STANDARDS FOR CITIZEN SCIENCE

PRINCIPLES AND GUIDELINES FOR CITIZENS SCIENCE PROJECTS AT UNIVERSITIES AND OTHER RESEARCH INSTITUTIONS

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proposed for discussion during a workshop on 17th November 2016 in Zurich

Questions to be discussed during the workshop:

- Do these Standards safeguard the quality of citizens science projects?
- Do these Standards address the critical points and provide for adequate mechanisms to mitigate them?
- Are the proposed Guidelines concrete and complete enough?
- Are the respective rights and duty issues between research institutions, researchers and citizens scientists adequately described?
- Do we need stricter safeguarding of compliance like a register?
- Who are the relevant stakeholder organisations to `parent` these Standards?
- Do we need an explicit list of expectations and rights that the projects maintain and share openly a light version of this?

PREAMBLE

For a long time, citizens have been involved in science. The evolution of universities and other research performing organisations, the complexity of research questions, and the distance from every day experience as well as the necessity to maintain expensive and complicated equipment have generally limited participation of citizens in the last century, although some projects depend on the contributions of citizens.. Today, research universities conduct research project largely without the participation and influence of citizens. This situation is however changing rapidly. The advent of new information and communication technologies has led to growing availability of scientific results for large groups of people. As a consequence, the involvement of citizens in science - citizen science - is increasing and will become more important with the emergence of well-informed knowledge societies and the ever-growing information and communication technology. Citizen Science gives interested people the possibility to participate in scientific projects and thus contributes to education and awareness of the public. The research is often guided by topics of general interest and concern, like environment or monitoring of capital accidents (Texas Oil spill). A large variety of initiatives exist, including, at various degrees, amateur scientists and 'professional' researchers. These projects might sometimes be detached from mainstream academic research, but may open up new research questions that are otherwise not addressed. They may not require formal academic recognition, but may become the seed for professionalised science later on. Using such technologies, organisations that focus on facilitating citizens participation in science (European Citizen Science Association, etc.). have been established. They are mostly focused on coordinating citizen science practice, being a community of practice that shares lessons, experiences etc.

On the other hand, citizens are also involved in the scientific processes within academia where they usually contribute to a research projects defined by academic researchers. As recognized by many, such involvement is beneficial for research. Citizen scientists often bring novel points of views. Although the usual academic procedures are efficient and have proven themselves, people from outside the specific discipline in which the research started may help overcome blind spots. The collaboration between academia and citizens fosters innovation, unravels novel research areas, advances technology and facilitates collecting farther-reaching data. Furthermore, involving citizens promotes public education and understanding of science, supports the transition to the future digital society and connects people and academics worldwide. Existing projects range from involving few to millions of non-specialist participants in such diverse areas as the classification of astronomical objects, birdwatchers producing and analysing quantitative data in distribution, or collecting medical data of one self or others.

PURPOSE

The purpose of these Standards is to provide academic researchers, their institutions and funding bodies with principles and guidelines how to run citizen science projects in the academic setting. They give the answers to pertinent questions, thus making citizen science projects more attractive to researchers and bringing them recognition and legitimacy. The Standards address specific issues of citizen science and offers ways to tackle them. They give answers to questions such as how to involve citizens in setting science agendas; how to involve them in a research project and how to make their contributions visible. Ultimately, the purpose of these Standards is to provide a basis for the recognition of the quality and solidity of the research results of citizen science.

These Standards thus provide definitions and non-regulator principles and guidelines to be applied when defining, deciding, funding, executing and evaluating citizens' science projects. They aim to clarify the roles of the parties involved and to provide a framework for citizen science as robust science rather than as public engagement.

By setting the framework for involving citizens, these Standards ideally encourage academic researchers to welcome citizens as serious and respected partners in their endeavours and open the doors for citizens to contribute substantially and creatively to science.

DEFINITIONS

Citizen science generally refers to the general public engagement in scientific research activities when citizens actively contribute to science either with their intellectual effort or surrounding knowledge or with their tools and resources. Various notions of citizen science, mostly addressing the degree to which academic (professional) scientists (**researchers**) and citizen scientists participate are in use. These Standards deal with research projects where academic and citizen scientists work together. The lead and organisation lies with the research institution of the academic scientists.

Research institutions initiate and support these citizen science projects in the same way they supports any other project, for example with basic resources. The projects involve the citizens in several ways. The goal of the project leaders is to enhance the quality and scope of the project by including academic and non-academic researchers to pursue new scientific insights.

Citizen scientist refers to anyone involved in research and not related to a research institution. Everyone can become a citizen scientist if the person fulfils the criteria of the research project in terms of basic skills and abilities.

APPLICABILITY

Academic Researchers may use these standards to plan, organise and seek funding for citizen science projects. Adhering to these Standards provides them with a solid base to set up, to seek recognition within their institution and to provide the funding agencies with a tool to judge their projects.

Citizens may consult these standards to learn about their rights and duties and to develop an understanding of working in research projects. Generally, the Standards enhance the role played by citizens in science.

Research institutions may use these standards to ascertain that their citizen science projects satisfy a set of recognised principles and guidelines.

Funders may use these Standards and the adherence thereto by research institutions to judge the quality of citizens' science projects and their outcomes. These Standards allow the comparison of different projects, increase reproducibility and prevent repetitions.

Policy makers may require the proper application of these Standards when funding citizen science projects.

PRINCIPLES

1. Excellence all the way

Citizen science projects must adhere to general international standards of science, the relevant international standards specific for the academic discipline (-s) of the projects and these Standards for citizen science. This includes aspiring for objectivity and assessing it, transparency of methodology, proper citations and avoidance of wasteful repetitive studies.

2. Participation all the way

Citizen science projects should aim to develop an active and productive participation of citizens' scientists in all the different phases of the research project, by acknowledging a large variation in their participation. Citizens might possibly contribute to topic selection and development, research design, execution, dissemination of results and funding. Expertise of citizen science shall be used in the best possible way implying flat hierarchies and the possibility of citizen scientists to take over responsibilities if they wish, once encouraged.

3. Clear motivation

The goal of a citizen science project must be clearly and realistically stated. Citizen Science is often cross disciplinary and the governance of such project should take this into account. The projects must be designed to encompass in a wide way the various aspects of a research topic.

4. Openness and diversity

Citizen science projects should be open to anyone. Projects may not discriminate on any personal grounds. In fact, cross-cultural approaches and diversity are often needed for optimal and unbiased scientific quality. Project should not just opt for passive diversity (not stopping anyone from joining) but have a clear engagement strategy that is suitable for the context of the research.

5. Transparency

Citizen science projects must operate in a fully transparent way. Either all data etc. are open to all members of a team or there shall be an agreement reached to why this is impossible.

6. Maintaining public and personal interest

Research institutions should ensure the public investments into citizen science are spent effectively and efficiently and empower citizens and institutions to explore new ways for science.

7. Sustainability

Research institutions and their researchers should provide access to citizens to their research projects, including to e-infrastructures. The research institutions and researchers should ensure the continuity in project support and the dissemination of knowledge and support participants who want to continue and develop their knowledge.. The development and maintenance of the community of citizen scientists should have high priority.

8. Education and training

Citizen science projects shall contribute to education and training of scholars and citizens alike. Importantly, researchers must properly instruct and train citizen scientist concerning all standards and ethics involved in the respective research project. It is recommended to work closely with science communicators, to make the information clear and suitable for a wide range of participants.

GUIDELINES

Recruitment and training of citizen scientists

Researchers must recruit citizens' scientists in an open and transparent way and take into account their competences carefully. The selection of the citizens must be unbiased and research institutions and researchers may not discriminate on any personal grounds. It must guarantee that the citizen science project complies with scientific standards, such as open outcome. Depending on the research foreseen and the amount of work involved, the research institution, researcher and the citizen scientist may conclude an agreement describing the respective rights and duties or an informed consent procedure.

Governance

Research institutions must ensure that citizen science projects have a governance structure that guarantees best practise rules for research projects. For this, the researchers must provide a written document to everyone involved stating the rules and procedures. Research institutions should appoint a person to monitor the compliance with scientific standards[1]. The researchers must allow for open transparent discussions in dedicated regular meetings where everybody can voice concerns and make suggestions. The university should provide the necessary infrastructure for carrying out the project.

Quality control

As for all research projects, research institutions, researchers and citizens scientists should undertake the necessary actions to adhere to the relevant codes of conduct and ethical behaviour in scientific research when conducting citizens science projects and using and disseminating research data and findings. Research institutions and their researchers must put measures in place such as protocols and quality control guaranteeing the quality of the work of citizen scientists so their effort is not lay to waste. This includes the training and use of appropriate protocol design, instrumentation and analysis methods. Importantly, such quality assurance measures also include measures for the storage or curation of data. Finally, it includes encouragement of citizen scientists, inviting them to participate at a higher level, by analysing data or managing groups of other citizen scientists.[2]

[1] list scientific standards

2 Gura, Trisha, "Citizen Science: Amateur experts," Nature 11 April 2013 / vol. 496, 261–262; Schnoor, Jerald L., "Citizen Science," *Environmental Science & Technology*, September 1, 2007, 5923

Ethical oversight

Researchers take the necessary steps to insure the rights and welfare of the citizen scientists involved and that their individual rights, included privacy, are respected and protected. If the projects involve the generation/collection of personal data of citizens (e.g. health data), research institutions should legally protect such data should and seek agreement on their use with those from whom the data has been generated. Where relevant, an informed consent process should be designed to allow participants to understand what will happen with the information that they collect. Depending on the project, necessary approvals from ethical oversight bodies (such as an ethics review committee) should be sought. However, ethical oversight mechanisms specifically designed for citizen science projects should also be considered as they emerged within the communities of practice such as the Citizen Science Association or the European Citizen Science Association.

Sustainability

Research institutions should attempt to ensure sufficient funding safeguarding the continuity of and support to a citizen science project and the adequate dissemination of the results obtained.

Intellectual property rights and acknowledgement[3]

Intellectual property rights derived from citizen science projects must be dealt with and agreed upon in the agreement regulating the respective rights and duties. Researchers shall provide feedback to the citizen scientists on for example how their data are being used and what the research, policy or societal outcomes are. Citizen science projects data and meta-data are made publically available, and results are published in an open access format. Data sharing may occur during or after the project, unless there are security or privacy concerns that prevent this. Researchers always should acknowledge the contribution of citizen scientists to their scientific results and publications.

Costs

The research institutions and their researchers should make sure that the costs for the citizen science projects are covered properly from a variety of funding sources, including crowd funding. The eventual sharing of benefits must be regulated in the agreement. The research institutions and their researchers must provide free access to the research work for citizen scientist and may not require fees. Research institutions and their researchers must insure that citizen scientists do not lose money.

[3] TYPOLOGY OF CITIZEN SCIENCE PROJECTS FROM AN INTELLECTUAL PROPERTY PERSPECTIVE, by Theresa Scassa and Haewon Chung February 2015

Health, safety, security and environment

Research institutions and their researchers should undertake the necessary measures to ensure the health, security and safety of any citizens' scientist contributing to a research project as well as to take the necessary actions to minimise the impact on the environment. Where applicable, citizen's scientists must be made aware so that they can comply with security, safety and environmental rules and with procedures in force at the research institution, in particular concerning the notifications on introduction of material and instrumentation that could induce risks or ethical issues to the research project.

ASSESSMENT AND APPLICATION

The research institutions and their researchers must provide mechanisms to implement these Standards safeguarding a low administrative burden. The relevant stakeholder organisations regularly assess the relevance and applicability of these Standards and, whenever appropriate, propose and decide upon needed amendments.