive indicators on which government or agencies can act

In most CS projects the different components are present at varying degrees.

For projects where the goals are mainly social, for examples when the project contributes to environmental causes (surveillance and monitoring), there must be a well-understood cause-and-effect pathway from what is being recorded to the impact on the cause's policy.

Agreed criteria based on project definition
○ The project is designed around a well-defined scientific question (in any field of natural sciences, social sciences, humanities and medicine) and the aim of the project is phrased as testable hypothesis. ○ The project definition, objectives and outcomes are open and can be communicated in an accessible and comprehensible manner. ○ The presence of scientific goals is a must, i.e. if the project cannot have only educational and social goals. ○ The objectives of the project are impossible – or very hard - to achieve without the contribution of the citizens.

2) LEVEL OF INVOLVEMENT OF THE CITIZENS

For a typical scientific project scientists go through different steps for the design and implementation of the research process:

- Search for a topic and formulation of research questions
- Method design
- Data collection
- Data analysis and interpretation
- Publication and communication of results

In a CS project citizen can be involved in one or more of the above stages, and according to this involvement projects are classified in three groups[(1)]:

1. CONTRIBUTORY - designed by scientists and for which citizens primarily contribute data;
2. COLLABORATIVE - designed by scientists and for which citizens contribute data but also help to refine project design, analyze data, and/or disseminate findings;
3. CO-CREATED - designed by scientists and citizens working together and for which at least some of the public participants are actively involved in most or all aspects of the research process.

Projects belonging to groups 1 to 3 increasingly optimize the goals and outcomes in terms of both science and education [(1)].

The actual level of participation depends on the willingness of the scientists to open their research process, and on the interest of each citizen. Also when encouraged to participate at all phases of the project's design and implementation, citizens may choose to join only some of them.

Agreed criteria based on level of involvement

- The project is open for citizens to participate in multiple stages of the design and implementation of the scientific research process
- **Priorities:** Projects with high level of potential involvement (group 3) have priority

3) VALUE

In a CS project there should be an added value (benefits) for all stakeholders, in particular for citizen scientists and professional scientists. Other stakeholders include, depending on the project, formal and informal organizations, and policy makers. In a successful project, benefits are directly linked to the original motivation for participation.

Benefits include:

For Citizens [(2)]

- personal development and opportunity to gain knowledge on a topic of interest and new skills, such as analyzing data and engaging with digital technology (education)
- personal satisfaction from contributing to the wider public good (altruism)
- opportunity to establish connections with similarly minded people (social networking)
- personal enjoyment from participating in enriching activities (fun)

For scientists

- resource efficiency of research activities (larger datasets gathered across a wider geographical area and over a longer period of time at lower cost)
- opportunity to widen dissemination and impact of their work

Note: ***Financial Incentives***
Providing small financial incentives is an option for some project. However, it requires the use of a dedicated platform (such as Amazon Mechanical Turk or CrowdFlower) or the development of an appropriate platform. This kind of support is not in the current plans of the Center.

Proposed criteria based on value
○ The project has wide general appeal for all stakeholders and is not restricted to a small interest group. ○ The project's topic and goals cover issues of proven importance and social interest that can facilitate the recruitment of participants. ○ The project maximizes the values offered to participants by touching on multiple value propositions and benefits.

4) PROTOCOL

Certain research projects may require particular processes and specific ways to collect or analyse data. However, as the complexity of the protocol increases then the number of participants is likely to decrease. A known killer for citizens' engagement is finding the task difficult and/or boring [(3)].

Typical tasks include:

- Record observations (often with information about the place and time) in the form of images, video or sound recordings.
- Measure something of interest which provides quantitative data, or presence/ absence of something.
- Collect physical samples (e.g. water or biological samples).
- Measure with sensors (e.g. radiation, temperature or noise) directly from smartphones or via plug-in sensors.
- Answer surveys or collect survey answers.
- Classify data already collected (i.e. tasks that require human intelligence for problem solving or pattern recognition).

The scope of the CS project can be both extensive large-scale and intensive small-scale studies, where the scale can be both geographical (need of data across a large/small surface) and temporal (collection over an extended/short time).

All cases present different challenges in terms of recruiting and retaining participants, related to difficulties of the tasks, decreasing interest, lack of time due to other priorities, lack of incentives, lack of guidance and feedback.

Proposed criteria based on protocol

- The project's goals are possible to achieve with a clear and easy protocol.
- The protocol guarantees that the data collected by citizen be of sufficient quality to answer the scientific question (generate a scientific publication) or be used to derive indicators for policies.
- The assignment of tasks and roles in the project (from the project leader to the citizen scientists) is clear and transparent.
- The technology necessary to perform the tasks is easily available or provided by the project organizers.
- The project's goals (quantity of necessary data, coverage, required number of participants) are reasonable and achievable within a defined timeframe.

5) RESOURCES

Resources, in terms of time and money, are needed at all stages of a CS project, including set up and design, test of protocols, set up of databases and websites, training of participants, running of the project, analysis, interpretation and communication of results. Sufficient resources must be available to ensure that participants are supported for the entirety of the project [4].

Also, continuous commitment and enthusiasm of the managing team is vital to the success of the project - there are many examples of CS projects that have been launched with great excitement but have rapidly ceased to be active.

Proposed criteria based on resources

- The project demonstrates the availability of sufficient resources to achieve the desired goals.
- The project demonstrates a long-term commitment to fully engage with volunteers.

6) ETHICS

The Citizen Science Center Zurich adheres to the principles of open science (open access to data and publications) and follows transparent ethical principles in compliance with ethical standards.

Proposed criteria based on ethics

- The project management has considered ethical aspects (e.g. diversity, inclusion, gender equality, reflection on in- or exclusion of specific groups) from the early stage of the process design.

- The projects' data and metadata are made publicly available, provided there are no legal or ethical arguments against doing so.
- The project has a data management plan which conforms to the European General Data Protection Regulation.
- The project management has evaluated and reduced all risks related to participation
- The results of the project are published in an open-access format, provided there are no legal or ethical arguments against doing so.

Ref

(1) Bonney, R., Cooper, C. B., Dickinson, J., Kelling, S., Phillips, T., Rosenberg, K. V., et al. (2009). Citizen Science: A developing tool for expanding science knowledge and scientific literacy. BioScience, 59(11), 977e984

(2) Aristeidou M.*, Scanlon E., Sharples M., "Profiles of engagement in online communities of citizen science participation" Computers in Human Behavior 74 (2017) 246e256

(3) Jennett C., Kloetzer L., Schneider D., Iacovides I., Cox A.L., Gold M., Fuchs B., Eveleigh A., Mathieu K., Ajani Z. and Talsi Y. "Motivations, learning and creativity in online citizen science", Journal of Science Communication 15(03) (2016) A05

(4) Pocock, M.J.O., Chapman, D.S., Sheppard, L.J. & Roy, H.E "A Strategic Framework to Support the Implementation of Citizen Science for Environmental Monitoring". Final report to SEPA (2014). Centre for Ecology & Hydrology, Wallingford, Oxfordshire.