Criteria for listing citizen science projects on citizen science online platforms

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Preamble

The main purpose of the following criteria is to provide *coordinators of citizen science platforms* with a checklist to help decide which projects to include on their platforms. They are deliberately designed to be applicable for all kinds of disciplines, research endeavours and stakeholders.

Since the criteria represent fundamental aspects of a citizen science project to enable collaboration on eye level for all persons involved, they can also benefit:

- *project managers* in their planning of citizen science projects.
- *volunteers,* as they will know that the listed projects on the platform are fulfilling the criteria.

The criteria are very brief and to the point, and are all designed to be mandatory. Where certain aspects may not apply to all projects, examples are listed, but are only required where relevant. To facilitate the implementation process, and avoid misunderstandings, we have put together a more comprehensive account on their respective meanings and intentions, including a set of tools and templates.

Please note that

- the criteria do not aim at limiting citizen science projects, innovative processes or freedom of project managers regardless of their background.
- “project managers” may be professional scientists or citizens without formal training in science.
- “volunteers” or “members of the public” are people who might be interested in citizen science, but are not yet involved in any citizen science project.
- “citizen scientists” are people actively involved in one or more citizen science projects.

The criteria can be used by all citizen science platforms as they see fit. For their implementation, we highly recommend a guided and assisted process not to create unnecessary barriers for users. Such processes could include workshops, mentoring or any other assisting feature.

Experiences from Austria:

In Austria, for example, very similar criteria have been implemented in 2018, guided by workshops (i.e. all criteria are explained in detail and applicants are guided through the process of answering the criteria) and a mentoring program (i.e. regional contact points coming from different research fields that are visible on the platform and that can be contacted if there are any questions on certain criteria). This has resulted in an increased awareness on the responsibilities towards the participants of a project in **project managers** and on potential barriers for participation. Furthermore, projects could identify themselves better as citizen science projects, which strengthened their position in the research community. The criteria also helped citizen science **project managers** to focus on aspects of citizen science they have unintentionally neglected before. Additionally, **funding bodies** such as the FWF (main funding body for basic research in Austria) have used the criteria as an orientation for deciding which projects fit in their citizen science funding programmes and adapted them to their needs.

We hope that the criteria will continue to be a living document, evolving with the field of citizen science. That way, they can contribute to making citizen science platforms more transparent and comprehensive, helping citizen science flourish for many years to come.

About the creation of the criteria

In the course of three years the ECSA working group “Citizen Science Networks” developed a catalogue of measurable criteria for projects wanting to be listed on national citizen science platforms. During the development, the working group actively involved citizen science project managers and experts, as well as citizen scientists to make the criteria as inclusive as possible without stifling innovation or flexibility of projects. You can find an overview of the process at the end of this document.

We sincerely thank all people who gave feedback during the last three years at conferences, workshops, focus group interviews, blog posts or via e-mail. Without you, the criteria would not be as they are today.

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1. **The citizen science project uses research methods, techniques and/or tools, which may include data validation and verification.**

FAQs/Guideline:

This criterium emphasizes that citizen science is a research endeavour (and may also have additional aims or objectives) and as such it should use **either** recognised methods within the discipline to reach the project goal **or** develop new methods **that are comprehensible and transparent**. Ideally, this information is documented in a research plan, which consists of a research goal (e.g. hypothesis, aim, research question) and the research design (methods that are being used for answering the research goal, i.e. which kind of data is collected how). For many citizen science projects it will probably be necessary to also include some kind of quality control (e.g. data validation and/or verification methods), most likely depending on the involvement of citizen scientists. We are aware that there are many different approaches in conducting research. In some disciplines it might not be common to have a research plan, in others a very detailed research plan is part of any project. Therefore, this criterion is focussing only on the most basic elements of such a research plan.

2. **The citizen science project aims at making data and meta-data publicly available and where possible, publishing results in an open access format (i.e. as open as possible, as closed as necessary). Data sharing may occur during or after the project, unless there are security, privacy or ethical concerns that prevent this. [ECSA PRINCIPLE 7]**

FAQs/Guideline:

This criterion focuses on the data, metadata and results that are produced in a citizen science project. Since data are produced by or with citizen scientists, it can be argued that they also belong to the public, as long as legal or ethical arguments don't speak against their publication. Such arguments could be privacy issues (e.g. personal addresses of citizen scientists) or ethical/legal issues (e.g. the location of endangered species, full names of persecuted people). Sometimes a part of data/metadata or results has to be classified, whereas some other part could be openly available ("as open as possible, as closed as necessary"). Therefore, citizen science data should aim to follow the principles of FAIR data (https://www.go-fair.org/fair-principles/). Please also refer to the General Data Protection Regulation (GDPR) in Europe if you are unsure which data you can share.

Several repositories are available to publish data/metadata/results openly. One well known example is Zenodo, where you get a DOI (digital object identifier) for your data/metadata/results, so other people can easily use and reference it. Open access publication of results should be preferred where possible in order to make the results accessible to the public.

3. **The citizen science project aims at producing new research-based knowledge.**

FAQs/Guideline:

This criterion aims at emphasizing that every citizen science project must have the intention to contribute to research, i.e. create new research-based knowledge or verify existing research-based knowledge to distinguish the project from other participatory activities. There can of course be other goals (e.g. raising awareness, protecting nature, educating participants, collecting data for policy decisions) as well, but it has to aim to contribute to research. Such an aim could be to answer or define a research question or a hypothesis, but it could also be to establish a research infrastructure (e.g. a database on the occurrence and distribution of animal species, historic archives; a new sensor for detecting e.g. noise). Since at the beginning of a project it is not clear if this aim can be fully realized (e.g. if the project fails, this could result in failing to produce new research-based knowledge), we ask for the intent to produce new research-based knowledge.

4. **The citizen science project has the intent to meaningfully and actively involve members of the public in the research process, and not solely as research subjects.**

FAQ/Guideline:

This criterion addresses the active involvement of members of the public, which become citizen scientists once they are actively involved in a project. They should be actively involved in at least one stage of the research process, but could of course be involved in several or all stages. Research stages or phases might vary from discipline to discipline, but in most cases are the identification of research questions, project design, development or implementation, data collection, categorization, transcription, analysis or interpretation, publication writing, as well as use of outputs (this list is not exhaustive). “Active involvement” means that citizen scientists are actively contributing to research and are not (solely) the research objects. However, they can of course actively contribute to research (e.g. by collecting data on the occurrence of animal species, define research questions, interpret historical documents) but at the same time be the subject of a survey that asks for their motivation to participate. If they would solely be involved in a project by being questioned (either by personal interviews or by a survey), then this would not qualify as citizen science.

5. **The citizen science project has the intent to benefit all participants, both the citizen scientists and the initiators of the project and other parties actively involved.**

FAQs/Guideline:

In order to enable collaboration between project managers and participants at an equal level it is necessary to establish a space where all people involved benefit from the participation. This mutual benefit/added value is very project specific, but project managers should be aware of this fact and be able to elaborate on this mutual benefit. Since a benefit/added value can only be evaluated after it has been realized, this criterion is evaluating if project managers have the intent to create such a benefit/added value, not if it is realized. For citizen scientists , such benefits/added values may include acquiring new skills or knowledge, personal fulfillment, new social contacts, social innovation or transformation etc. For project managers , benefits/added values might include the addressing of research questions that are otherwise not possible to answer, finding new research questions etc. Financial rewards for participants might also be considered a benefit/added value, but are not common or necessary. Since such benefits may be realized only at a later stage of a project, we here ask for the intention to benefit all participants.

6. **The citizen science project has clearly defined and communicated aims, tasks, and responsibilities, and aims to be transparent about the results of the project.**

FAQs/Guideline:

Citizen science is a collaborative process, where interactions between all collaborators are based on dialogue, mutual respect and feedback. One important aspect for this collaboration at equal level is the within-project communication throughout the project. Project managers should be transparent about their role and responsibilities within the project as well as of the roles and responsibilities of the citizen scientists to avoid misunderstandings (e.g. on the project website, through personal communication at meetings). They should also be available for questions and suggestions from citizen scientists by providing ways of communication (e.g. e-mail-address, contact form, telephone number). Results should also be communicated in a generally understandable way.

Furthermore, initiators of the citizen science project can organize their communication in a dedicated communication strategy, in which consideration is given to a range of topics, e.g. the target audience, transparency and ethical considerations, recruitment, participant motivations, actions to motivate and re-motivate, give continuous feedback, timeline, budget, etc. (Guidance can be found in many places, see Supplementary information). Most projects have a clearly defined goal or aim and as such also one or more target groups they want to attract. Especially in the beginning of a project it clearly helps to be aware of who my target group is and how I can reach this group (i.e. what communication channels I should use to communicate my project). Project managers should think about who their target group is (e.g. teenagers), how they can reach their target group (e.g. Instagram, Tik Tok) and what implications come with the use of these channels (e.g. privacy issues).

Elaborated guidelines on what to think about when designing the communication of a project can be found on several websites such as EU-Citizen.Science.

7. **The citizen science project provides citizen scientists with all necessary information on legal and ethical issues relevant to the project, for example: copyright, intellectual property, data sharing agreements, confidentiality, attribution (e.g. acknowledging participants in project results and publications), and the environmental impact of any activities. [ECSA PRINCIPLE 10]**

FAQs/Guideline:

When collaborating with people ethical and/or legal issues are arising. They are highly project specific, but project managers should be aware of these issues and address them accordingly. Legal issues could be connected to the General Data Protection Regulation (GDPR) in Europe (e.g. if you have a list with e-mail-addresses with names of your participants). Ethical issues could be connected to the research topic (e.g. working with minorities or refugees). Several guidelines exist on how to identify such legal or ethical issues, but we want to emphasize that they cannot give a one-fits-all answer and that it is necessary to contact some professional legal aid if you want to be sure to address such issues. Citizen science platform/portal coordinators cannot conduct a legal or ethical check or give advice in these areas, but it is important that project managers pay attention to these issues.

Supplementary information

Communication in Citizen Science (https://www.scivil.be/sites/default/files/paragraph/files/2020-01/Scivil%20Communication%20Guide.pdf)

ECSA 10 Principles (https://ecsa.citizen-science.net/ecsa-guidelines-and-policies/)

Guide on how to deal with citizen science data management; linked to criteria 2, how to make your data as FAIR as possible (https://www.scivil.be/sites/default/files/paragraph/files/2021-10/Scivil%20Data%20Guide%20-%20EN%20-%20oct2021.pdf)

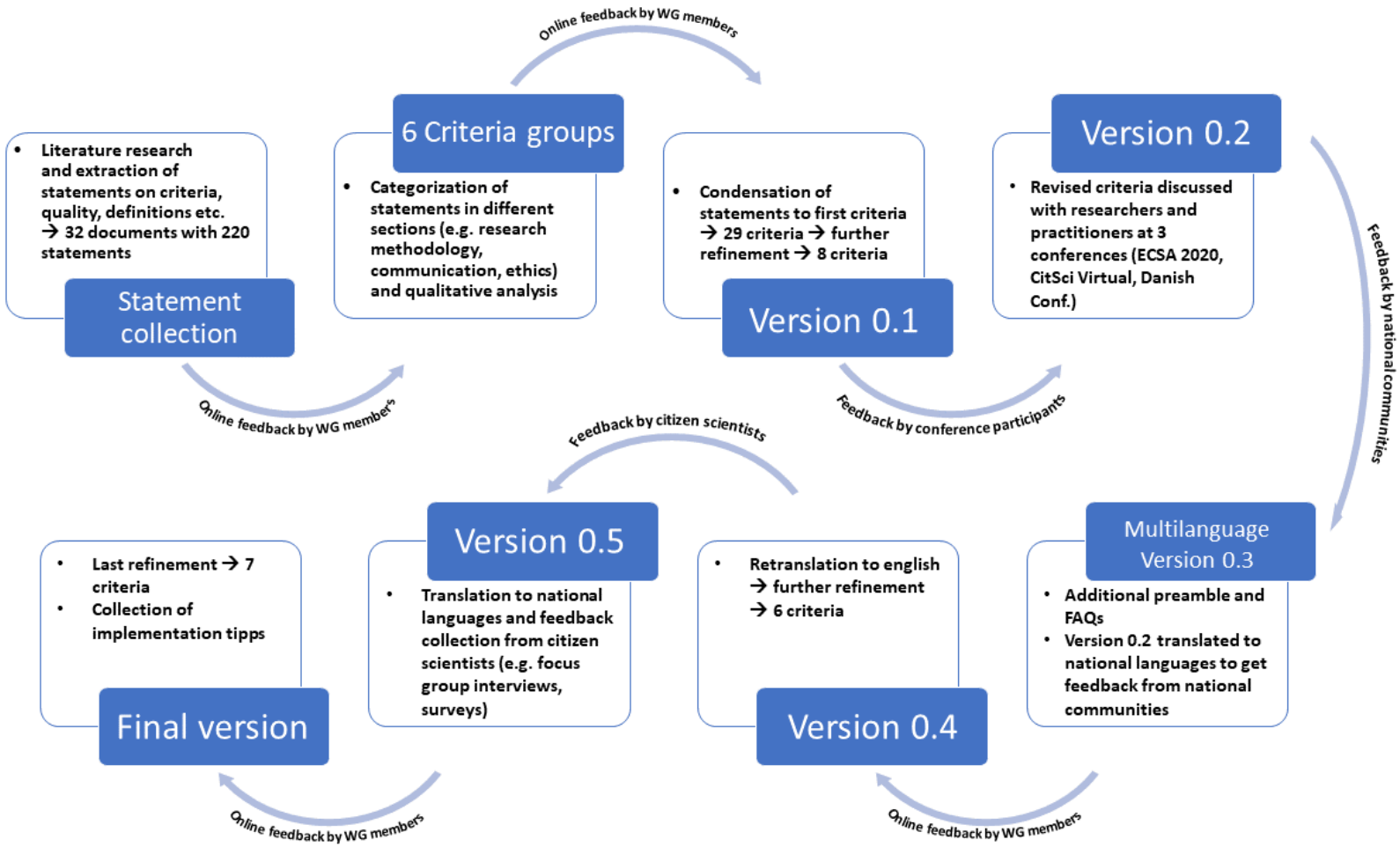

Figure 1: Background information on the process of co-creating the criteria; several steps with multiple feedback loops by different stakeholder groups (e.g. researchers, citizen scientists, practitioners) in multiple formats were organized to collect feedback during the process. In total more than 400 comments were collected and discussed.