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Report

European Stakeholder Round Table on Citizen and DIY Science and Responsible Research and Innovation

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doing it together science

EUROPEAN CITIZEN SCIENCE ASSOCIATION

Imprint

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Disclaimer

This report is an output from an event with the aim of voicing different perspectives. The viewpoints and opinions expressed in this report solely reflect the perspectives of the authors, are not necessarily congruent with those of the participating organizations, and do not represent official standpoints of the participating organizations.

Photos

From contributors presentations, by Hwa Ja Götz, Aleksandra Berditchevskaia and Waag Society.

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Content

1 European round table on Citizen and DIY Science

On 8th November 2016, the European Citizen Science Association (ECSA) organized the European Stakeholder Round Table on Citizen Science (CS), Do-it-Yourself (DIY) Science and Responsible Research and Innovation (RRI) at the Museum für Naturkunde Berlin as part of the Doing-it-Together Science (DITOs) project. More than 50 participants took part in the one day event and contributed their perspectives on CS and DIY Science as stakeholders from science, communication, government, business, civil society and art. The event was part of Berlin Science Week accompanying the Falling Walls conference and linked to a Soirée on Public Participation in Bioinnovation at the museum as well as meetings of the ECSA Policy Working Group and DITOs consortium.

The round table was the first of a series of stakeholder events with the objective of improving the link between CS and DIY Science and decision makers. The specific aims of this workshop were:

- Develop joint understandings of CS, DIY Science, Responsible Research and Innovation (RRI), and related concepts,
- Map and analyse the links between these concepts,
- Clarify the understanding of roles of the different stakeholders and actors,
- Discuss needs and barriers of stakeholders to implement RRI in CS and DIY Science projects,
- Start working on DITOs policy papers and their underlying concepts, on Biodesign and environmental sustainability,
- Informing about DITOs and possibilities to get involved.

Throughout the DITOs project (June 2016 – May 2019), ECSA and its members will coordinate European and national stakeholder round tables on cross-cutting RRI issues, such as gender equality and the inclusion of disadvantaged groups, ethics, the involvement of SMEs and industry, and methods of evaluating DITOs activities.

Doing-it-together science, coordinated by Muki Haklay (UCL), is a Horizon 2020 project aiming to support the CS and DIY Science communities and increase public participation in science by means of a diverse range of events organized across Europe by the 11 European partners of the consortium.

Key approach of DITOs is the idea of an escalator of participative activities: Depending on resources (times, skills, interest, etc.) available to (potential) participants, DITOs partners develop appropriate event formats in order to bring more people into contact with science. The thematic focus of the project lies on BioDesign and environmental sustainability. Event formats can be science cafes, workshops, exhibitions travelling on the science bus, BioBlitzes or lab experiments. A careful evaluation scheme is tightly linked to event development and testing in order to analyse synergies and constraints. In total, about 500 events are planned throughout Europe for the three-year-funding period. ECSA is responsible for leading the work on stakeholder engagement for RRI, mobilizes members' capacities for contributing activities related to environmental sustainability and acts as legacy institution ensuring that the results and networks created are useful beyond the duration of the project.

2 For active, scientifically literate citizens and responsible, open research processes in Europe

In her introduction to the round table, Dr. Katrin Vohland, Director of the Research Programme „Public Engagement with Science“ and Executive Chair of the European Citizen Science Association (ECSA), reflected on the importance and challenges for CS in the current situation in Europe. Two opposing trends that can be observed: On one hand, science appears to be firmly established in European societies. More people than ever attend universities, newspapers have their own science sections, science festivals grow everywhere, and there is a boom in Citizen Science, do-it-yourself science, FabLabs and other forms of participatory knowledge creation and innovation. Scientific evidence plays an increasing role in political decisions, at least science-policy platforms that promote such aims multiply, e.g. the Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES).

On the other hand, increasing scepticism towards science can be observed. While critical discussions, e.g. on the representation of different knowledge systems or access to the benefits of science and technology, and scrutiny regarding scientific integrity are much needed for healthy research systems. Caution is warranted when overly emotional rhetoric and populism gain ground, like when narratives of a post-truth or post-factual age take hold. Another observation is a coming-back of autocratic regimes in Europe, in which scientific freedom is already massively restricted.

In this situation, endeavours like the DITOs project aiming to engage more people in science are much more political than the list of “fancy” events might indicate at first sight: Their ultimate goal and underlying reason is to increase the number of active, scientifically literate citizens in Europe and responsible, open research processes. One very promising and to-date rapidly growing entry point to enhance public engagement with science is Citizen Science. At the European level, for instance, the ECSA has grown to about 200 individual and institutional members in only four years. Members are united by the idea to strengthen and reflect on Citizen Science approaches. A key achievement in this work has been the formulation of the 10 Principles of Citizen Science (see next page) which highlight both scientific quality and transparent, equitable cooperation. A main challenge of this expanding field is to become even more inclusive; not only with regard to geography, gender and age – as addressed for example in the above mentioned COST Action; but also with regard to links between activities with different levels of engagement, the involvement of decision makers and a joint understanding of the societal challenges to be addressed. DITOs, in which ECSA is a key member, offers a great platform to stimulate and guide work on these and other questions over the next three years. We’re delighted to have you here and are looking forward to a productive exchange!

Museum für Naturkunde Berlin - A capacity hub for Citizen Science in Germany and Europe

The Museum für Naturkunde Berlin is a research museum, built up on the natural history collections once created by the Humboldt University and with major contributions by amateur naturalists, and since 2009 a member of the Leibniz Association. It currently houses about 30 million objects. Research is conducted in the natural sciences and related questions on earth history or biodiversity change as well as in social sciences and humanities. In this latter research area, which studies and reflects on the dual role of the museum as institution of science communication as well as scientific knowledge production, Citizen Science understood as contributions of citizens in any part of the scientific process has become a major focus of activity in recent years. The museum has, for instance, taken a leading role in promoting Citizen Science in Germany as co-lead of the German CS platform "Bürger schaffen wissen" (Citizens create knowledge), hosts the Headquarters of the European Citizen Science Association and chairs the COST Action "Citizen Science to promote creativity, scientific literacy, and innovation throughout Europe".

Museum für Naturkunde Berlin.
https://www.naturkundemuseum.berlin/en

Bürger schaffen Wissen, platform presenting CS projects in Germany.
http://www.buergerschaffenwissen.de/en

European Citizen Science Association (ECSA), European network of CS institutions and researchers.
http://ecsa.citizen-science.net/

COST Action CS to promote creativity, scientific literacy, and innovation throughout Europe.
http://www.cost.eu/COST_Actions/ca/CA15212

10 Principles of Citizen Science

Ten statements that have been developed by the ECSA 'Sharing best practice and building capacity' working group, led by the Natural History Museum London with input from many members of the Association, to set out some of the key principles which as a community we believe underlie good practice in Citizen Science. To be accessible as a tool in Europe and around the world, many volunteers have translated the principles into their local languages – 26 at present. The current 10 principles are not meant to be fixed or exclusive – if you find an aspect of CS is not captured (well), ECSA is happy to learn what would be your 11th principle! Members and working groups at ECSA have also started several initiatives to apply the principles to specific focus areas, such as developing CS apps and platforms. If you are interested in learning more or carrying this work further, please get in touch!

http://ecsa.citizen-science.net/documents

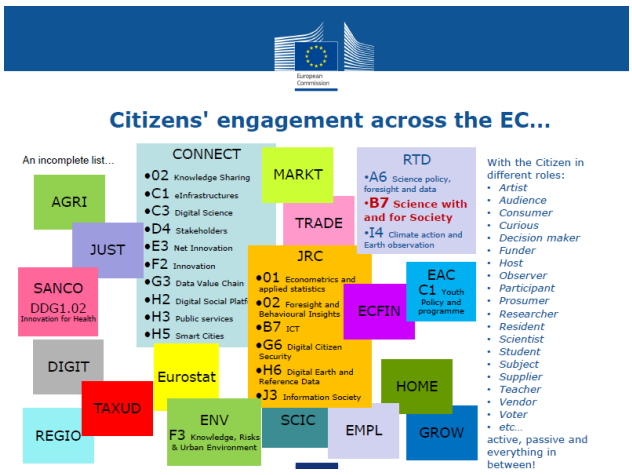
3 EU Policy Agendas: RRI and Open Science

DITOs' work to support citizen and DIY Science seeks to contribute to make research and innovation in Europe more responsible and open to members of the public. We do this, on the one hand, through organizing public events that demonstrate and test exemplary engagement and co-creation formats as well as through capacity building in the CS and DIY Science communities. On the other hand, we invite stakeholders to share their expectations of, concerns with and needs for participatory research in order to channel these inputs to decision makers and advocate for improved conditions for Citizen and DIY Science. Part of this stakeholder engagement work is focused at European policy and consists in both campaigning for more support for CS from Brussels and making policy agendas of the European Commission (EC) accessible to CS projects. Two policy agendas are particularly relevant for CS at the moment: Responsible Research and Innovation (RRI) and Open Science. We invited EC representatives to outline some of the hooks these programmes provide for CS projects and give their perspectives on the future role of CS in EC research and innovation policy.

Open Science, Citizen Science, Responsible Research and Innovation

In the keynote, Dr. Philippe Galiay, DG Research and Innovation at the European Commission, discussed the relation between the concepts of Open Science, RRI and CS, linking to current European policy agendas. Under Commissioner Carlos Moedas, promoting Open Science has become a major focus for European research and innovation policy, and CS is seen as an integral part. "Citizen scientists significantly contribute and are recognized as valid knowledge producers of European science". Over the last years, the European Commission has supported various CS initiatives through their work in the fields in research, infrastructure and environment. Examples include funding Citizen Observatories, supporting the elaboration of a White Paper on Citizen Science for Europe through the Socientize project, various JRC activities and consulting with CS networks like ECSA. Following a stakeholder consultation, CS has now also become one of the eight policy ambitions on the Open Science agenda and is represented in the advisory body Open Science Policy Platform (see below).

"Citizen Science can contribute to the Commission's goal of RRI, as it reinforces public engagement and can re-direct research agendas towards issues of concern to citizens".



In order to translate this overarching policy agenda into action, CS initiatives are supported through the Horizon2020 funding scheme. Most relevant here are two funding lines: (1) 'Science with and for Society' (SwafS) – through which the EC aims to build effective cooperation between science and society, recruit new talents for science and pair scientific excellence with social awareness and

responsibility; (2) RRI – through which the EC promotes public engagement, gender equality, science education, ethics and open access as cross-cutting issues in Horizon2020. Looking closer at the concrete funding calls and selected projects in these programs, we see a trajectory from a wider focus on public engagement in research policy making in the past (e.g. through the Voice and Simulact projects) with public participation in research rather being the exception (e.g. in DITOs) towards more explicit mentions and an increase of dedicated calls open to CS approaches in the current work program (see resources below) expected to expand over the next years. The EC is going to evaluate their activities on SwafS and RRI against the percentage of projects where citizens, Civil Society Organisations (CSOs) and other societal actors contribute to the co-creation of scientific agendas and scientific contents as well as institutional change, which is where also CS will have to prove impact. Galiay emphasizes that beyond SwafS and RRI, citizen engagement in many forms is supported by a large variety of activities in the European Commission, which makes it worth to look around.

Open Science Agenda of the European Commission.
http://ec.europa.eu/research/openscience/index.cfm?pg=home

Responsible Research and Innovation Agenda of the European Commission.
https://ec.europa.eu/programmes/horizon2020/en/h2020-section/responsible-research-innovation

Science with and for Society programme with link to related funding calls and projects.
https://ec.europa.eu/programmes/horizon2020/en/h2020-section/science-and-society

The Open Science Policy Platform and its linkages to Citizen Science

Ron Dekker, Secretary General of the Open Science Policy Platform at the European Commission, DG Research and Innovation, introduced the Open Science Policy Platform (OSPP). This expert body advising the European Commission on Open Science was created in order to support further development of the European Open Science agenda and to promote the uptake of best practices. It involves stakeholders, such as universities and research organizations, academies of science, funding organizations, publishers, libraries and ECSA as Citizen Science association with Prof. Johannes Vogel, ECSA Chair, chairing the OSPP.

Dekker stressed that Open Science demands a completely new approach to the scientific process. Collaborative work and continuously increasing technological development that allow new ways of diffusing knowledge motivate a shift from the traditional focus of publishing as fast as possible to sharing knowledge as early as possible. He sees the link between Open Science and Citizen Science founded in a perspective on research and innovation as ecosystems that require inclusiveness to strive: Only through incorporation of diversity of expertise, technologies and infrastructures as well as cooperation in Europe and internationally can today's complex societal and grand challenges be

solved. The major contribution of CS for making research more open is, first, through collecting and analyzing large amounts of research data. Second, CS is key for enhancing the impact of research. The latter is currently limited to scientific impact among peers and limited by taking the Journal Impact Factor as the main indicator. However real impact deals with science, innovation, society and education – and this is where CS can make a difference, especially since now funders are also seeking to increase the return on their investments. In sum, CS is one approach to better connect science with innovation and to the world and thus contributes to promote openness as principle for research in Europe.

Open Science Policy Platform.
http://ec.europa.eu/research/openscience/index.cfm?pg=open-science-policy-platform

4 Reflections from the field: Project examples and common ground

To make the big variety of old and new participatory research projects out there more tangible, three Lightning Talks were dedicated to learn about concrete CS and DIY Science activities. The invited experts gave examples how responsibility and openness are relevant to their work in hacking, sensing and BioDesign projects and shared their reflections on common ground between the CS and DIY Science communities.

(Bio)hacking at Technarium: What we do & where is the Citizen Science

- *by Egle Marija Ramanauskaite, Technarium hackerspace & Human Computation Institute*

In this talk I presented the type of (bio)hacking we do at Technarium hackerspace (Lithuania), and how our activities are linked to CS. The main aim was to introduce all stakeholders at the roundtable to the real activities that happen at hackerspaces, and start building more effective bridges between the different communities.

To begin with, I described two specific examples at Technarium biolab that work at the intersection of biohacking and CS, and are only possible because of it: lichen biohacking and bryozoan research – completely grassroots initiatives brought forward by our community. Additionally, I spoke about one specific example where grassroots and "top-down" initiatives meet, i.e. a cheap camera trap project that has been suggested to us by academic CS project owners working in wildlife conservation. Lastly, I pointed out that with access to a variety of newest technologies (3D printers, CNCs, ceramics studio etc.) we are very well equipped to develop tools for CS, enabling new research and making projects more accessible.

Therefore, as biohackers, we already see ourselves as doing CS and being part of the community. However, due to different labels (self-assigned or not) some of us are not always included. This is

amplified by the fact that most of us are DIY-type hobbyists who cannot come to expensive conferences or attend meetings on workdays.

How can the CS community (ECSA and beyond) work together with existing (bio)hacker communities to make the communication & collaboration easier?

In any case, at Technarium we already see major links between CS & hacking – we have the same goals, similar ethos and could work together for a common benefit.

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Technarium Blog. http://blog.technariumas.lt/

Etherpad to continue the conversation between CS and DIY Science communities.
https://pad.okfn.org/p/DIY-citizenscience

Just Good Enough Data and Citizen Sensing

- *by Jennifer Gabrys and Helen Pritchard, Citizen Sense, Goldsmiths, University of London*

Drawing on participatory and practice-based research methods, the Citizen Sense research project held a series of discussions and monitoring events with residents living next to hydraulic fracturing (or fracking) infrastructure during 2013 to 2015. Through this collaborative process, we developed the Citizen Sense Kit for the citizen-based monitoring of air quality in the region. The Citizen Sense Kit was developed in response to the concerns of community members, who provided information via Citizen Sense "logbooks" that asked for input on what the key concerns were for natural gas infrastructure in relation to air pollution.

After a period of developing the Citizen Sense Kit with participants, the Citizen Sense research project deployed the kits in October 2014 with a workshop and walk to field test the technologies. The Citizen Sense research team then undertook visits to participants' monitoring locations to help set up the technologies, and participants developed a number of situations and experiments to monitor areas of particular concern to them.

The Citizen Sense Kit was used by a wide range of residents living near infrastructure, and also taken up by a local group, Breathe Easy Susquehanna County (BESC), which was interested to document changes in the environment particularly in relation to air quality. The kit attempted to provide accessible and unobtrusive ways for participants to document pollution events and experiences, and to observe patterns and relations that emerged from collected environmental data.

Citizen Sense. http://citizensense.net.

Citizen Sense Kit. http://citizensense.net/kits/citizensense-kit

"Just good enough data"

While environmental data was collected and logged on the Citizen Sense Airsift platform, some participants began to notice patterns in their own data, particularly in the particulate matter data sets. Although in the view of the regulators the data generated by the Citizen Sense research project was not comparable to AQI air quality data, it was however "just good enough" (Gabrys, Pritchard, Barratt, 2016) for the participants to read together with state-collected air quality data and locally collected wind data from Weather Underground. The distribution of devices also contributed to drawing together evidence of local sources of particulate matter that were possibly emissions from fracking infrastructure.

"Just good enough data" is a phrase and concept that we use here to address issues of accuracy in relation to citizen-collected data, and to expand the types of uses that might accompany these new types of data. "Just good enough data" draws attention to attempts to counter the reliance on high levels of measurement accuracy as the sole criterion by which data are evaluated. What different practices emerge when environmental data are engaged with in a more indicative register? What do these practices enable? And what other relations, connections and points of focus might "just good enough data" generate?

Citizen Data as Evidence

Data that emerged through these techniques further became a useful negotiation tool. It was used to arrange a number of conference calls with regulatory bodies such as the Center for Disease Control and Prevention (CDC), the Agency for Toxic Substances and Disease Registry (ATSDR), the Pennsylvania Department of Health (DOH), and non-profit environmental organisations as well as local political representatives. Although responses to the citizen-collected data ran the spectrum from outright dismissal to interest, there was just enough evidence to lead to one environmental agency requesting that local monitoring be undertaken, something which BESC participants had been campaigning for since the inception of their organisation.

Citizen-produced data sets are often declared to be inaccurate due to the devices used, illegitimate due to the protocols followed, and unscientific due to perceived community bias, such as citizens monitoring to create deliberate evidence for pollution events (cf. Gabrys, 2016; Gabrys and Pritchard, 2015). However, citizen sensing is also an entry point for testing the claims about the ease of participation that next-generation environmental sensors are meant to offer, as well as for developing expanded aspects of monitoring, data collection and environmental politics, which might allow communities to engage more readily with environmental problems.

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Promoting collaboration in the emerging practice of Biodesign

- *by Imane Baïz, Université Paris Descartes (UPD), Center for Research and Interdisciplinarity (CRI Paris)*

The lightning talk discussed how the Center for Research and Interdisciplinarity (CRI) focuses on promoting interdisciplinarity in the field of Biodesign. We believe inclusion provides more citizens with the chance to be part of the process of making research and innovation happen. Interdisciplinary projects have also the potential to bridge the gap between research and society, using different vocabulary and practices compared to traditional research.

Responsibility of research is to provide the chance for more citizens/stakeholder to be part of the process of making, using and communication of scientific knowledge.

At CRI, Biodesign is understood as an approach which mixes that of design and modern life sciences, engineering and art. In our projects, such as Biodesign NightScience, iGAMER, High School Workshops and Co-lab Biodesign Workshops, we experiment and showcase how new relationships between members of the public, scientists, artists and designers nurture skills and provide new perspectives. The real issue is how to sustain interests in collaborative projects for the long term. To address this, we do not only organize events to inform citizen about Biodesign, but actively provide opportunities for them to get hands-on experience. We believe it is our responsibility to empower citizens, e.g. through giving tools to citizens to do DIY science. Through our contributions to the DITOs project, we aim to propose new models of research by introducing public debates and social uses of science in the laboratories. Collaboration is a motivational force to revolutionize scientific methodologies to open up new avenues for science. New relationships and diverse group dynamics equip participants with various skills. In such situations, citizens can become catalysts, debaters or actualizes to provide alternate approaches to science.

Center for Research and Interdisciplinarity Paris. http://cri-paris.org/

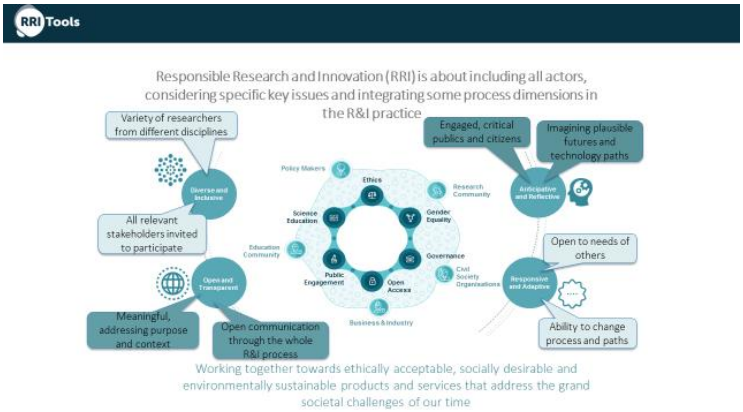
5 How responsible is Citizen Science?

One main aim of the round table was to explore the concept of Responsible Research and Innovation and how it can be linked to Citizen Science. Daniel García started with an introduction to the concept of RRI by prompting participants to interrogate their work for levels of inclusiveness, diversity, responsiveness and in other dimensions. Thomas Völker shared reflections on responsibility in the field of transdisciplinary research and drew links to Citizen Science. In a world café participants shared their experiences and views on how public engagement, open access, ethics, education and governance in Citizen Science are and can become more responsible.

RRI in a nutshell

- *by Daniel García, RRI Tools project, La Caixa Foundation*

The principles of Responsible Research and Innovation (RRI) are spreading across Europe and beyond, looking for a science and technology system more aligned with society's needs and values. Citizen science is supposed to be responsible because it already takes lay people on board. However, RRI goes further and invites us to consider whether our Citizen Science projects are responsible enough. For doing so, we might need to ask ourselves questions such as: Are we including citizens only for collecting more data in a cheaper way or are we treating them as equal partners in the project? Do all participants clearly know and agree on their roles in the project and how the project is defined? Are we including all voices - especially the silent ones - in our project? Are we able to change our project plans in response to society's changing views and opinions? Is our project economically and environmentally sustainable? Are we handling data in an ethically acceptable way? Are we contributing to solve some of the societal challenges our society faces today? Are we reflecting on and anticipating the unintended consequences of our project? By considering these and other questions, which lie at the heart of the RRI concept, we will boost our Citizen Science projects and become more responsible actors. Actors can find resources to apply RRI in their Citizen Science project in the RRI Toolkit online.



For acting more responsibly, only including citizens is not enough.

RRI Toolkit at website of RRI Tools project. http://www.rri-tools.eu

Responsibility in Transdisciplinary Sustainability Research

- *by Dr. Thomas Völker, European Commission, DG Joint Research Centre*

The aim of my talk 'Responsibility in Transdisciplinary Sustainability Research' was twofold: First, the talk situated current debates about Citizen Science, DIY Science and Responsible Research and Innovation (RRI) within a broader historic context of ongoing debates about changing relations between science and society (Etzkowitz & Leydesdorff, 1998; Funtowicz & Ravetz, 1992; Nowotny, Scott, & Gibbons, 2001) and the establishment of 'spaces for collective experimentation' (Felt, Igelsböck, Schikowitz, & Völker, 2016; Felt & Wynne 2007) and stressed some of the common threads that can be found throughout these debates. Second, by using the exemplar of a transdisciplinary sustainability research funding program (proVISION), I intended to direct attention to some of the tensions that emerge when the ideas and ideals of collaborative or participatory knowledge production are enacted in day-to-day research practices. For doing so I drew on materials gathered in a three-year research project at the University of Vienna called 'Transdisciplinarity as Culture and Practice'.

I showed how the funding scheme's objectives of 'making knowledge available' for dealing with contemporary problems by establishing a 'new science culture' based on the principle of 'responsible care' resonates with ideas present in current RRI discourse (Owen, Macnaghten, & Stilgoe, 2012) and stressed the tensions that arose when researchers and their so-called 'extra-scientific partners' tried to enact these ideals in their research collaborations.

I argued that the findings of this research on transdisciplinary knowledge production can be useful also for thinking about Citizen Science and DIY Science (and for DITOs in particular). The findings of this research make clear that it is necessary to keep in mind the multiplicity of forms of collaboration. There is no such thing as a single coherent and unified version of transdisciplinary research just as there is no 'Citizen Science'. It follows that in order to understand the possibilities and constraints of such forms of collaborative knowledge production it is necessary to focus on the concrete and locally situated practices and on the conditions that are co-emergent with particular modes of collaboration.

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World Café: Citizen Science and RRI areas

- *by Fermín Serrano, Foundation Ibercivis, Chair ECSA Working Group on CS and RRI*

The main goal of the world café was to promote reflections and two-way dialogue between key stakeholders representing different communities in the context of Citizen Science and RRI. Outputs will be used for the policy paper on RRI that ECSA is preparing. Five tables where designed following key issues on Citizen Science and major features of RRI. During the introduction, some key issues were outlined in order to raise deeper reflections among participants. We brought together more than 50 Citizen Science experts, practitioners and policy makers from all around Europe. However, the lack of cultural diversity was mentioned several times. Participants were invited to balance considerations for the EU scale while considering the features of each specific project and local environments.

Table 1 – Public engagement & inclusion & gender equality

It is recommended to expand current academic reputation systems and evaluation criteria to account for social impact and engagement. Finding alternative metrics and incentives for scientific curricula that recognize social engagement may help to support this. We need measurement indicators and metrics to assess public engagement activities and the impact achieved at different levels (scientific, societal, economic, environmental, behavioral…) for the wide range of projects of Citizen Science.

What are the most innovative cases of significant collaborations with independent citizen scientists? Why? Could you implement them in your context?

Participants collected examples of what works well and what doesn't regarding public engagement, inclusion and gender equality in CS. DIY Science spaces and hackspaces have been mentioned as good examples of inclusiveness for their horizontal organization. People can appear without scientific knowledge and they get exposed to scientific thinking; no leaders, no agenda, they just come to give it a try. Another example was mentioned from the Far East where there are many environmental problems and scientific communities are working with people who are affected by problems which are subject of research. It was suggested that if researchers want to study a problem, e.g. dementia or air pollution, they should talk directly with the people involved. "It is about the repeated sentence: nothing about us without us".

Among the things to improve in CS regarding engagement, inclusion and gender equality, it was observed that some Citizen Science projects are very much oriented towards rather intellectual circles, not economically or socially diverse ones. The fact of doing CS activities in a university or in a museum leads to thoughts like "I'm going to see my friends in the pub instead". As a result, cultural diversity of some CS projects is not very good and this becomes a massive issue.

As positive example Open Air Laboratories was mentioned, who mix top-down and bottom-up approaches to engagement. It was also discussed that environmental problems quite often happen to be raised by communities and by the time local the government starts to do something about the problem, it costs 10 times as much as it would have when the problem was first raised by the community. So listening to communities and involving them can save money for public authorities.

Table 2 – Open Access & ethics

Citizen Science implies handling data in a very sensible way, taking into account intellectual property rights, fundamental personal data protection rights, ethical standards, legal requirements and scientific data quality. Clear ethical guidelines and appropriate data licenses are needed for EU-wide data policy.

Even if research data is made open, are there reasons to place restrictions on how the date is used by downstream users?

Participants recommended that, in general, restrictions on data availability should be defined by the research questions of each CS project, which in turn should be defined by all project participants, naturally including citizens. Besides that, Citizen Science projects should try to make collected data as openly accessible as possible, except for sensitive personal data and environmental information (e.g., location of endangered species).

Policy makers, especially at European level, should open up the discussion on how open data can be used by private companies for products or services subject to restrictive licenses (copyright, patents, etc.). This is one recurrent concern from the research community regarding open science: “does open science mean companies will make profit with our findings without having to pay anything for accessing our results, methods and data?”

Table 3 – Science Education

Educational programs should stress collaboration between schools and scientific institutions, which needs to be reflected in scientific and educational value systems. These plans should cover key aspects of Citizen Science.

What are the best cases of CS education that link with RRI? Why?

Participants stressed that education is both a prerequisite and an output of Citizen Science projects. The pre-existing level of education of participants as well as the information required to get engaged in a given project need to be considered as input in the process, while participation in turn also

increases knowledge. Techniques used in science education can also be considered in CS endeavors. As main difficulties participants identified different levels of interest of participants, cultural barriers, time available and resources in general.

This table also raised the need of two-way discussions between participants and project organizers from the very beginning of CS projects in order to frame the research problem and agenda so that they align with the real needs of the people. When addressing indicators for education in CS it should be remembered that accounting has to be accountable. As good example for science education student universities and science shops have been mentioned. They embed real-world problems in education to identify the question and students to work with concerned communities. Regarding the sustainability of CS projects it was stressed that if CS endeavors are to continue after the funding period of a project, it should be more than only about data. There must be a follow-up where the citizens themselves keep the education process on.

Table 4 – Governance & sustainability

Early involvement of different stakeholders in project design processes is important in order to understand the different experiences and challenges of participating groups and to adapt project designs accordingly.

What are the best cases of institutional change and uptake indicators for Citizen Science and RRI?

Discussions focused on the nature of structural reforms needed to increase public engagement in science and what engagement should mean, especially for research institutions. It was asked how to involve people and connect institutions in such a way that leads to better, citizen-based science? Participants identified training for researchers in science communication as need to work to openness. “We have to make institutions more open. Only one open-doors day is clearly not enough, we need to enrich the contact with the people.”

Regarding indicators it was recommended to focus on quality, not on quantity as it is the case now, since researchers are promoted without considering the way that research is done with communities. Also, in order to find meaningful Indicators, a first question is to decide for whom they would be meaningful.

Table 5 – Open table

An open table was dedicated to overarching questions linking CS and RRI, e.g. is Citizen Science responsible? What should we do to be responsible?

Among other topics, participants discussed examples and benefits of structured vs. less structured projects in CS, DIY Science and bio art; limitations of approachability in how H2020-funded projects are built, e.g. deliverables; how to overcome institutional barriers; where art, as production of meaning, and science, as production of knowledge, can come together; as well as relevance and excellence of research and how they can be realized within and outside of institutions.

6 Linking Citizen Science and DIY Science to decision makers

Martin Brocklehurst opened the second interactive session by giving an overview of the activities of the ECSA Working Group on Policy, Strategy and Partnerships and outlined key challenges for Citizen Science at the European level. Claudia Göbel introduced policy engagement activities in the DITOs project. In three break-out groups participants discussed policy priorities for DITOs with Aleksandra Berditchevskaia, definitions of Biodesign with Imane Baïz and Lena Asai, and ECSA policy-related work with Martin Brocklehurst.

How can Citizen Science be relevant to policy?

The ECSA Working Group on Policy, Strategy and Partnerships has three main objectives as defined in the Brussels workshop in the autumn of 2013: (1) Assess the CS landscape and develop strategies across countries, (2) Approach policy makers and assess how to influence decisions and leverage funding, (3) Analyze who the key stakeholders are and who ECSA needs to engage with to bring about change in sectors. Activities of the Working Group in the past years included several policy briefings at the European Union. Since 2014, the Working Group is in contact with DG Environment, DG Connect and DG Research. In 2015, a lunch time seminar was held at the European Commission and in 2016 the group conducted a briefing for Members of the European Parliament.

Martin Brocklehurst asked how to increase the support for CS by EU policy makers. He pointed to the government support for Citizen Science in the United States highlighting the White House's statement on the significance of CS and the platform citizenscience.gov that presents CS projects realized together with US agencies. In the EU we find a great potential to engage many people in research. He identifies seven key challenges for Citizen Science in Europe:

- How do we mainstream Citizen Science into the European Union policy process and exceed the US White House achievements with their Federal Agencies?
- How do we achieve a "Platform" for Citizen Science within the EU chaired by senior political figures to map out how to mainstream Citizen Science into the policy work of the Commission?
- How can we establish policy leads on Citizen Science in key EU Directorates and within the EU Parliament to work with ECSA and to support engagement?
- Most EU Directives or Regulations do not recognize Citizen Science. Many provide real barriers to the use of Citizen Science data. How do we change the status quo?
- How do we establish common templates that policy makers can use to make recommendations on where Citizen Science makes sense in future Directives?
- How do we establish and maintain a common European data base system that citizens can use to store data and interrogate?
- How do we create robust institutional frameworks to encourage Citizen Science?

Based on these challenges, the Working Group will work towards encouraging the EU to recognize the role of CS in: EU Environmental Monitoring and Reporting, meeting and reporting on the UN Sustainability Goals, and as an early warning on key environmental challenges. Two initiatives are just

forming to advance this work: a sub-group on linking serval national Mosquito monitoring projects in Europe that is also working with the partners in the US and supported by UNEP. Another sub-group will explore EU environmental policy areas where an existing CS project could be demonstrated at European scale.

Introduction to DITOs policy work

Next to public engagement, the DITOs project also seeks to create guidelines, mechanisms and institutions to extend the development of policy engagement in Citizen and DIY Science across Europe, fostering RRI, linking the pan-European Citizen and DIY Science communities to decision makers at various levels. There will be four types of activities for that purpose:

- **A fact finding and review** exercise of good practice and policy guidelines to develop an evidence base for DITOs policy engagement activities.
- **A series of Policy Briefs** to provide information for decision makers on pertinent issues from the field of Biodesign and Environmental Sustainability as well as the RRI-related topics gender equality and inclusion, ethics and quality evaluation, involvement of SMEs and industry in DITOs, open access, open data, and open science.
- **Events** to present and review good practice and discuss with stakeholders including Stakeholder round tables, Discovery Trips with policy makers, a perspectives on Citizen Science conference and a Pan-European Policy Forum.
- **Institution building** for ECSA to ensure DITOs' legacy and sustainability through linking DITOs activities to the ECSA network.

For all of them contributions are very welcome, please get in touch with the DITOs team.

Discussion: DITOs stakeholder engagement

- *by Dr. Aleksandra Berditchevskaia, Tekiu*

When it comes to discussions of the long-term sustainability of Citizen Science, the 3 core issues of funding, infrastructure support and validation tend to dominate. The interactive session allowed roundtable participants to elaborate on these and other topics by suggesting policy priorities for the DITOs project to focus on in the next 3 years. The group contributed the following list:

1. Creating communication channels and infrastructure for sharing of results and methods within Citizen Science community.

2. Engaging local government authorities to support Citizen Science and carry out pilot projects.

3. Writing Citizen Science into legislation and policy. (e.g. European version of US Bill on Citizen Science).

4. Funding support through better relationships with institutions and adapting indicators and evaluation criteria where relevant.

5. Official validation and recognition of the value of Citizen Science, both for participating communities and academics.

6. Provision of facilities, equipment and training through improved relationships with universities and industry.

7. Not losing sight of the grassroots and opening up dialogues around policy.

In addition, during the session possible future scenarios for Citizen Science in Europe were considered - a thought experiment that allowed the group to confront some hopes and concerns. For the best-case scenarios participants imagined widespread recognition of complimentary roles for Citizen Science and traditional academia in the scientific endeavor, with funding schemes adapted to enable access by community stakeholders. As a counterpoint, it was imagined the negative consequence of cuts to research funding due to promotion of Citizen Science as frugal (or free) science and the possibility that the Citizen Science movement will lose momentum if negative publicity around safety concerns of DIYbio is not fairly balanced with its positive potential.

How can we bring grassroots and institutions into dialogue with each other to resolve issues of funding, legitimacy, infrastructure and reciprocity in the long term?

A recurring theme throughout the discussions was the need to improve the relationship between grassroots and institutions. All of the issues highlighted as priorities can only be confronted if time is invested in developing the links between communities and universities, funders, regulators and policy makers.

Defining Biodesign: What do you think it means?

- *by Imane Baïz, Université Paris Descartes (UPD), Center for Research and Interdisciplinarity (CRI Paris)*

Biodesign is an emerging field that needs a commonly agreed definition. This workshop served as a starting point for a very fruitful discussion that contributed to better contextualize Biodesign in Citizen Science. First, it was outlined the importance of creating a framework for Biodesign in order to ensure common understanding and efficient communication. Definitions and approaches of Biodesign provided by DITOs consortium partners were discussed, and current fields and concepts related to Biodesign reviewed, such as biomimicry and cross-disciplinarily in arts and sciences. Participants exchanged about their views and insights on Biodesign, such as for example the importance of involving the DIYbio community and grassroots in general, but also the need for Biodesign event's organizers to adapt their vocabulary and labelling for each activity according to the target audiences (i.e., for children partners could use the terms "make, create, experiment, play with biology").

Defining Biodesign working document. Google Doc

7 Towards policy recommendations

One of the objectives of the DITOs project is developing a policy engagement strategy to raise awareness on the value of active participation of citizens in science. The strategy is implemented via different events formats and activities, including stakeholder round tables at local and European scale, a Policy Forum, Discovery Trips and policy briefs on six different topics.

The stakeholder round table closed with two parallel workshops aimed at introducing the topics of the first two policy briefs: 1) DIYbio – regulation, creative and societal change potential, and 2) Cross-border research and cooperation for environmental sustainability.

The session aimed at creating a common understanding of the policy brief - meant as a tool for effective evidence-based communication for the science-policy interface - and starting a participatory process for their development, by leveraging a diversity of stakeholders beyond DITOs partners and ECSA members.

DIYbio – Regulations, creative and societal change potential

- *by Lucas Evers and Pieter van Boheemen, Waag Society*

The topics of the BioDesign & DIY Biology Policy Brief session included the discussion how to find a working overarching label for the combination of general public, designers, artists and scientists working on non-academic bio sciences as part of a wider interest of non-scientists in 'creating' science. It was a lively and productive discussion about the need of inclusiveness, artistic participation, ethics, institutionalization versus grass-roots, waste, safety and security issues beyond the 'bioterrorism' nonsense, transparency and last knowledge about legal rules of what is allowed and what not and where to find advise.

The discussion was both diverse and lively and overarched many points that will be addressed in the eventual policy brief. The grass roots organizations and the organizations that have grassroots groups in house warned to identify the productive powers of CS and put emphasis on diversity, access, inclusiveness, transparency, ethics, reciprocity and avoid over-institutionalization, criminalization and not take facilitation of these groups to light-heartedly.

Waag Society (CC BY-NC-SA 2.0)

How can DITOs strengthen Citizen Bio Sciences by offering support for grassroots groups to be facilitated but not over-institutionalized; to be creative but also supported in creating quality; work safe without being criminalized; get access to knowledge, information and technology to do its own research and work with its own questions?

Diversity. Citizen science movement encompasses a rich diversity. For example, the thousands of people that take part in a museum night are quite different from the duo doing TLC (thin layer chromatograph) analysis of metabolites on an open community lab day. This observation is the starting point of DITOs and the project includes a similar rich diversity of activities directed towards specific subgroups of the Citizen Science movement. In the session in Berlin we clearly observed citizen, design, artistic interests in approaches to Citizen Science.

Recognition. What indicators are used for measuring and recognizing success and impact? We are living in a world that's dominated by market logic, and in order to play that game we need numbers - however not only numbers that reflect a narrow capitalist market logic, but also that of more sustainable forms.

Reciprocity & fairness. What do citizens get in return for their contribution to the commons of knowledge? Who is benefitting from the value created by Citizen Science and how are those benefits redistributed?

Criminalization. Everywhere I go to speak about DIYbio the second question has to do with terrorism or security. This foolish discussion is seriously hampering the progression of the movement. This topic needs to be addressed nonetheless, just like "regulation" and other ways of "restriction", but enough has been said in other policy briefs already. I am not a big fan of code of conducts, because the narrative of "trust us, because we will take care ourselves" is incorrect. Any critical audience would demand oversight by an independent party, not by the practitioners themselves.

Inclusiveness. What groups within society are able to take part in Citizen Science, and how to enlarge this group?

Transparency. Insights in the process of knowledge production and the motivations behind research topics. This counts for both institutional as Citizen Science.

Affordability. Academic science has its traditional ways of spreading knowledge through publications and conferences. Entrance fees and submission fees are often covered by grants. A similar structure is needed for Citizen Science.

Quality. A major concern in all sciences regarding Citizen Science is the issue of quality and reliability.

Access. The worst I experienced was a Citizen Science meeting at the JRC center in Ispra, an invitation only event, where I had to hand in my passport, go through scanners, and was not allowed to walk around the building without supervision. Clearly, the organizers of Citizen Science events must be more careful in selecting venues. Access to infrastructure is also important, perhaps a step beyond the current Science Shops model.

Advocacy/Representation. In what way is Citizen Science represented? Is the fragmented nature of the movement the cause for overlooking the impact?

Funding. From my perspective, the EU is much more progressive in funding Citizen Science than national funding bodies, but perhaps that is different in each country.

Responsibility. Whose responsibility is it to ensure Europe has a science literate society? What kind of obligations and morality is associated with this responsibility? Are citizen scientist solving the issues that academy should?

Permissions. An additional point related or overarching criminalization, access and responsibility is permission. In the Berlin session we spoke about the rules and regulations that exist in all member states of the EU where it comes to working with chemicals, pathogens, technologies that require safety measures. Must we and can we create an overview of such regulations in a manner useful for Citizen Science and does it help or hinder the development of Citizen Science?

Based on these conversations, it was discussed to re-orient the policy brief that is to be written. The current suggestion is: Citizen Bio Sciences - advise how to facilitate bottom up non-academic research. Including biohacking, bio arts, bio design and citizen bio sciences research.

Cross-border cooperation for environmental sustainability

- *by Pawel Wyszomirski*

Cross-border research and cooperation for environmental sustainability is a very wide topic. During the workshop held at the end of the round table, the discussion was narrowed to cross-border research and cooperation within the European Union in field of Citizen Science.

Commonly, such cross-border research and cooperation are supported under EU programmes like Horizon 2020 or the previous Sixth and Seventh Framework Programmes for Research and Technological Development (FP6 and FP7). Examples within FP7 include several projects under the category "Citizen Observatories" focusing on the themes of Citizen Science and environmental sustainability (e.g. CitiSense, Omniscientis, CobWeb, WeSenseIt). Additional instrument for smaller actions are research networks under the European Cooperation in Science and Technology (COST) programme. Finally, an important player for such cooperation in the field of Citizen Science has been recognized in the European Citizen Science Association (ECSA), which is a forum for European-wide discussions and actions on the topic.

Currently, the EU has started discussions for the preparations of the next (9th) Framework Programme, most likely to cover the period 2021 – 2027. Therefore, it is crucial that future policy recommendations on cross-border research and cooperation for environmental sustainability are identified.

Cross-border cooperation for environmental sustainability in the field of Citizen Science is not only on cheap data collection by ordinary people but on engagement of them and their communities in active research.

Discussion

During the workshop challenges faced by the Citizen Science community on the topic of cross-border research and cooperation in Europe were discussed. Challenges can be grouped in four key themes - 1) stakeholders, 2) policy & methodology, 3) infrastructure & data management, 4) funding.

Two main stakeholders groups were addressed: scientists and citizens interested in scientific research. In order to facilitate cross-border research and cooperation for scientists it will be important providing networking opportunities among key players, including different communities e.g., NGOs. Main challenges for citizens that were discussed regarded strategies of engagement in research projects, communication, and the recognized need for tackling cultural differences to allow cross-border cooperation.

Participants acknowledged that Citizen Science is not only about data collection but also about working with communities. Therefore, policy should be opened to a wide range and informed by evidence of best practices on different aspects in the field of Citizen Science – e.g. education, technology, community building.

Infrastructure and data management is another key topic when talking about cross-border research and cooperation. A common standard for data management was claimed during the discussion, as it can be crucial for an efficient coordination of data collection and data sharing between different projects.

Another issue highlighted by participants is the common concern that Citizen Science is often considered a tool to reduce costs of research. Scientist should not look at Citizen Science projects merely as a method for low-cost collection of data, as such outlook could have very negative outcomes in the long-term, discrediting the different values and impacts that Citizen Science has on research, education, society and policy.

The workshop closed with proposals for further actions. The draft policy brief on cross-border research and cooperation for environmental sustainability developed within the DITOs project will be consulted at EU wide scale. Several different stakeholders will be consulted, including non-science stakeholders and grassroots. The policy briefs that will be produced in DITOs, will potentially include policy recommendations at different levels to be introduced in period 2012-2027.

8 Synthesis

The round table facilitated a crossing of perspectives between stakeholders of Citizen and DIY Science from science, civil society, communication, government, art and business that altogether drew up a broader view on potentials and needs of participatory research practices.

Dual Relationship between RRI and Citizen Science

Relations between RRI and CS/DIY Science were a mayor thread of discussion throughout the round table. Two directions need to be considered: (1) CS and DIY Science can be seen as a form of Responsible Research and Innovation because they facilitated public participation in research. An example was provided by the Citizen Sense project. It co-created an air pollution monitoring kit with residents at fracking sites and promoted the use of CS data as input for decision-making and policy processes regarding environmental problems. Another one can be found in activities at Technarium, where hackers develop tools for CS with the aims of enabling new research and making projects more accessible. Participants noted that as CS is becoming more popular with funders now, it needs to be emphasized that CS is more than data gathering - education, technology and community building are integral parts of participatory research practice and need to be accounted for. On a similar note participants voiced the common concern that CS is often considered a tool to reduce costs of research. Scientist should not look at Citizen Science projects merely as a method for low-cost collection of data, as such outlook could have very negative outcomes in the long-term, discrediting the different values and impacts that CS has on research, education, society and policy.

(2) The second direction of the relationship between CS/DIY Science and RRI was aptly expressed by Daniel García, who highlighted that “Citizen Science is supposed to be responsible because it already takes lay people on board. However, RRI goes further and invites us to consider whether our Citizen Science projects are responsible enough”. He drew attention to questions on levels of inclusiveness,

diversity, responsiveness that CS/DIY Science projects could ask and pointed to the RRI Toolkit for further resources on how to implement more "responsible" research and innovation practices in CS. Based on his reflections on responsibility in the field of transdisciplinary research, Thomas Völker pointed out that since "there is no such thing as a single coherent and unified version of transdisciplinary research just as there is no 'Citizen Science'" responsibility can only be considered and made productive in practice if the diversity of CS and DIY Science approaches and the local contexts of projects are taken into account.

The RRI concept as presented by the European Commission (2016) is based on the six pillars public engagement, open access, gender equality, ethics, science education. These were used to explore RRI further regarding specific questions for CS and DIY Science, good examples and challenges in a World Café and several interactive sessions (Table 1). During the discussions it became clear that inclusiveness is a key field in this interplay which has to be explored in more detail. Also the expert group on policy indicators for responsible research and innovation came to the conclusion, that sustainability as well as social justice and inclusion are necessary overarching areas of RRI (EC 2015). Sustainability refers to the broader picture of flows, ecosystem services and human wellbeing, social justice means that social groups equally benefit from research (EC 2015). It can be assessed how far researchers consider impacts of their research on social justice, and whether concrete steps are taken to enhance social justice or avoid negative consequences. Regarding indicators, it was recommended in the discussion to focus on quality, not on quantity, so as to take into account that research done in cooperation with communities has special needs.

This collection of material provides a basis for further discussion within the CS and DIY Science communities and DITOs work in that area. In the DITOs project itself, RRI is addressed as part of the project evaluation (DITOs Consortium, 2016, Table 5.2). Concrete means to enhance inclusiveness and to evaluate its impact on social justice are an important next step.

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European Commission (2016) Resonsible research and innovation. https://ec.europa.eu/programmes/horizon2020/en/h2020-section/responsible-research-innovation (access 28.12.2016).

Table 1: Dimensions of RRI, indicators and points from round table discussions.

Dimensions of RRI (EC 2016)	Indicators (EC 2015, selection)	Important points from round table discussions & remarks for DITOs
Public Engagement with Science	Dimension policies: public influence on research agendas; Dimension events: museum visits; Citizen Science initiatives; Dimension competence building: training activities	Involvement of people in research is important, especially when affected by a problem, and can also save money for public authorities. Challenges: Involving citizen scientists in making decisions from the beginning of projects on so research aligns with needs of people. Reciprocity & fairness. What do citizens get in return for their contribution to the commons of knowledge? Who is benefitting from the value created by Citizen Science and how are those benefits redistributed? Create sustained interest over longer terms. Good examples: OPAL combining bottom-up and top-down engagement DITOs intends to develop evaluation schemes for the event types exhibitions, online activities, cafés & seminars, and workshops.
Open Access	Data repositories that include explanation and commentary to facilitate use	CS projects should try to make collected data as openly accessible as possible, except for sensitive personal and environmental information. Challenges: Address question “Does open science mean companies will make profit with our findings without having to pay anything for accessing our results, methods and data?” Infrastructure and data management is another key topic when talking about cross-border research and cooperation. A common standard for data management would be helpful. While in environmental monitoring open access to data is key, for the DIYbio scene open access to methodologies should be considered, too. Transparency beyond open access & open data - Insights in the process of knowledge production and the motivations behind research topics.
Gender Equality	Gender equality plans; percentage of woman as principle investigators; perception of gender believes	DITOs seeks to address gender in its reporting and evaluation procedures. The will also be a policy brief on gender and inclusiveness.

Ethics	Mechanism for multi-stakeholder / transdisciplinary processes of appraisal of ethical acceptability	Two important points where ethics is relevant are volunteer work as unpaid work and bioethics. In addition to ethics, differences in national regulations on molecular/synthetic biology have been discussed, e.g. on working with chemicals, pathogens, technologies that require safety measures. Must we and can we create an overview of such regulations in a manner useful for Citizen Science and does it help or hinder the development of Citizen Science? It was also highlighted that security needs to be discussion without criminalizing DIYbio protagonists.
Science Education	RRI training; projects with educational resource deliverable; projects registered at www.scientix.eu	Education is both a prerequisite and an output of Citizen Science projects. Challenges: Different levels of interest of participants, cultural barriers, time available and resources in general. Training for researchers in science communication as need to work to openness. Regarding the sustainability of CS projects, if CS endeavors are to continue after the funding period of a project, it should be more than only about data. There must be a follow-up where the citizens themselves keep the education process on. Good examples: science shops, student universities Information on RRI will be offered in the DITOs framework; a study on barriers to implement RRI from the researchers' perspective may be helpful, too.
(Inclusiveness & Social Justice)	(calls and projects considering social justice)	Challenges: Lacking social, economic & cultural diversity of CS projects. More open institutions. Good examples: DIY Science spaces and hackspaces for their horizontal organization. DITOs should develop clear policies and recommendations on enhancing inclusiveness as key approach for social justice. A policy brief on gender and inclusiveness will be prepared.
(Sustainability)	(monitoring of stocks, ecosystem services and human wellbeing as part of the socioecological metabolism of the EU /world)	BioDesign as well as environmental monitoring are chosen as key thematic topics for DITOs in order to enhance sustainability

CS and DIY Science

It was stressed that it is critical to invest time in establishing links and better understanding roles of the different stakeholders and actors in CS and DIY Science, such as communities, universities, funders and policy makers. The round table showed that there are different perceptions about the role of citizens, science, and the value and type of interactions in Citizen and DIY Science. While especially parts of the DIYbio community consciously chose some distance to institutions for implementing their projects, there have been other examples, such as in the cases of lichen and mosquito monitoring, showing how fruitful such co-operations between citizen scientists and research institutions can be. It is important to take this diversity of approaches into account, the DITOs escalator is one attempt to do so. Roots for common ground between CS and DIY Science were seen in similar goals and ethos. However different labels, as noted by Egle Ramanauskaite self-ascribed or not, sometimes prevent productive discussions. One option is rather not to focus on definitions but on exchanging experience on the work that is conducted in projects. Improving relationships between grassroots communities and scientific institutions was identified as a need for further action. A mayor tension that makes such relations difficult is seen between paid and unpaid contributions to science, and the form of acknowledgement. This is true both for work done in CS and DIY Science projects as well as for co-operation between these communities. For further exploring these relations, it is important to create accessible spaces for exchange. Locations, schedules, money need to be considered here as well as transparent and open planning.

Follow-up Points for DITOs Policy Engagement and ECSA Development

- Continue analysis of the different policy frameworks (RRI, Open Science, etc.), their meaning and potential for the strategic development of Citizen Science. In addition to follow up with work on RRI, this is especially needed for Open Science as many aspects that are discussed within CS communities are overlapping, e.g. indicators of success and impact, infrastructure needs, business models, access to research processes and results. Another reason is that Open Science has become a major focus of European research and innovation policy and CS is seen as an integral part. However in this context, CS is mainly perceived as ways for collecting and analyzing large amounts of research data, while a broader view of CS activities as well as consideration on how CS can enhance the impact of research remain vague.
- Examine closer needs regarding long-term sustainability of CS as well as cross-border cooperation, especially regarding funding, support and legitimacy, stakeholder engagement, infrastructure and data management, and reciprocity. Specific points for action and further investigation have been identified:
    - Creating communication channels and infrastructure for sharing of results and methods within CS community.
    - Engaging local and national government authorities to support CS and carry out pilot projects and support recognition of CS in policies.
    - Providing networking opportunities among key players, including different CS and DIY Science communities as well as stakeholders.
    - Recognition of complimentary roles for CS and traditional academia in the scientific endeavor, with funding schemes adapted to enable access by community stakeholders.

- Community support structure for CS akin to academic science's traditional ways of spreading knowledge through publications and conferences where entrance fees and submission fees are often covered by grants.
- Better relationships with institutions for funding support and access to facilities, equipment and training.
- Adapting indicators and evaluation criteria, where relevant, to specific affordances of CS and DIY Science. Take responsibility of research, including social justice and environmental sustainability into account.
- Official validation and recognition of the value of CS, both for participating communities and academics.

- Continue engaging with DIYbio communities. Jointly analyze and work on tensions, e.g. typical ones (paid vs unpaid volunteers) and specific ones (bioethics). The need for improving relationships and communication between grassroots and institutions and for networking opportunities emerged several times during the round table discussion. DITOs should follow up here. Projects and activities run by ECSA also have the potential to contribute here by exploring collaborative approaches and leveraging resources for the benefit of the members. This is one of the scopes of DITOs, which in fact provides multiple opportunities to link its objectives and planned activities with ECSA working groups. ECSA should also continue its work on inclusiveness – regarding the CS communities and stakeholder it addresses, and in the organization of own activities, e.g. time and venues need to be accessible to citizen scientists. Voices that are perceived to be lacking are those of volunteer participants and volunteer organizers. Continue critical discussions on representation and advocacy work against this background.
- Refining the definition of the term BioDesign appears useful at least for use in DITOs, although different communities may use the term for different purposes (see for instance the relationship of DIYbio and art). The current definition proposed by DITOs uses a triangle of research-science-engineering, but the biological dimension of it is unclear. A clear understanding would be helpful, especially since synthetic biology is very much linked to new technologies and public interest/participation is still an emerging field.

9 List of Participants

Surname	Name	Organization
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Elbing	Kerstin	German Life Science Association (VBIO e. V.)
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Krpan	Jurij	Kapelica Gallery
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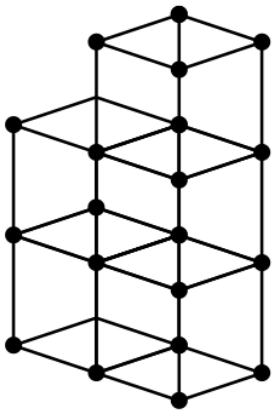
Labeeuw	Annick	Centre for Genomic Regulation/ Stick out your tongue (CRG)
Lipinski	Marc	CNRS
Luna	Soledad	ECSA
Mari Saez	Almudena	Institute of Tropical Medicine and International Health-Charite Berlin
Mascarenhas	Andre	ECSA & LandSense
Mateo Penas	Alfonso	Individual
Matrai	Silvia	Hospital Clínic de Barcelona
Mazzonetto	Marzia	Individual
Nunes	Maria	State Festival
Palceco	Carole	RBINS
Patterson	Lucy	SHD Berlin
Pritchard	Helen	Citizen Sense

Rapp	Regine	Art Laboratory Berlin
Ramanauskaite	Egle	Citizen Science Coordinator & PIO at Human Computation Institute
Riousset	Pauline	Institut für ökologische Wirtschaftsforschung
Rössig	Wiebke	Museum für Naturkunde Berlin
Runnel	Veljo	University of Tartu Natural History Museum
Schroth	Fabian	Fraunhofer Center for Responsible Research and Innovation
Serrano	Fermin	Fundacion Ibercivis
Steinhaus	Norbert	WiLa Bonn
Thauer	Guenter	TBS
Trojok	Rüdiger	Synenergene
Vohland	Katrin	Museum für Naturkunde Berlin & ECSA
Völker	Thomas	JRC
Wandl-Vogt	Eveline	Austrian Academy of Sciences
Weiand	Laura	Institute for Advanced Sustainability Studies
Wessolowski	Iris	Wila Potsdam - Sciencekompass - openMINT
Wolf	Eric	Individual
Wyszomirski	Pawel	Eco21
Ziegler	David	Museum für Naturkunde Berlin



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