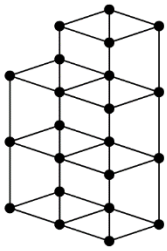

doing it together science

Grant agreement no. 709443

DITOs

Doing It Together science

Coordination & Support Action

D1.3 Good Practices in Participatory Biodesign

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EU-RES	Classified Information: RESTREINT UE (Commission Decision 2005/444/EC)	
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1 Version Log

Version	Date	Released by	Nature of Change
DRAFT V1	14/03/2019	Tonnino Rizzo, UPD	Initial draft
DRAFT V2	15/04/2019	Tonnino Rizzo, UPD	Version 2
DRAFT V3	02/05/2019	Tonnino Rizzo, UPD	Version 3 of the draft sent to be reviewed
DRAFT V4	20/05/2019	Tonnino Rizzo, UPD	Review comments added
V1.0	30/05/2019	Judy Barrett, UCL	Final formatting for formal release

2 Definitions and Acronyms

Acronyms	Definitions
CS	Citizen Science
CSA	Communication and Support Action
DITOs	Doing It Together science
DIT	Do It Together
DIY	Do It Yourself
EC	European Commission

ECSA	European Citizen Science Association
eutema	eutema GmbH
H2020	Horizon 2020 Programme
KI	Kersnikova Institute
KPI	Key Performance Indicator
Meritum	Centrum Szkolen I Rozwoju Osobistego Meritum
MP	Medialab Prado, Madrid
RBINS	Institut Royal des Sciences Naturelles de Belgique
RRI	Responsible Research and Innovation
SDGs	Sustainable Development Goals
STS	Science and Technology Studies
Tekiu	Tekiu Limited
UCL	University College London
UNIGE	Universite de Geneve
UPD	Universite Paris Descartes
UN	United Nations
WS	Waag Society

3 Executive Summary

This report analyses ten event formats from the Doing It Together Science (DITOs) project (1 June 2016 - 31 May 2019).

The contribution of this deliverable is to categorise ten DITOs citizen science activity formats into different typologies according to level of engagement:

- **Raising awareness:** to sensitise the public to social and environmental issues
- **Participation**: to engage citizens in contributing to scientific projects
- **Co-design:** to engage a variety of stakeholders in co-creating innovative and interdisciplinary projects.
- We also include the '**Education'** typology, which engages and empowers young people across all levels of engagement.

This taxonomy is intended to help event organisers and scientists pick the relevant citizen science activity formats for their specific goals and help them target particular groups.

The report lists the main characteristics of each of the event formats, starting from their objectives, required resources, and showcases DITOs examples of each format as well as discussing their pros and cons.

Finally, these event formats are analysed and synthesised to create a set of good practices suggestions for how to use events to engage citizens and society in scientific activities.

4 Introduction

From the 1st of June 2016 to the 31st of May 2019, the DITOs project focused on running citizen science events that would support scientific literacy and skills. During this period, DITOs partners organised **764** events spread around Europe, which engaged **3,806,866** people. Events play a key role in connecting citizens, academics and practitioners and create a framework for Citizen Science (CS) to develop freely. CS projects can be initiated, and co-designed with citizens, or citizens can be engaged in CS activities.

While the previous deliverables (D1.1, D1.2, D2.1 and D2.2) discussed event and outreach planning, this report focuses on how to achieve specific goals using different event formats. These formats have specific properties and affordances that make them more or less suitable for different tasks. To illustrate this, this report showcases a selection of citizen science (CS) event formats and discusses their benefits and weaknesses using a qualitative approach. The events are illustrated using a series of radar charts that display multivariate data in the form of two-dimensions.

The methodology for compiling this report involved asking the DITOs partners to discuss their most successful event formats and analyse their characteristics. Each format is illustrated by a case study from DITOs and classified into four typologies according to their potential in engaging societies at all levels: education, awareness and discussion, participatory actions, and co-design.

This report was written in parallel with D2.3 using a complementary approach. D1.3 focuses on the best practices for CS event format and technical characteristics, whereas D2.3 focuses on the best practices for the CS experience. Both reports aim to leave a legacy for future CS event organisers and describe successful events, provide guidance on choosing one event format over another, and share good practices that are relevant to CS and citizen engagement. Since some explanations apply to both deliverables, some pieces of texts are reproduced in both deliverables to ensure that each report can be read independently.

We would like to highlight the term ‘citizen’. In our context, ‘citizen’ is often used as an antonym to ‘expert’. According to this usage, a space engineer would be a citizen to the biologist and vice versa, such that anyone might be considered a citizen across a range of specific topics. In its original use, the word ‘citizen’ denotes someone who is a part of a societal group. A scientist working in CS is therefore as much a citizen as anybody else. This fact has direct consequences for the understanding of what citizen engagement is. For example, a summer school focused on DIY technologies that is open to anyone, mostly makers, engineers, doctors, etc, will aim to develop a project. Even though the participants cannot be designated as the general public because it has a specific target audience, it is still an act of citizen engagement, especially if the outcome is directed toward society or shared open-source. Also, while organising a face-to-face event between the public and an expert, it is an act of citizen engagement from the side of the expert to come and contribute, especially if it is on a voluntary basis.

We believe it is important to consider societal engagement as well - how to have everyone working toward the same goals and acting to change global issues. The

Sustainable Development Goals (SDGs) were created by the United Nations to channel effort in this direction. While nations have adopted the SDGs, and industries and institutions have rallied to them, it remains important to have the general public involved in this common effort [**2**].

5 Activities and Results

Citizen science (CS), although it has many definitions, is a community-based process in which scientists meet with non-experts to exchange knowledge, know-how and practices.

In this regard, events play a key role in connecting multiple actors, specialists and active individuals. They are special occasions in which resources and intelligence are pooled together to move forward as a society, solving problems that are relevant to humanity or local populations **[1]**.

In the following section we will examine ten event formats that are relevant to CS because they have a great potential to connect motivated scientists, practitioners, non-specialists, and policy makers. These connections can have different objectives: raising awareness within a population, uniting stakeholders to lead a project, co-designing projects, or working with policy makers to create a better framework for CS.

As engagement is a central aspect of the DITOs Project, we have identified four typologies according to their level of engagement, namely education, awareness, participation and co-design. These levels of engagement underpin the DITOs escalator model around which the project was built. Education might appear to be outside of our scope, but citizen science embedded in education is an efficient means to engage and empower young people and future adult citizens. Education functions as a fundamental cross-cutting approach that transverses the DITOs escalator.

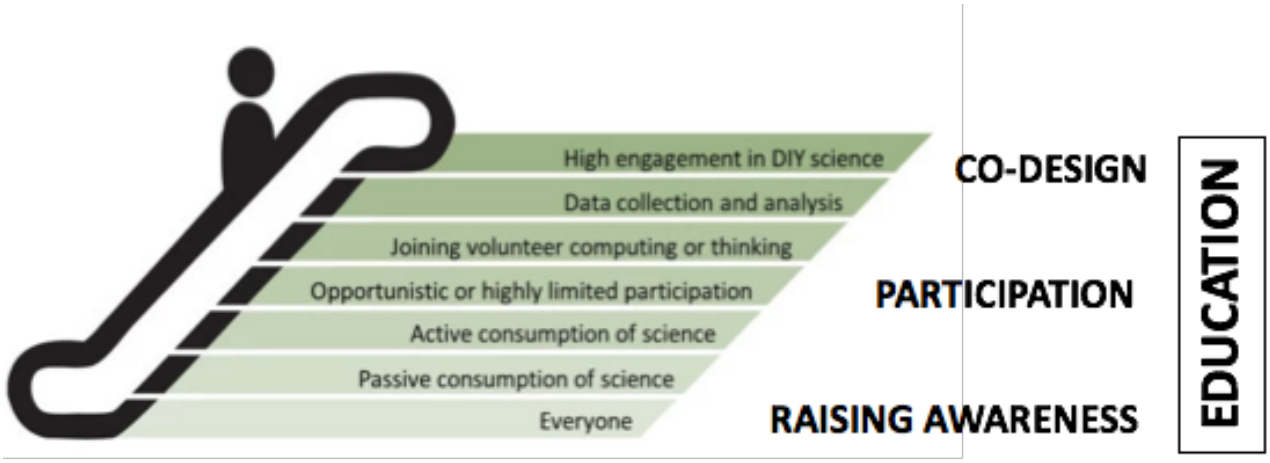


Figure 1: The DITOs Escalator Model combined with the four typologies for event categorisation

The two following tables show the four typologies, and how each of the ten formats fits into them.

Table 1: Four citizen science typologies and the ten event formats from DITOs.

<table>
<tr><th colspan="3">EDUCATION</th></tr>
<tr><td colspan="3">Education is a transversal typology that encompasses all of the others. Integrating citizen science at schools is a way to equip learners with life-long skills, knowledge and attitudes that foster change-making. CS-based education does not only provide an understanding of scientific methods, but it also develops social skills used to communicate, take part in or coordinate multi-stakeholder projects.

DITOs examples:
● High School Workshop
● Teacher Training</td></tr>
<tr><th>RAISING AWARENESS</th><th>PARTICIPATION</th><th>CO-DESIGN</th></tr>
<tr><td>The general public discovers citizen science initiatives and ways to be engaged.

DITOs examples:
● DIT Workshop
● Film Night
● Science Café</td><td>Citizens are involved in the process of gathering data or other forms of contribution in externally led projects.

DITOs examples:
● Bioblitz</td><td>Individuals are actively involved in the design of the projects, alongside experts and other participants.

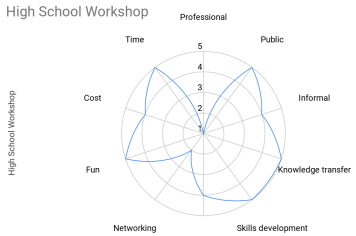
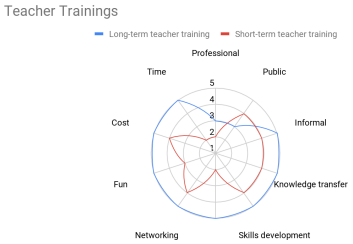
DITOs examples:
1. Citizens with Experts
● Interactivos?
● Co-lab Workshop
2. Experts with Experts
● Cross-cultural Conference
3. Policy makers with Experts
● Stakeholder Round Table</td></tr>
</table>

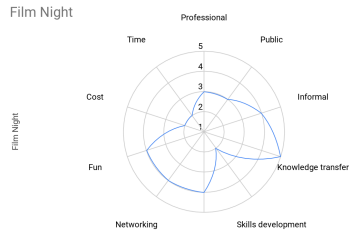
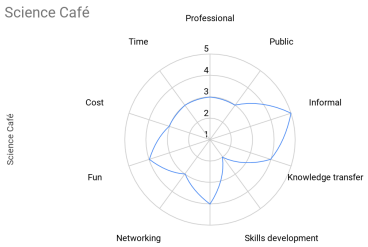
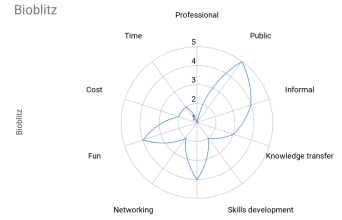
Because organising events requires important planning effort and resources, we decided to focus on the underlying objectives of event formats best suited to achieving those objectives. If the main goal is to discuss specific topics with policy makers and share knowledge with practitioners, then a Stakeholder Round Table is well suited. On the other hand, if the goal is to gather data with the help of citizens, then a Bioblitz would be a better format in that case. We are eager to share DITOs' experience to inspire and help future event planners to build the best events according to their needs and objectives.

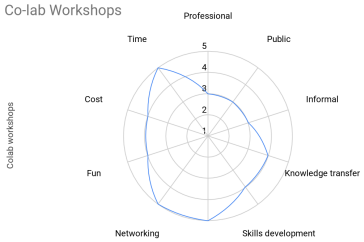
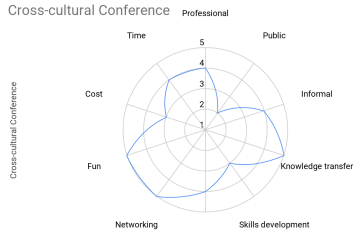
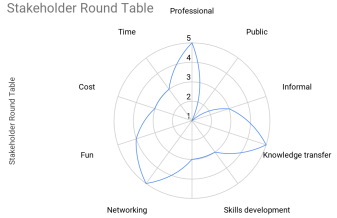
5.1 Event Format Overview

This section summarises key points from the event details in subsequent sections.

Table 2: Event Format Overview showing the ten event formats and four typologies.

Radar Charts	Event Format *(Typology)*	Target Audience	Facilitators and Partnerships	Number of Participants	Optimum Location	Optimum Duration and Time slot
	**High School Workshop** *(Education)*	Students, educators	Scientific mediators, Researchers, National education authorities, research centres, industry, foundations	30	School lab or outside	½ to 1 day During the week (except holidays)
	**Teacher Training** *(Education)*	Educators	Scientific mediators, Researchers, National education authorities, research centres, industry, foundations	***Short-term training***		
				100	An auditorium, small rooms to split groups and a space for networking	½ to 1 day
				Long-term training		
				15	A room or a school lab	9 months (around 260 hours), preferably in January

	**DIT workshops** *(Raising Awareness)*	General public, doers / amateurs / makers, Activists, hackers, Educators	Scientific mediators, researchers, DIY practitioners or scientists	6-10	Anywhere that would and can host such event	2-2.5 hours, on evenings (it allows working people to attend)
	**Film Night** *(Raising Awareness)*	General public, practitioners, scientists, researchers interested in public engagement	Practitioners, scientists, researchers interested in public engagement; but also with universities or institutions who have free space AND screening license	20	Anywhere with a large screen and a screening license	2-2.5 hrs on evenings
	**Science Café** *(Raising Awareness)*	General public, doers / amateurs / makers, activists / hackers, students, educators, policy/decision makers, academia	Experts, scientists (on individual and institutional level)	40	Small auditorium, gallery	2hrs on evenings during the week
	**BioBlitz** *(Participation)*	General public	Institution, natural museum, NGO working in environment monitoring	25+	A small space and a large outdoor space	24hrs Time depends on the context

	**Interactivos?** *(Co-design)*	General public, doers / amateurs / makers, activists / hackers, students, educators, academia	Experts that will act as mentors from different sectors (academia, industry, etc) and a network of hubs that can promote and disseminate the open calls	From 50 to 100	Auditorium for the seminar, open space for workshops and an exhibition place	Around two weeks (15 days) during spring or summer
	**Co-lab Workshop** *(Co-design)*	Students, professionals (architects, designers, photographers, artists, sociologists, biologists, researchers, ...)	Scientific mediators, students, researchers, research centres, NGOs	25	Hackerspace / fablab / lab; a room big enough to welcome all the participants	3 days, preferably on Friday - Saturday - Sunday
	**Cross-cultural Conference** *(Co-design)*	Doers; amateurs; makers; activists; hackers; students, policy/ decision makers; academia	Scientific mediators, researchers, research centers, practitioners	80-100	Auditoriums and Hackerspaces	3 days + A trade-off has to be found between both cultures and communities to find the most suitable time during the week
	**Stakeholder Round Table** *(Co-design)*	Policy / decision makers, people from several stakeholder groups	Scientific mediators, students, etc. It is all about partnerships from different sectors; diversity is the key.	40	Several rooms (for working in subgroups) and an auditorium (for introduction, restitution)	1-2 days, preferably on Friday and Saturday

5.2 Education Typology

Educational events usually take place in the school context and involve direct collaborations with educators and teachers. The main idea is to connect schools with external actors such as scientific mediators, researchers and practitioners.

This typology includes two event formats: (1) the High School Workshop format, in which external actors interact directly with students to offer them various ways to be engaged through CS and (2) the Teacher Training format, in which external actors train educators and teachers on innovative and CS-based pedagogical methods that they can integrate in their teaching practice.

5.2.1 High School Workshops

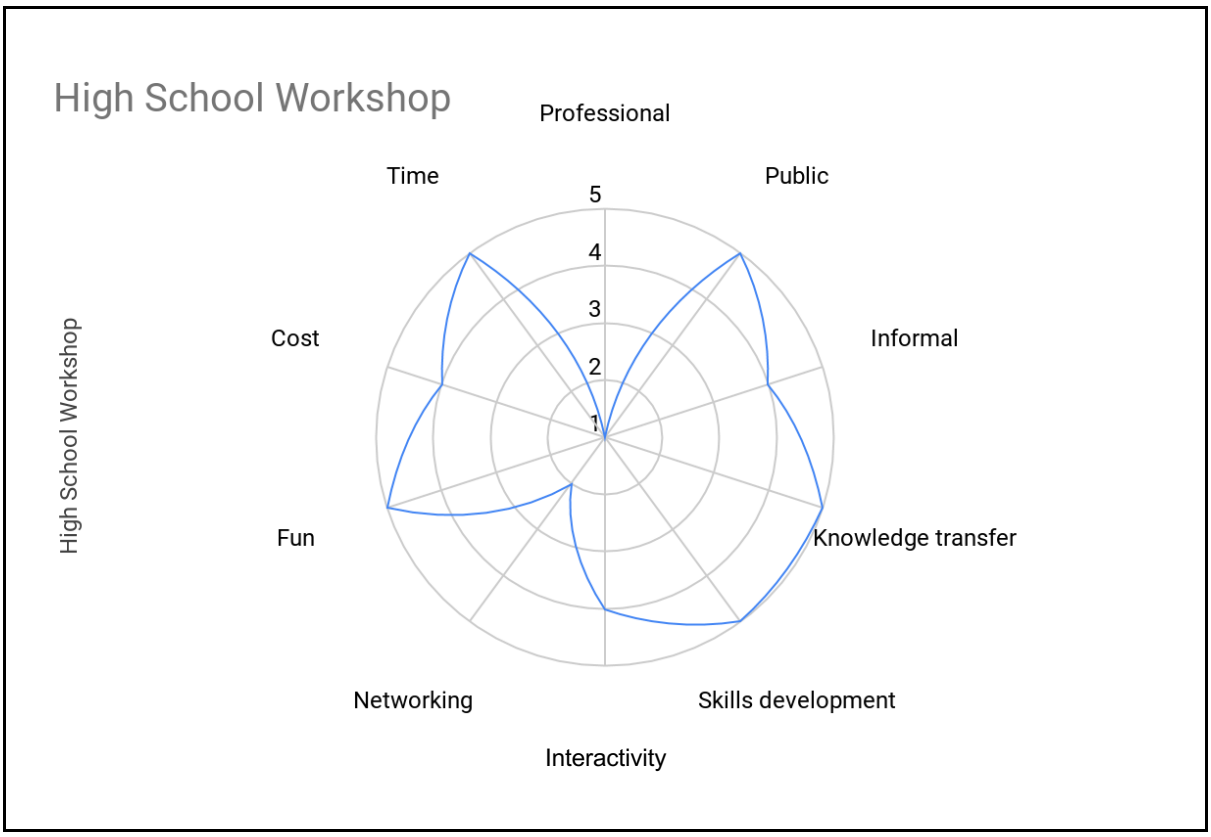


Figure 2: Main features of the High School Workshop format

Description

High Schools Workshops offer opportunities for students to be engaged in science. The presence of external actors such as scientific mediators and researchers is valued by students as it gives them the chance to work on real-world case studies and experience new ways of learning. During these workshops, students discover the culture of sharing (e.g. open source, open data, open hardware, Fablabs). They are introduced to the global framework of the SDGs (e.g. SDG 13. Climate Action), work on a interdisciplinary project (e.g. combining electronics, physics, genetics, ethics), and develop their critical thinking and empathy through role-playing, such as debates about the Genetically Modified Organisms (GMOs).

Case Study #1: GMO Detective Workshop - UPD

Figure 3: Soldering a DIY fluorescent detector during a High School Workshop, credit Imane Baïz

GMO Detective is a project developed by Guy Aidelberg, a biohacker and PhD student from UPD, dealing with the democratisation of genetic markers detection. The project invites the public to detect GMO DNA present in their food using lab technologies. A workshop for high school students was conceived out of this project, cross-linking genetics knowledge, DIY technology, basic lab skills and citizen science. Students were given the task to test food samples to detect the presence of GMO while using scientific methods. Through role-playing, students were able to debate as politicians, citizens, medical professionals or agronomists. This exercise led them consider the real-world applications of the science they were undertaking. In addition to searching on the Internet to find facts, students benefited from the presence of the scientific researcher who explained to them how to use scientific evidence to build an argument.

Objectives

High School Workshops aim to transmit scientific knowledge and methodology using a mix of alternative pedagogies. Students are given access to out-of-school skills, technologies and materials. Such workshops help teachers plan more impactful pedagogical sessions and give students a positive school experience. Finally, it is an opportunity to create a network of motivated teachers around the globe.

Objectives from different perspectives		
Organisers	*Contributors and guest speakers*	*Participants*
• Raise awareness about "hot" scientific topics • Create an active teaching community	• Have an insight into alternative ways of teaching	• Learn about new topics and real-world case studies • Have fun while experimenting new ways of learning

PROS	CONS
• Allows efficient scientific knowledge and skills transfer • Raise awareness about the scientific research method • Train educators on alternative pedagogies	• Requires extensive preparation of the educational content • Is time demanding • Is costly in terms of human resources

Figure 4: Objectives, pros & cons of high school workshops

Citizen engagement

Students are in a direct contact with practitioners and researchers who are willing to share their scientific knowledge and passion. Hands-on activities are meant to give a practical dimension to their learning, but also a taste for action and collaboration.

Main characteristics

HIGH SCHOOL WORKSHOP	
Target audience	Students, educators
Facilitators and possible partnerships	Scientific mediators, researchers, National education authorities, research centres, industry, foundations
Number of participants	30
Optimum location	School lab or outside (depending on the workshop content)
Optimum duration and time slot	Half a day to a full day, during the week (except holidays)
Indicators to monitor	Knowledge transmission, skills, level of fun, interest in the topics of the workshop, motivation

Figure 5: Characteristics of high school workshops

Event structure

High School Workshops happen in a special environment: a classroom, where the participants (i.e. students) already have an obligation to be present, so no effort is required to hire or invite them. On the other hand, teachers with whom you might want to collaborate already have national standards to achieve, an agenda to follow and personal reasons for starting a collaboration. It means it is necessary for you to tailor your content to their needs.

In this regard, we propose the following template:

- Introduction
- A series of lectures
- Hands-on activities
- Debate and discussions
- Perspectives and Conclusion

Communication

Before the event: we recommend passing information to relevant communities through national education channels. Having an educational authority which endorses your workshop is always useful. If you work with under-aged students, be sure to have image rights authorisations signed by the parents prior to the event.

During the event: collect the image rights authorisations. To ease up the process, a possible trick is to give a necklace or a sticker to the students who do not wish to be photographed.

After the event: collect any outcome and call the teachers for feedback. Document the activity with articles and reports.

Key points

- Be sure your material and protocols are fully functional during the preparation phase.
- Test your workshop prior to the event.
- Run this workshop during the time of the year that best suits the teacher's agenda.
- Get approval from the educational authorities.
- Let students have fun as it is not a traditional course.
- Think about image rights authorisations and legal aspects to be able to work and take photos of under-aged students.
- Allow yourself time to organise the workshops, as going to the schools is demanding in terms of logistics and human resources.
- Provide clear and verified explanations to the teachers and students.

Story

"During the events many students openly shared how surprised they were about all the possibilities citizen science offers. It's like they never realised that they could have an impact on their surroundings themselves and not only depend on external actors."

Tonino Rizzo - UPD

5.2.2 Teacher Training

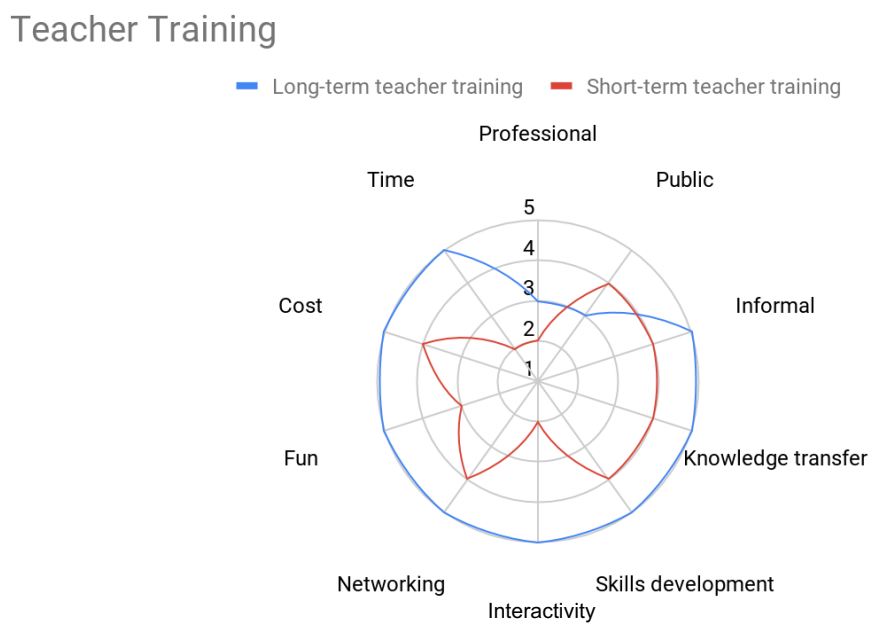


Figure 6: Main features of the Teacher Training format

Description:

Integrating citizen science at school is important as it aims to instil new habits in citizens from an early age and thus have a transformative impact on society. With this in mind, training educators and teachers is crucial as they will disseminate methodologies to take action and learn science at the same time, collectively and creatively. During teacher training, new methods and pedagogies can be transmitted to make their practice evolve on the field (e.g. Meritum).

Case Study #2: Adult Training - Meritum

Figure 7: Group of teachers being trained on an ecology module, credit Monika Opieka

Teacher training involves a series of workshops over 9 months to train educators and teachers using a citizen science module.

Teacher training can also be the perfect moment to train teachers about new tools and software (e.g. RBINS - XperiBIRD project). It can include a series of long-term training programmes (e.g. Meritum) or one-off events (e.g. XperiBIRD). While the aims are similar, the means and the resources required may vary

Case Study #3: Training teacher on XperiBIRD - RBINS

Figure 8: Photo 3: A teacher using a connected nest with her class, credit Thierry Hubin

Every year, in order to distribute new 'observation kits' (nest box equipped with a camera) and consolidate the XperiBIRD.be network, an event is organised at the Museum. There have been three editions of this event so far. On Saturday 13th October 2018 'XperiBIRD.be Day #3', about 100 people were present. Presentation and installation of the kit sessions were organised during that day for new participants. First, scientific results were presented by the ornithologist in charge of data analysis during a plenary session open to all participants. A network event took place during lunchtime, thanks to the support of DITOs. It allowed discussions between participants and the XperiBIRD.be team. For the first year, we also distributed a survey to participants in order to know if their expectations were met.

Objectives:

Teacher Trainings aim to help educators and teachers improve their skills and learn about new pedagogical methods. In the case of Meritum, teacher training was about developing skills and methodologies to enable educators to better teach adults.

Objectives from different perspectives		
Organisers	*Contributors and guest speakers*	*Participants*
• Engage participants • Transmit know-how • Implement something new in education • Share scientific results • Grow a network	N/A	• Improve and develop skills • Exchange of educational practices

PROS	CONS
• Deep knowledge and skill transmission. • Access to educational professionals. • Grow a network.	• Costly. • Requires high levels of engagement and motivation from participants. • Accessibility and availability for the teachers.

Figure 9: Objectives, pros & cons of teacher training

Citizen engagement

Teacher Training is not in direct interaction with the public but improves the interaction and scientific engagement with the public. The educators and teachers involved will develop skills and knowledge to better engage students on a specific topic with more efficient methods. It is also an efficient methodology to engage younger people in science.

In the framework of DITOs activity, training had an intrinsic focus on Citizen Science, for example how to involve learners in community mapping projects around sustainability, how to train teachers to use a connected nest (Case Studies 3 & 4 respectively).

Main characteristics

TEACHER TRAINING		
	Short-term training	**Long-term training**
Target audience	Educators	Educators
Facilitators and possible partnerships	Scientific mediators, researchers, national education authorities, research centres, industry, foundations	Scientific mediators, researchers, national education authorities, research centres, industry, foundations
Number of participants	100	15
Optimum location	An auditorium, small rooms to split groups and a space for networking	A classroom or school lab
Optimum duration and time slot	Half a day to a full day, during weekends, a few weeks after the start of the school year	9 months (around 260 hours)
Indicators to monitor	Knowledge transmission, level of engagement, level of enthusiasm, change in the educator practices, consistency with the pedagogical objectives	

Figure 10: Characteristics of teacher training

Structure of the event

The structure of the event is very simple whether we consider one-off training or a session embedded in a broader program. A typical structure would be:

- Opening
- Talk to introduce the focus of the day
- Workshop
- Closing

The contents of the workshop can be based on practice exchange, creating a new method, role playing game to understand a situation, experimenting with a new device, exploring a new concept or testing some new education application.

Communication

Before the event: Send invitations well in advance. It is even possible to start informing teachers in the prior school year. Early contact of targeted communities or institutions can be via social media or word-of-mouth.

During the event: If you are saving any images or scientific data, make it clear to attendees - get their permission, ask whether they would like to be acknowledged and tell them where they can find it afterwards

After the event: At the end of the training, the outcomes can be shared as pictures or community maps. Results can be fed into a dedicated website or blog to keep alive the community created.

Key points

- Have enough money to fund the training for the whole period. Educational projects usually have high goodwill but low budgets.
- Have good trainers, capable and enjoyable, to run the workshops
- Have a clear view on the pedagogical objectives you want to achieve
- Be sure to make they feel that what you bring to them is relevant for them
- Make educators and teachers feel supported
- Make attendees feel part of a community and bigger project
- Adapt the content of the training to the needs of the teachers and educators

Story

“People from the group are still meeting with each other and preparing new projects.”

Paweł Wyszomirski - Meritum

5.3 Raising Awareness Typology

Raising scientific awareness among a population is the first step to initiate action and foster responsible science engagement. This can raise unexpected scientific questions and interests.

Events focusing on raising awareness usually target the general public, but also require a substantial engagement from the scientific and expert community. In the process of sharing, it is crucial to bring together people eager to receive with experts eager to give, and that is precisely the goal of such events.

The focus can be discussion as well as basic skills. It could start from any media, news, or hands-on activities to deconstruct false beliefs. It can greatly contributes to the raising scientific consciousness among society at all levels. Crucially it needs to be relevant to the target audience.

DITOs involved three event formats focused on ‘raising awareness’:

- DIT workshops help spark questions starting from a hands-on activity;
- Film nights, where discussion will be triggered by a movie or documentary.
- Science cafés in which deep questions will be discussed in a friendly environment.

5.3.1 DIT Workshops

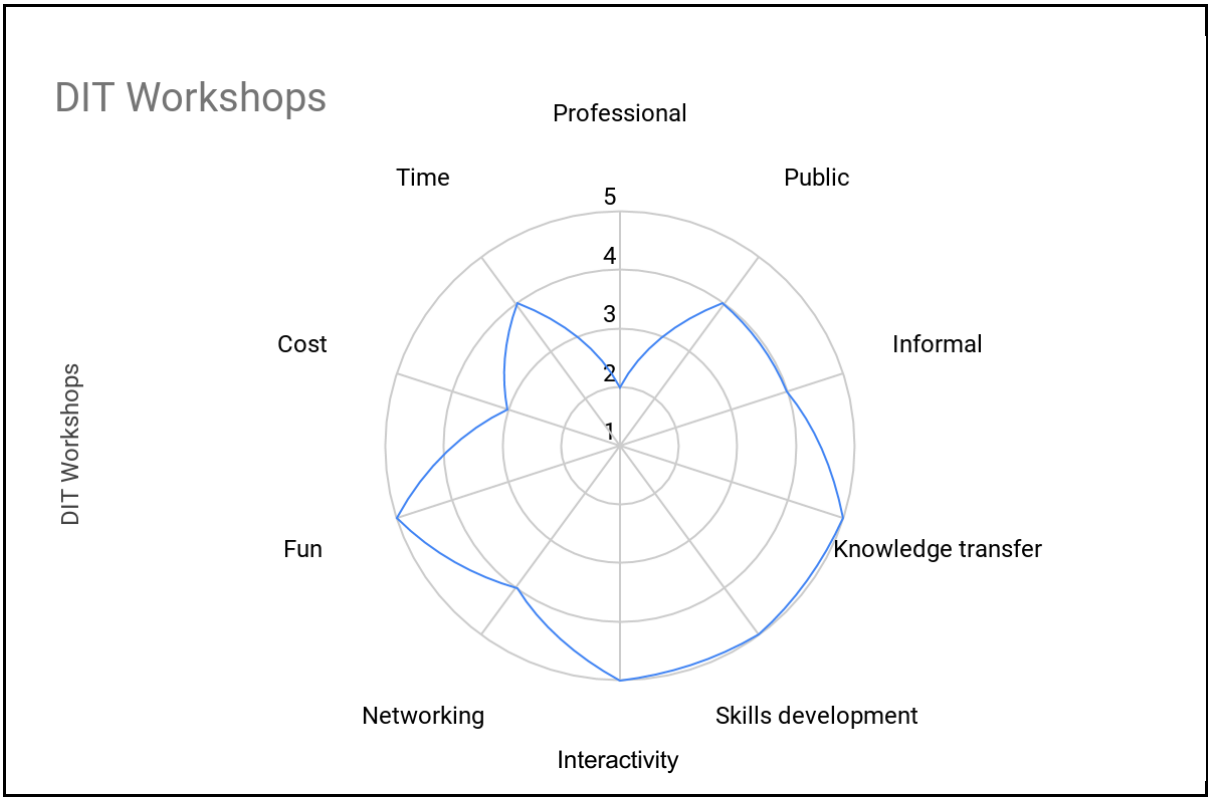


Figure 11: Main features of the DIT Workshop format

Description:

DIT workshops are hands-on events open to everyone and facilitated by professionals. It is the occasion to develop skills, illustrate knowledge and discuss questions related to a specific scientific topic (Case Study #2, for instance, is about biology). Being face-to-face with a specialist is an occasion to share, demystify and democratise science. This format allows ideas and know-how to diffuse through society beyond the walls of academic institutions.

Case Study #4: *DIT Workshop - UCL*

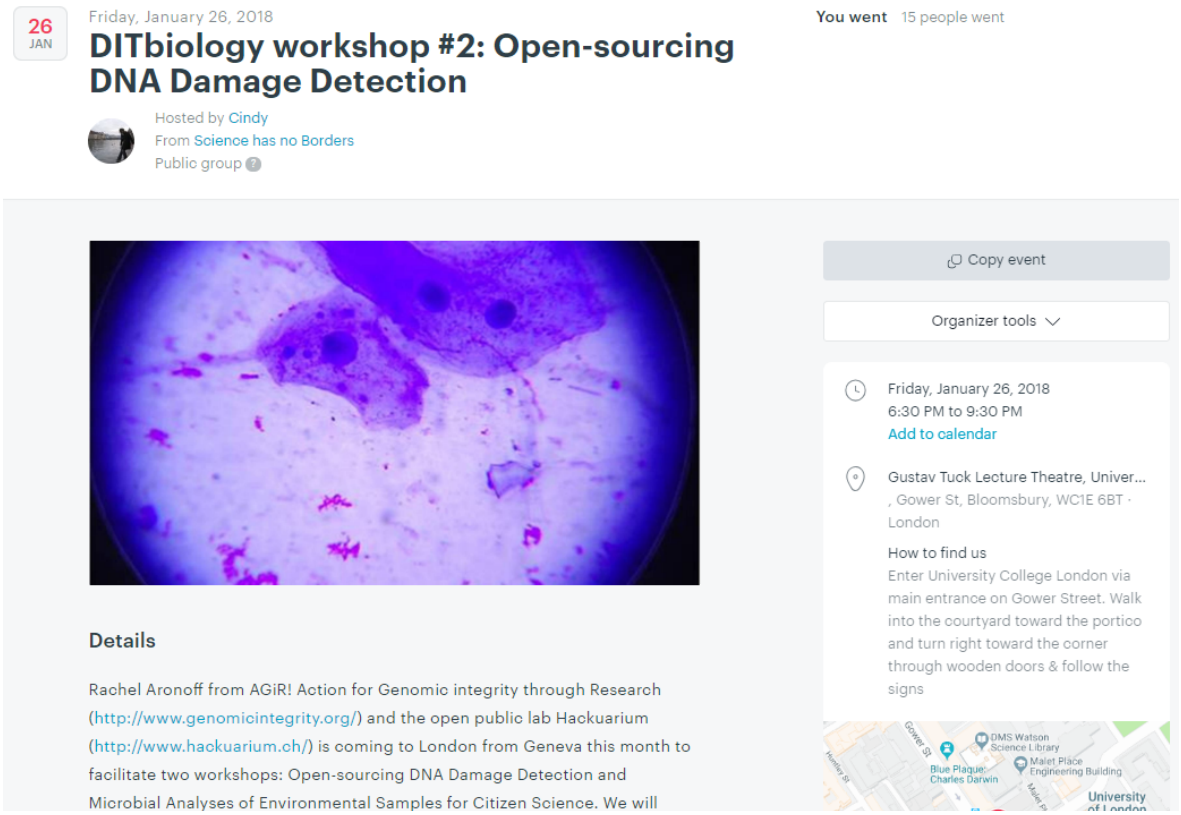


Figure 12: Screenshot of the DIT Workshop meetup dedicated to DNA damage

Two DIT Bio workshops were organised: Open-sourcing DNA Damage Detection and Microbial Analyses of Environmental Samples. Rachel Aronoff from AGiR! Action for Genomic Integrity through Research (http://www.genomicintegrity.org/) and the open public lab Hackuarium (http://www.hackuarium.ch/) came to London from Geneva to facilitate two workshops at 'Science has no Borders': Open-sourcing DNA Damage Detection and Microbial Analyses of Environmental Samples for Citizen Science. The workshop began with a discussion on citizen-led and DIT (Do-It-Together) research looking at ongoing challenges and ways to enable true citizen science. We then rolled up our sleeves and sampled ourselves (cheeks) and our surrounding environment. First, we carried out micronucleus testing, which assessed our cheek cell baseline levels of DNA damage; and second we cultured our environmental samples to see how choices we make about environmental risks might influence our health. We learnt about quantitative biological methods via cell staining and microbial cultures and the challenge of interpreting statistics.

Objectives:

This event aims to engage the attendees' interest and incorporate their ideas into the workshop so that they can learn new skills, scientific knowledge as well as inspiration.

Objectives from different perspectives		
Organiser	*Contributor and guest speakers*	*Participants*
• Engage public interest and leave them with a take-home message. • Share knowledge. • Understand today's societal concerns.	• Be able to share and contribute to the cause of bigger projects (i.e. DITOs). • Enjoy being part of a community.	• Exposure and inspiration. • Share passions with relatives and friends. • Enjoy practicing science and gain opportunities to fulfil their interests.

Pros	*Cons*
• Deeper exploration of scientific topics using hands-on activities. • Adaptive format that leaves room for discussion. • Fun way to get in touch with various scientific topics. • Sourcing things is part of building DIY/DIT know-how, which builds organisational infrastructure in the area.	• Requires access to specialist lab spaces and infrastructures. • Requires access to DIY scientists willing to teach and share their know-how. • Requires funding to pay for scientists' time to acknowledge their public engagement.

Figure 13: Figure 8: Objectives, pros & cons of DIT workshops

Citizen engagement

A DIT workshop is a full Do It Together Science event where the participants are directly engaged on a specific topic with hands-on activities. Attendees come face to face with specialists and are able to ask any questions. The interest of the public will then shape the workshop over time. It is a great way to raise awareness and collect what is relevant to society.

Main characteristics

DIT WORKSHOP	
Target audience	General public, Doers / amateurs / makers, activists, hackers, educators. Dynamics groups are a target audience as they learn from each other's perspectives
Facilitators and possible partnerships	Scientific mediators, researchers, DIY practitioners or scientists who wish to share their know-how or/ and skills.
Number of participants	6-10
Optimum location	Anywhere that can host such event. Partnering with organisations with spaces and facilities is ideal as one can have access to their members and bring new members in as it is an open event
Optimum duration and time slot	2-2.5 hours, on evenings (it allows working people to attend)
Indicators to monitor	Joy of science, that people appreciate their own abilities

Figure 14: Characteristics of DIT workshops

Structure of the event

A DIT biology workshop is a blend of exploring theory, practicing and discussing. We propose the following template:

- Welcome attendees
- Introduction where participants and organisers explain what motivates them to come to the event and what they expect or would like to get out of it.
- The attendees are then informed of what they are going to perform.
- Roll up sleeves and get down to DIYing!,
- Review what attendees have done and share results and discuss experiences.
- Leave with satisfaction.

Communication

Before the event: Meetup.com is an online platform that gathers people according to their center of interest and practices. Information should be shared with communities related to the chosen topic.

During the event: Document through photos, video or other statistical formats. Post on social media if possible

After the event: If the workshop is held in a series of workshops it is interesting to plan a series of interviews, each video / interview announcing the next date.

Key points

- Double-check protocols and material, be sure it works and include a backup.
- For newer organisers/animators, come along to these kinds of workshops and observe how organisers/facilitators carry out their work.
- Volunteer alongside the experience facilitator to get hands-on experience
- For the first try, involve someone with experience to get you started.

Story

"One of our participants wanted to test (and prove) to his partner that his trousers did not have microbes and therefore he was allowed to sit on the bed if he wanted. The workshop taught him and all of us that microbes are everywhere but they are not harmful, but part of the ecosystem. We discussed germophobia, had some good laughs and became all the wiser."

Cindy Regalado - UCL

5.3.2 Film Night

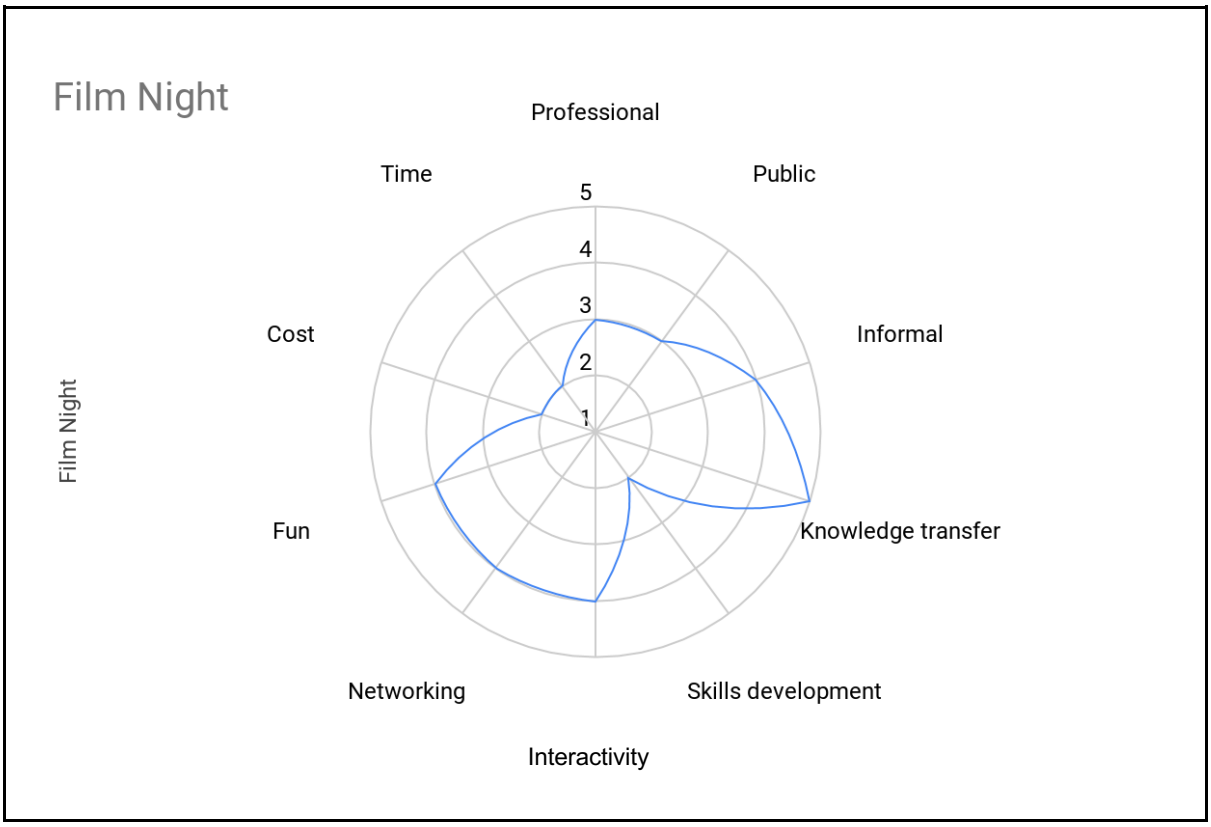


Figure 15: Main features of the film night format

Description:

Film Nights are an efficient event format to raise awareness and discuss particular scientific topics. Discussions can be initiated by watching movies or documentaries, while a scientific expert is present to answer questions and put the topic into perspective about ongoing scientific research.

Example #5: *Food & Data: empowering citizens and patients ?*

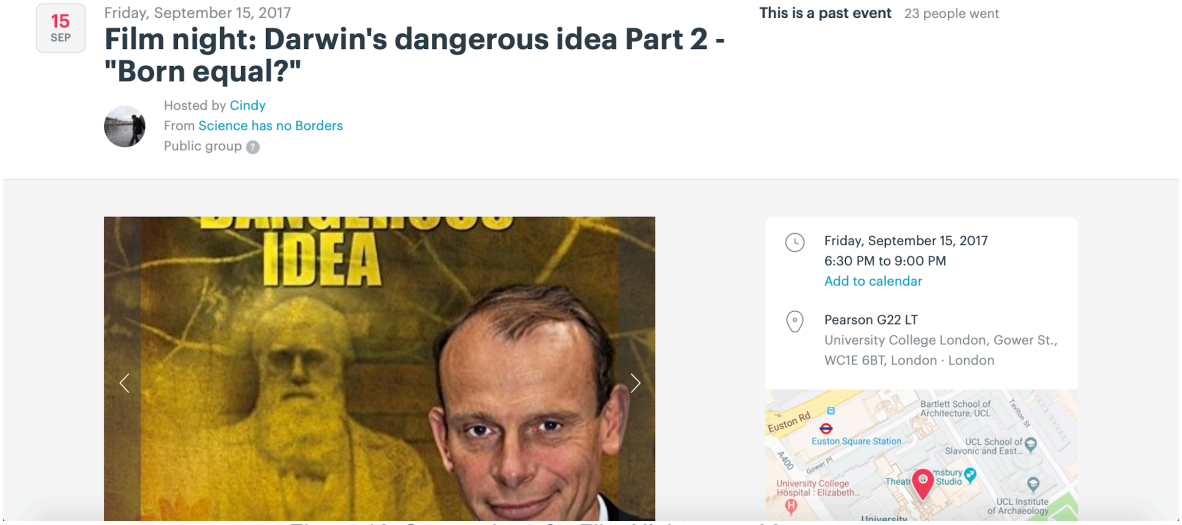


Figure 16: Screenshot of a Film Night event Meetup page

London film night: 'Food & data: empowering citizens and patients?' In this film night, a space for discussion was created around two topics: nutrition and health tracking (dieting, sports). The participants watched a documentary to stimulate discussion and then gathered in a circle with special guests and healthy snacks (of course!) to explore issues such as cardiovascular disease and how data could help us to improve our lives. The guests were Dr Owen Bain who brought a 'quantified self' perspective together with Dr Andrea Pucci from University College Hospital who brought the medical and clinical perspective.

Objectives:

This event format is an efficient tool for stimulating interest and discussion on topics that are close to the heart of people and society. The goal is to discuss topics openly, with experts in a relaxed environment. Film nights ignite interest in exploring topics further by encouraging participants to attend further hands-on workshops as DIT science workshops.

Objectives from different perspectives		
Organiser	Contributor and guest speakers	Participants
• Having stimulated interest and discussion on topics that are close to their heart. • Creating a relaxed environment to	• Share what they are passionate about. • Contribute to public engagement. • Enable experts with little	• Having stimulated discussion on topics that are close to their heart and with experts.

discuss topics with experts. ● Invite participants to attend other events and join hands-on activities.	experience of public engagement to interact with the public.	

PROS	CONS
● Relatively quick, easy and inexpensive to organise. ● Low barrier entry into scientific controversies for public and experts. ● Everyone loves films and documentaries.	● There is a requirement to obtain screening licenses which can pose a serious barrier for NGOs and community groups.

Figure 17: Figure 8: Objectives, pros & cons of film nights

Citizen engagement

In reference to the DITOs escalator model, this event format represents the bottom rung of initial engagement. Citizens are invited to join in and to express their questions and opinions and debate with specialists. The format is efficient for raising awareness and demystifying scientific topics and disperse false beliefs.

Main characteristics

FILM NIGHT	
Target audience	General public, practitioners, scientists, researchers interested in public engagement
Facilitators and possible partnerships	Practitioners, scientists, researchers interested in public engagement; but also with universities or institutions who have free space AND screening license
Number of participants	20
Optimum location	Anywhere with a large screen and a screening license
Optimum duration and time slot	2-2.5 hrs on evenings (when people can engage after work)
Indicators to monitor	Level of discussion (not just 1-2 people speaking); types of questions asked; how relaxed the environment is

Figure 18: Characteristics of film nights

Structure of the event

This gathering is about discussing ideas initiated by a movie that everyone watches together. This is structure of the format:

- Introduction
- Instructions (they are given post-its or paper to write down questions and discussion points during the film)
- Film/documentary screening,
- 2-3 mins to write final reflections,
- Rearrange chairs in a circle to start the discussions with the expert
- Attendees pose questions or the facilitator kickstarts with a question
- At the end, each participant has to give one highlight or take-away point
- Thank participants and hand out leaflets, ask them to sign up to social media groups
- Ask them to fill the evaluation form
- Leave time for networking
- Packing up

Communication

Before the event: Meetup.com is an online platform that gather people according to their centre of interest. In this case, it is a media of choice to promote this event. Some participants are personally invited because they are already part of established communities.

During the event: Photos are taken and posted on social media afterward. Record questions and answers.

After the event: Most relevant questions can be shared with their answers. A small website can be created to present the movie, expert invited with question raised and discussion.

Key points

- Ensure you have a screening license.
- Contact experts in the topic well in advance.
- Brief your experts - what is expected of them, how long will they be there, meet them at the entrance.
- Choose your films by speaking to experts about them - ask for their suggestions.
- Ask your audience to suggest future films.
- Ask your audience at the end of the event what film/documentary (or type) they would like to watch next.
- Go to several events and identify what you like and what you do not.
- Volunteer at some events to get experience.

5.3.3 Science Café

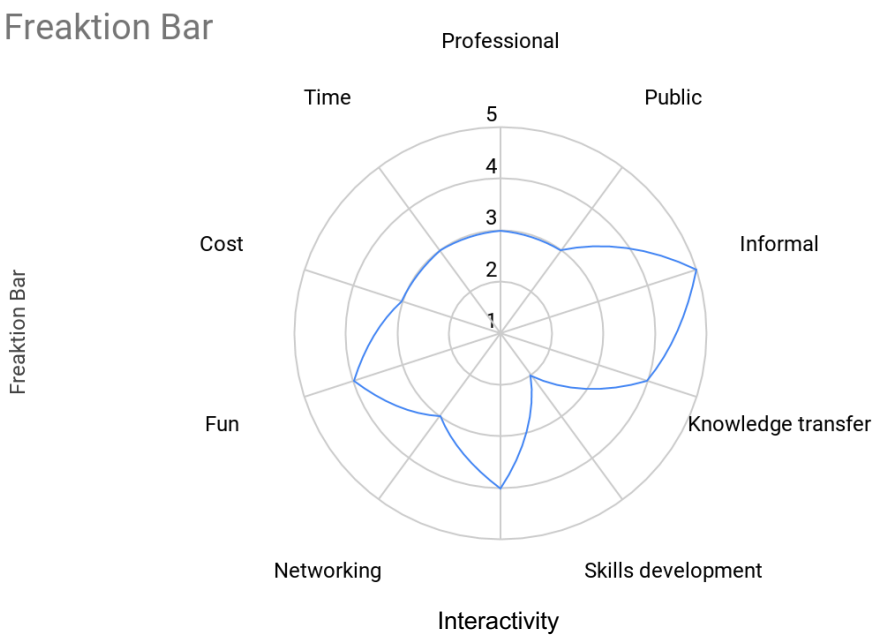


Figure 19: Main features of the Science Café format

Description:

A Science Café aims to engage citizens and experts in a discussion in the least formal environment possible. Anyone can join, for example after work, to unravel specific topics with people who have an inspiring story to share.

Case Study #6: Freaktion Bar - KI

Figure 20: A moment in the 5th edition of Freaktion Bar, credit Hana Jošić:

A series of informal conversations were held in the redaction of Kapelica Gallery, Rampa Lab, BioTehna and in the club atmosphere of Kersnikova. 'Brilliant individuals' working between the boundaries of arts, science and possible

technologies met to discuss, play and move those thin lines around. They discussed their works in progress and findings that stimulate them in addressing fringe topics.

Objectives:

Enable a wide variety of people to have a way to engage with difficult, controversial or diverse science and society topics.

Objectives from different perspectives		
Organiser	*Contributor and guest speakers*	*Participant*
• Highlight a topic • Present Work • Deeper understanding of the topic by listeners and participants • Foster meaningful discussions • Create a network	• Present their work • Present their thoughts • Gain insights from other people's point of view	• Have an enjoyable social evening • Discuss a topic they are interested in • Meet interesting and talented people • Build a network

PROS	**CONS**
• Low maintenance • Relaxed event • Open to a wide variety of people	• Needs to be aesthetically pleasing with enjoyable surrounding and atmosphere (difficult to set up) • Individual arrangements with speakers (difficult to coordinate)

Figure 21: Objectives, pros & cons of science cafés

Citizen engagement

This event type enables all kinds of participants to get an entry level understanding of state-of-the-art topics in scientific and technological procedures and processes used in the development of hybrid artworks. It can also be a topic that is investigated in the framework of a project.

In a certain aspect, participants contribute to the value of other people’s projects by adding their thoughts, scientific knowledge and opinions.

Main characteristics

SCIENCE CAFE	
Target audience	General public, doers / amateurs / makers, activists / hackers, students, educators, policy/decision makers, academia
Facilitators and possible partnerships	Experts, scientists (on individual and institutional level)
Number of participants	40
Optimum location	Small auditorium, gallery
Optimum duration and time slot	2hrs on evenings during the week
Indicators to monitor	Enjoyment level (however, there is no formal method to indicate this)

Figure 22: Characteristics of science cafes

Structure of the event

Science Cafés are pretty straightforward events and happen following that planning:

- Welcome and introduction (5 minutes)
- Discussion (1.5 hrs) around snacks and beverages.
- Wrap-up (5 minutes)

The discussion and the wrap-up can eventually be extended according to the enthusiasm of the crowd.

Communication

Before the event: Newsletter to your community or reach out to relevant communities. The event can also be announced on news portals.

During the event: Have functional equipment to record and take pictures in low light environment. Ensure participants have given permission and are aware what will happen to their contributions and where they can find them subsequently.

After the event: Post a sum up of the event, showcasing the most relevant questions and answers, share the records.

Key points

- Make sure snacks and beverages are in sufficient quantities, almost like a bar setting
- Be sure the photographer is arranged
- Double-check the sound system and recording options
- Set up comfortable lighting
- Ensure that speakers know when they are supposed to show up
- Bring in relevant experts
- Ensure an informal setting

- Be highly focused when organising the event
- Get a couple of people to help you with on-hand tasks

Story

"Many people stay after the event and discuss the topic in more depth (and network) afterwards. We had a case when the Freaktion Bar lasted for more than two hours, in which people went on to discuss the artwork and the processes for another hour and the evening finished with a lot of them going to a restaurant afterwards and continuing the debate."

Simon Gmajner - KI

5.4 Participation Typology

Participatory events aim to directly involve the citizen in pre-established projects. A lot of online citizen science project platforms use this method where citizens gather data and share them openly, most of the time using a smartphone app, or through a webpage.

This event type is focused on joining forces to help a project grow and progress. Collecting data together, analysing them together, concluding in a perspective of action. It can be helping an institution find a cure for Alzheimer's (Stall catchers[1]) or impact policy makers to take action against air pollution (Mapping for Change[2] or Meritum[3] [**1; 3**]).

There are many formats of this type; we focus on the 'Bioblitz' format as it is a very appreciated and spread format [**4**]. It is also a very good example of on how an online platform functions in real life.

5.4.1 Bioblitz

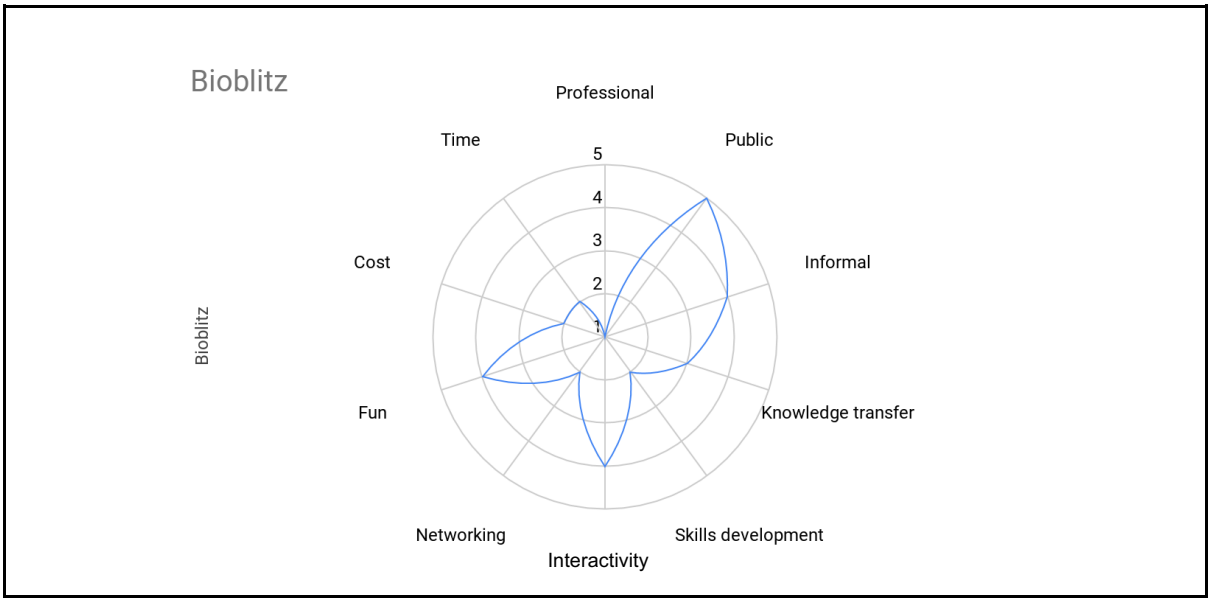


Figure 23: Main features of the Bioblitz format.

[1] https://stallcatchers.com/main
[2] http://mappingforchange.org.uk/
[3] http://katoluft.pl/

Description:

A BioBlitz is an intense period of biological surveying in an attempt to record all the living species within a designated area. Groups of scientists, naturalists and volunteers conduct an intensive field study over a continuous time period (usually 24 hours). There is a public component to many BioBlitzes, with the goal of getting the public interested in biodiversity. To encourage more public participation, these BioBlitzes are often held in urban parks or nature reserves close to cities.

https://en.wikipedia.org/wiki/BioBlitz

Case Study #7: Leopold Park Bioblitz - RBINS

Figure 24: Leopold Park Biobllitz, credit Bart Coenen

'BioBlitz Leopold Park' is a follow-up of how biodiversity has changed – and hopefully increased – in a park located in the heart of Brussels, since the revegetation of the pond and set-up of a wildflower meadow in 2015. After a short introduction on sampling techniques and insect ecology, 20 citizens were invited to collect insects at the bank of the pond, in the meadow, and in other locations of the park. This participatory event aimed at raising citizens' awareness of biodiversity in the city. The material to be used for the observation and identification of the specimens were provided by the Museum staff.

Objectives:

Raising citizens' awareness of biodiversity while collecting useful data to monitor the environment.

Objectives from different perspectives		
Organiser	*Contributor and guest speakers*	*Participants*
● Raise awareness of hidden biodiversity in various environments ● Raise awareness of the important presence and role of species in the ecosystem	● Share knowledge ● Gather data	● Learn about the work done by professionals ● Be involved in environmental monitoring ● Learn about biodiversity

PROS	**CONS**
● The direct face-to-face contact with experts makes discussions easy. ● Direct impact, participants see the fruit of their efforts at the end of the day: many insects in vials and many more photographed! ● The quality of the information provided. ● Open to anyone.	● Not always easy to find enough motivated or available scientists. ● Good weather is unpredictable and crucial for attracting participants and catching insects. ● This event format requires very motivated staff to hold the event on a long period (24 hours for example).

Figure 25: Objectives, pros & cons of bioblitzes

Citizen engagement

The Bioblitz is a well known event format in the world of environmental monitoring and citizen science. It directly relies on citizens to gather scientific data. In doing so, participants will learn how to recognise different species of birds, insects and plants and develop a better understanding of biodiversity and the scientific process.

Main characteristics

BIOBLITZ	
Target audience	General public
Facilitators and possible partnerships	Institution, natural museum, NGO working in environment monitoring
Number of participants	25+
Optimum location	It needs a small space to set up a temporary science lab with a few binoculars, forceps, tables, and some small materials such as nets and vials to catch the insects. A large outdoor space in which participants can go and look for insects, birds or plants or other organisms.
Optimum duration and time slot	One day Time depends on the ecosystem you are working on and the species you want to identify. In the case of insects, an afternoon during spring or summer is best as this is the time when they are the most active.
Indicators to monitor	Number of samples collected, satisfaction of participants, quality of the data collected, understanding of biodiversity, ability of participants to interpret data.

Figure 26: Characteristics of bioblitzes

Structure of the event

BioBlitzes are at the heart of scientific mediation processes and scientific data gathering. The general public has to feel welcome, useful and up to the task. In order to not lose anyone on the process we suggest the following template:

- Welcoming session with technical explanations
- Day hunt
- Species identification with experts
- Break (food/coffee)
- Night hunt
- Species identification with experts
- Closing session

Communication

Before the event: Facebook, Newsletter in relevant communities

During the event: Photos, Articles, Posts on social media, video to make tutorials on how to recognise different species.

After the event: 'The Catch' can be showcased to the public, insects pinned down, flowers can be set in an herbarium.

Key points

- The availability of the experts volunteering as facilitators
- Avoid scientific jargon
- Give goodies to participants such as the Bioscope hand lenses!
- Participants like receiving a follow-up afterwards, e.g. an email with some results and impressions.

Story

"We have received many emails after the event from participants who wanted to know how to work as a volunteer at the museum."

Justine Jacquemin - RBINS

5.5 Co-Design Typology

The co-design section concerns all the process involving mind and heart working together to create something taking into account the point of view of everyone involved in the project. It can be about co-designing a tangible project, creating a large-scale program or creating a legal and political framework to help CS blooming.

5.5.1 Co-designing with citizens

Co designing with citizen is about gathering people from all over society to think problems, find solutions and achieve a collective goal polling together their skills and knowledge. It is a straightforward bottom-up approach. We consider two such event types below: Interactivos & co-lab workshops.

5.5.2 Interactivos?

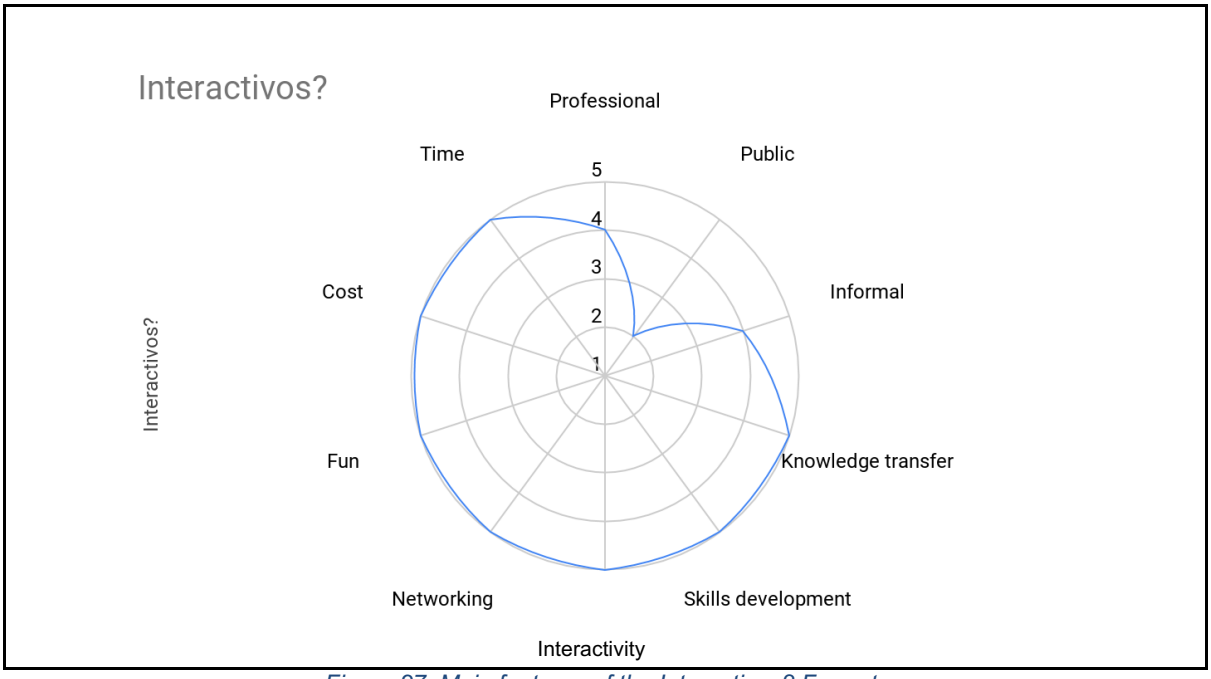


Figure 27: Main features of the Interactivos? Format.

Description:

An *Interactivos?* event is an international collaborative prototyping workshop where different topics are addressed through creative experimentation with free hardware and software tools: creative programming, graphic experimentation, interaction design, digital narratives, DIY bio techniques, environmental strategies, etc. It is a 2 week event where people work together and many of them are accommodated together (in a hotel or a hostel) as well, experiencing a very rich and intense experience. The event is a combination of a 2 day seminar combined with 15 days of workshop and followed by 3 month exhibition to showcase the results. The prototype produced can range from a biodigestor (system that produces gas from organic waste anaerobically), to a DIY ship or some fabrics made of biomaterials to design clothes.

Case Study #8: Interactivos? - Medialab Prado

Figure 28: Biomaterial project from Interactivos? #19, credit Cesar Lucas

Interactivos?'19 was focused on food futures. The idea was to see food as a gear level to make a necessary change in our relation to the environment. Question was how to stop producing food by being irrigated with oil products and move towards a more sustainable and social model for producing, distributing, eating and relating to food. Great projects came to Interactivos? this year, from new fabrics developed by orange peels, new kitchen techniques to get food made of different powders, to a way to get advantage from beer production disposals to create not only snacks to accompany the beer, but also to produce organic bowls where to put the snacks, in a virtuous loop of circular economy. This last project for example continues being developed in Argentina as an actual business, so yet another example of how citizen science promotes innovation.

Objectives:

Bring people to work together to research, learn and develop prototypes in a very social, intense and fruitful collaborative atmosphere.

Objectives from different perspectives		
Organiser	*Contributor and guest speakers*	*Participants*
● Bring life to a large number of working prototypes ● An unforgettable human experience ● A very deep learning process ● A boost of energy and motivation ● The creation of networks that can last forever (at least four couples got married after knowing each other in Interactivos?) so you can imagine the level of engagement).	● 15 to 20 contributors are working in such an event, they can all have a different objective while being part of it. Roles are mostly coordinators, speakers, facilitators, conceptual and technical mentorships.	● A DIY project done (prototype) ● A lot of support and help to disseminate and communicate the outcomes. ● A rich social experience

PROS	**CONS**
● Promotes collaboration between people that do not know each other with a goal they chose. ● Enables complete strangers to work collaboratively, sharing their time and effort to achieve a collective goal. ● Efficient to start a possible community in your city or internationally that is interested on a specific topic (chat channels are still open and alive several	● It is expensive to pay flights to promoters, hotels to foreigners and food for everybody. ● It requires detailed, time-consuming planning. ● It requires a great professional team behind caring of the participants, experts to mentor them and make sure everybody is very open and empathic (this is constantly facilitated).

years after and people really become friends). ● Emphasises creativity and the exchange of ideas, perspectives and knowledge. ● Every output is released with open and free licenses to make knowledge abundant and accessible to the public.	

Figure 29: Objectives, pros & cons of interactivos?

Citizen engagement

While the main topic of the session (very broad and open to different understandings) is chosen by organisators, projects to be developed are proposed by participants through an international open call. Selected projects are published, then a second open call for collaborators is opened. Anybody can come to help the promoters to do their prototypes. The prototypes, blueprints, pictures, texts, etc, should be released with open and free licenses.

It is a very stimulating environment to allow citizens to jump from one idea to a prototype, to concretise the intangible into the tangible. Engagement happens because people are given space, time, care, knowledge and tools to achieve to let them be.

Main characteristics

INTERACTIVOS?	
Target audience	General public, doers / amateurs / makers, activists / hackers, students, educators, academia
Facilitators and possible partnerships	Experts that will act as mentors from different sectors (academia, industry, etc) and a network of hubs that can promote and disseminate the open calls
Number of participants	From 50 to 100
Optimum location	Auditorium for the seminar, open space for workshops and an exhibition place to show the prototypes during some weeks
Optimum duration and time slot	Around two weeks (15 days) during spring or summer, so people can join together for leisure time after the event. It is always better after university exams.
Indicators to monitor	Participation, knowledge transfer, level of collaboration and understanding, quality of prototypes and always, always human care.

Figure 30: Characteristics of Interactivos

Structure of the event

Interactivos? is a human experience about living together, working together and producing together. The template we suggest is a mix between social event, pitch, lectures and hands on:

- Welcoming session
- Icebreakers
- Lectures
- Workshops
- Presentation for prototypes
- Closing session
- Mount exhibition
- Opening exhibition

Communication

Before the event: Facebook, Twitter, Instagram, newsletters, meetings with responsible people from hubs and personalised invitations to selected people that can contribute to disseminate the word to answer the open calls.

During the event: Properly document photos, videos, articles, posts on social media. It is also a good idea to document the prototyping process.

After the event: Organise a final presentation followed by an interactive exhibition. Documentation created by the participants can be shared on open and free licenses. Instructable or wikis can be created as well.

Key points

- Have an amazing team that do not only knows science and technical stuff but also kind, open and coherent human beings that love what they do, love to share what they do and love to work together.
- There are hundreds of micro tasks when working with so many different people. And you have to be very sensitive about the needs and motivations of the people involved.
- Don't do it alone. Create a good team and really divide tasks.
- Bring some experts for the seminar and the mentorship.
- The team is your first priority.
- Design the event in such a way you can manage it and of course pay it.

Story

“Both if you organise or you participate, no matter how expert you are, you are going to learn and experience a lot of new things thanks to the collective intelligence and experience of every single participant. Seriously, experience is great. No words are fair enough to describe it. When Interactivos? is finished, everybody is exhausted but filled internally with a vast amount of energy, knowledge and inspiration for the times to come.”

Jose Maria Blanco - MP

5.5.3 Co-lab Workshop

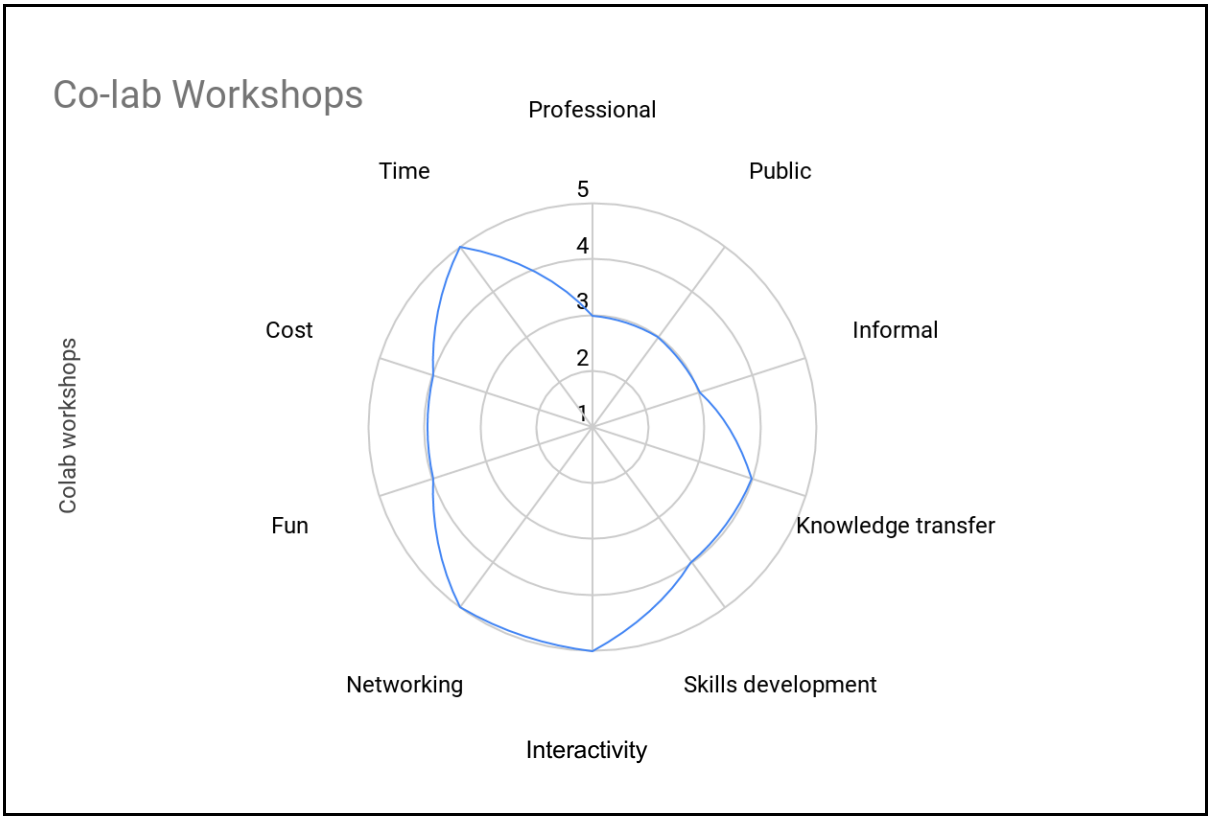


Figure 31: Main features of the Co-lab Workshop format

Description:

Co-lab is a format for creative workshops, a community, and a philosophy for interdisciplinary collaboration in science, art and design. The workshops, run since December 2015, are organised by the Open Science School, an association hosted by the Center for Research and Interdisciplinarity in Paris. By the time the workshop took place, nine workshops had been organised in Paris, London, Cambridge, Norwich, Lausanne, Shenzhen and Beijing, involving different partners worldwide; some of those prior to the DITOs project but which informed the design of the DITOs co-lab workshops. CoLab focuses on different biology topics (e.g. synthetic biology and biomaterials) making use of methods from both biology and design (e.g. design fiction, design thinking). Each event is unique, driven and co-directed with different participants investigating a specific topic. Co-creation in this type of activity is a result of the interdisciplinary overlap of synthetic biology with design and art, which inspires participants to co-create new knowledge across previously disconnected disciplines, and to co-create novel solutions such as prototypes, which address significant environmental and societal problems.

Case Study #9 Co-lab Workshop:

1. **Co-lab Bioremediation, 26-28 November 2016, London.**

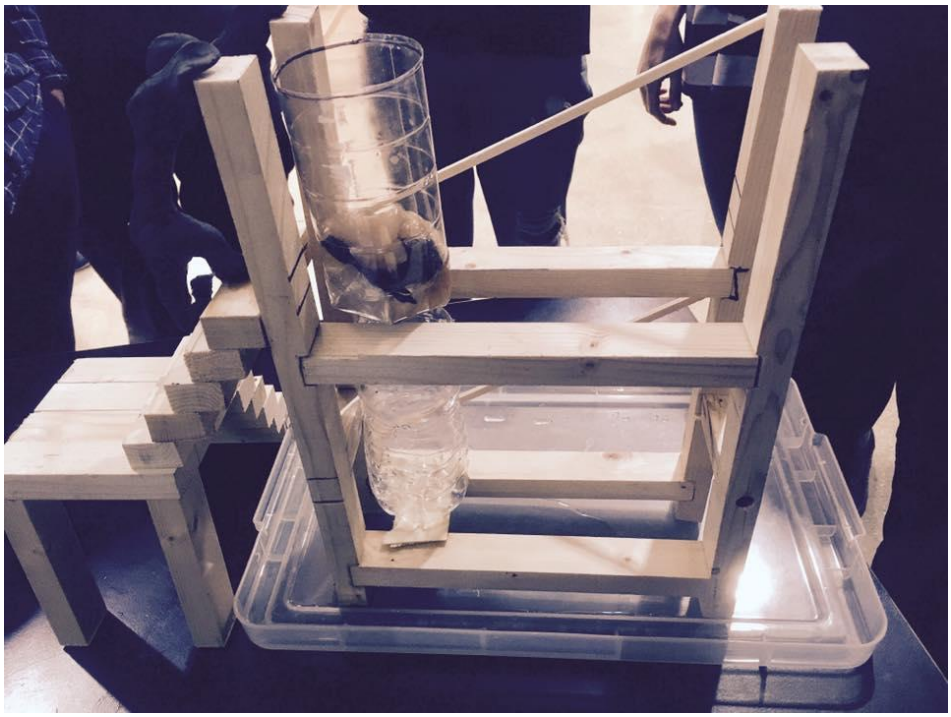


Figure 32: Participants showing their prototype during 'Co-lab Bioremediation, credit Imane Baïz

The '*Co-lab Workshops'* is a series of interdisciplinary co-creation workshops around different topics related to biodesign. The 3-day *Co-lab Bioremediation workshop* and was held at University College London and the Institute of Making from November 26-28th, 2016. *Bioremediation* refers to the use of plants and microorganisms to remove or sequester pollutants. This event gathered participants from different specialisations ranging from biology, engineering and chemistry, to neuroscience, architecture, design and social scientists, with the aim to collaborate, co-design and prototype solutions that tackle environmental pollution. The remarkable aspect of this workshop was that its topic was linked to a real pollution case-study, introduced by the Blacksmith Institute NGO based in India. As such, the workshop started with an introduction to the case study, and a stakeholder empathy map activity, during which we tried to understand different viewpoints and interests of policy makers, industries, local organisations and populations involved in the case study. During the three days of the workshop, scientists had the opportunity to learn about design thinking and ethnographic methodology in science and designers gained exposure to lab environment and techniques. By the end of the workshop, the five following projects were produced by participant teams and presented to the public: *Self irrigate/Lowtech bioreactor, Bio-Bucket Chromium Bioremediation, CHROM-ACTION! Replacing Chemical ETPs with Biological ETPs, Citizen lead (Pb) detection and Fungi Edu Kit.*
Booklet: https://issuu.com/shneel9/docs/co-lab_book

2. Co-lab BioArch, 15-17 April 2017, Paris.

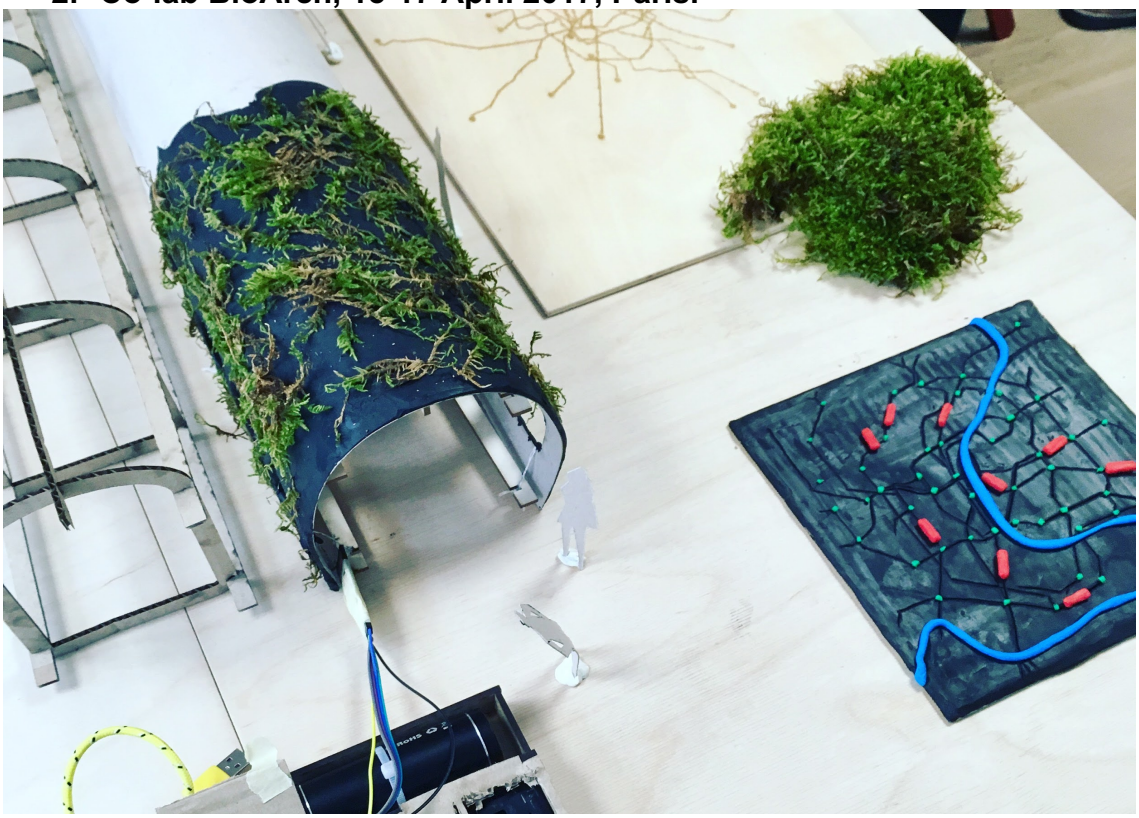


Figure 33: Photo 10: 'Subskin' project. Prototyping time during Co-lab BioArch, April 2017 at Volumes Coworking, Paris, France, credit Imane Baïz

Co-lab workshops are a series of interdisciplinary co-creation workshops around different topics related to biodesign. Participants are offered lectures, workshops and a fablab to prototype their projects. Examples of Co-lab workshops include the BioArch workshop in April 2017 which was dedicated to design, architectural and urbanistic solutions for including non-human citizens such as animals and plants, via participative approaches. Participants were invited to attend an interactive lecture about generative architecture design process, discover smart and biological materials to get inspired, learn about some biology, practice gamification, experiment with open source, and build a prototype in the context of post-anthropocentric architecture. One of the groups chose to focus their work on the topic of treating air pollution in the Parisian Metro ('Subskin' project). Using scientific procedures and tools to validate the problem and to validate their idea using real data, participants engineered a solution where trains act as a mobile cleaning systems equipped with a « second skin » which covers the train wagons to absorb air pollution particles. Laser-cut technology and drawings were co-created to illustrate how their idea could work in practice.

Objectives:

The objectives of the Co-lab Workshops are to foster collaborations between participants from different backgrounds and create prototype solutions responding to real-world challenges. It is an efficient solution to bring together all the important

actors needed to solve a specific problem and give each of them the same time of expression.

Objectives from different perspectives		
Organiser	*Contributor and guest speakers*	*Participants*
• A set of interdisciplinary projects that can be reused by researchers and NGOs • Set a friendly co-designing environment	• Share knowledge with participants • Get feedback on specific aspects • Challenge ideas • Broaden his/her perspectives	• Learn about new topics • Create a project in an interdisciplinary environment • Learn methodologies of codesign / collaboration • Work on real-world case studies • Help researchers and NGOs by providing new ideas

PROS	**CONS**
• Very rich format that combines hands-on activities, lectures, discussions, ethnography (observations and interviews on the field), etc. • 3 days so participants have the time to get to know each other, learn about a topic and prototype solutions • Working with people from different backgrounds	• Long and difficult to organise • 3 days is long but also too short for participants to actually get deeper in their projects, so sometimes their projects are too superficial • Difficult to follow-up on the outcome of projects

Figure 34: Objectives, pros & cons of co-lab workshops

Citizen engagement

Co-lab Workshops are a deeply engaging format in which participants are directly involved in contributing to a project or co-creating / co-designing solutions to meaningful problems. Experts and laypeople are in contact for an extended period of time, enabling an efficient transfer of knowledge and competencies.

The fact that the prototypes and project are not followed up after the event diminishes the impact of the event, but this does not reduce how much participants

learn from it. Methodologies learnt during this event may be carried for the rest of the participant's life.

Main characteristics

CO-LAB WORKSHOP	
Target audience	Students, professionals (architects, designers, photographers, artists, sociologists, biologists, researchers)
Facilitators and possible partnerships	Scientific mediators, students, researchers, research centres, NGOs
Number of participants	25
Optimum location	A hackerspace / fablab / lab; a room big enough to welcome all the participants
Optimum duration and time slot	3 days, preferably on Friday - Saturday - Sunday
Indicators to monitor	Quality of the prototypes, networking, social impact, knowledge transmission, level of fun

Figure 35: Characteristics of co-lab workshops

Structure of the event

Colab workshop holds the human at the centre of its activity. The social aspect has to be integrated.

Here is a template:

- Welcoming session
- Icebreaker & Presentation
- Set of lectures
- Workshops
- Ethnography (interviews on the field)
- Prototyping sessions
- Presentations
- Debriefing
- Closing session

Communication

Before the event: Contact local universities to distribute the information among their students. Informed your community using a newsletter and Facebook event. Contact centers working on your areas of interest and concern.

During the event: Photos, videos and interviews are taken and shared to relevant networks (Facebook, Twitter, Instagram).

After the event: After each CoLab workshop, collect feedback from participants and organisers in order to create a booklet describing the workshop, the different

sessions and outcomes. It is also interesting to showcase the prototypes and ideas produced.

Key points

- Find a partnership with a research centre
- Source their needs and see if they can offer funding to organise the workshop
- Find relevant speakers for the chosen topic
- Launch an open call to select participants
- Book the space and catering for three days
- Don't organise this event all by yourself; find partners that you can rely on
- Set regular meetings with the other organisers to make sure your ideas are aligned
- Don't overfill the schedule of the event and give breaks to participants so they have time to breathe
- Step back and connect with the other participants
- Learn how to delegate so you are not too stressed on the day of the event
- Have a plan B / C and even D in case things don't go the way you had initially planned
- Train facilitators on how to communicate the event through social media. This training can be given to the participants at the beginning of the event.
- Create time at the beginning of the event for every participant to introduce themselves and, say what their current projects are
- Set aside time at the end for reflection with everyone sitting in a circle

Story

“On the first version of the CoLab workshop, we had a participant who was very enthusiastic about the event. At the second edition she came back with her sister, and at the third edition she came back with her sister and her mum! She told us that thanks to the workshop she realised she didn't really want to continue her PhD but create her own project and work with local NGOs. It had offered her new perspectives.”

Imane Baïz - UPD

5.5.4 Co-design in between experts

Co-design between experts does not necessarily aim to produce anything physical, but is more about exchanging practices, exchanging points of view, creating international networks of scientists and practitioners willing to work together to initiate and calibrate new CS and RRI projects. We consider two types of co-design expert workshops below: cross-cultural conferences and stakeholder round tables.

5.5.5 Cross-Cultural Conference

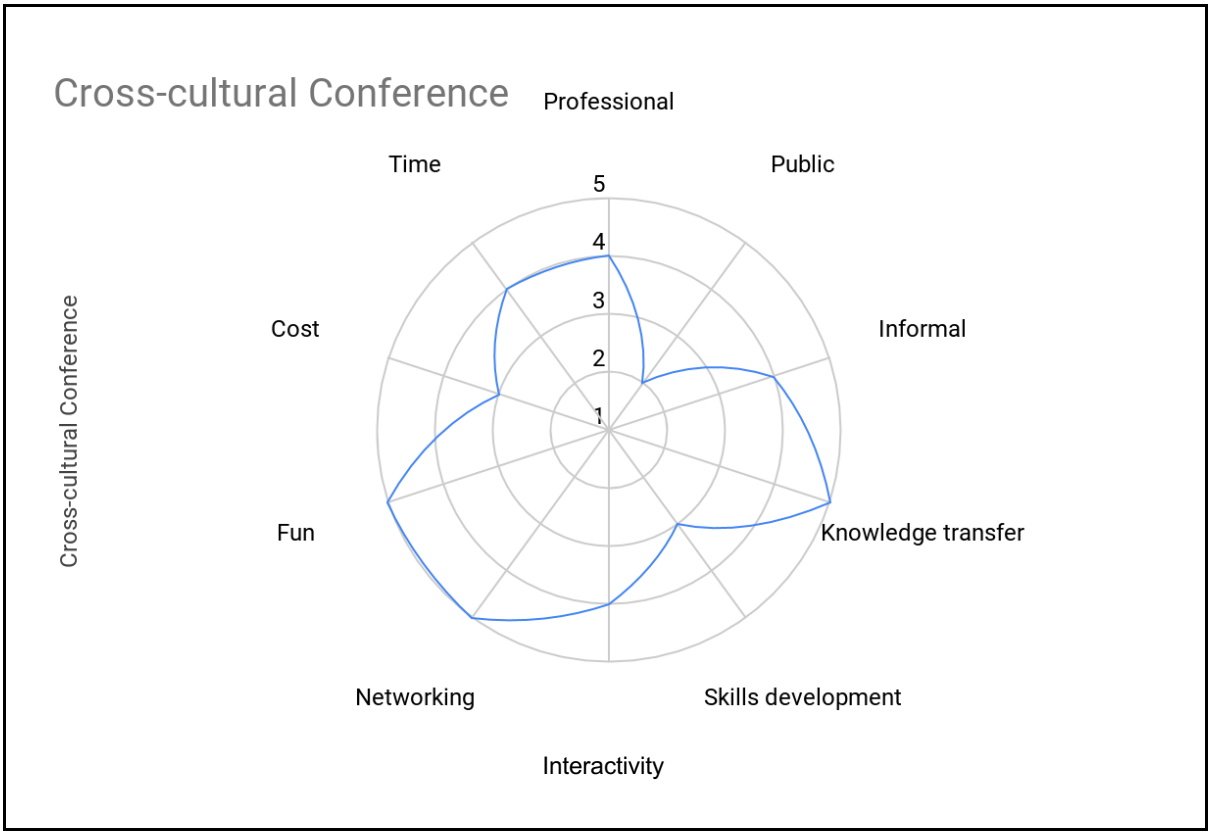


Figure 36: Main features of the Cross-cultural Conference format.

Description:

Cross-cultural conferences are experiments to bring together two different cultures. They can involve scholars and practitioners of DIYbio/biohacking and citizen science, but it could also be something entirely different, such as physicists and dancers. This event blends together two formats: 'conferences', which are very formal and classic, and 'unconferences' trying to create some creative and critical distance to defined topics.

Objectives:

The objective is to foster transformative discussions, create learning experiences, and explore ways in which participants and contributors can work together in the future. The mix between the two formats (Conference and Unconference) means that attendees can freely share research, thoughts, and visions on knowledge and practices of a specific topic. It is an ideal setup for an exchange of ideas involving radically different practices.

Objectives from different perspectives		
Organiser	*Contributor and guest speakers*	*Participant*
Greater critical insight into the cultures and practices around a topic.	Feedback about their work from the perspective of other professionals.	Learning the points of view of different disciplines.

PROS	CONS
● There is a lot of diversity from speakers and attendants. ● It can foster transdisciplinarity and encourage taking different perspectives. ● The friendly and informal environment makes people and events more approachable.	● Co-design can emphasise clashes of epistemic cultures. ● This format requires extensive planning to accommodate the different kinds of expertise and sessions. ● With its great diversity there can be a lack of focus.

Figure 37: Objectives, pros & cons of cross-cultural conferences

Citizen engagement

This event engages different cultures and communities to meet and exchange their practice to co-design projects and inspire each other. It can directly involve citizens as a community/culture. In Case Study 10, 'Biofabbing conference', STS scholars and practitioners of DIYbio/biohacking met together to discuss how to better implement Citizen Science in practice, and how to better involve society in Science.

Case Study #10: Biofabbing Conference – *UNIGE*

Figure 38: Exchanging practices between DIYbio and researcher communities, credit David Kong

The BioFabbing Conference was an experiment to bring together two cultures, scholars and practitioners of DIYbio/biohacking and citizen science. It combines a 'Conference on Critical Studies of DIYbio and Biohacking' and an 'Unconference of Global DIYbio and BioArt Networks'. How does academia see DIYbio, what criticisms can be made, what academia can miss from DIYbio community perspectives, how each community can reinforce the other practice, pointing out strengths and weaknesses and discussing possibilities and differences.

Main characteristics

CROSS-CULTURAL CONFERENCE	
Target audience	Doers; amateurs; makers; activists; hackers; students, policy / decision makers; academia
Facilitators and possible partnerships	Scientific mediators, researchers, research centers, practitioners
Number of participants	25
Optimum location	Auditoriums and Hackerspaces
Optimum duration and time slot	3 days + A trade-off has to be found between both cultures and communities to find the most suitable time during the week
Indicators to monitor	Knowledge transfer, number of projects initiated

Figure 39: Characteristics of cross-cultural conferences

Structure of the event

The cross-culture conference mixes structured discussions with hands-on workshops (DIY/DIT). A lot of room is left for networking and exchange of ideas resulting in new projects or adding new layers to existing projects.

Due to the importance of the social dimension of this event, it is highly valuable to add social meeting, group activities and icebreakers to ease interaction.

As a template we propose:

- Social event the night before
- Welcome session
- Keynote speech
- Workshops and lectures in parallel
- Optional local evening events
- Optional evening events
- Workshops and lectures in parallel
- Closing session

Communication

Before the event: communication channels can be different from one community to another. To reach an equal proportion of both, each channel has to be identified and used.

During the event: During the event itself, it is important to document what is happening using photos and videos and unloading them to social media.

After the event: Gathering feedback or witnesses statements can be important. Showcasing project ideas or outcome of workshops is also encouraged.

Key points

- This event format often lasts at least three days but participants have expressed a desire for longer. Maybe a week or two in order to delve into projects.
- Find an efficient way to communicate with speakers and participants.
- Focus on encouraging participation and organisation of sessions in the unconference. People are often reluctant to take leadership roles.
- The great number of attendees make it difficult to manage accommodation bookings and thus the location of the event is crucial.

Story

"I constantly hear feedback that it was an amazing event full of interesting people and they appreciate the networking they did"

Gabriela Sanchez - UNIGE

5.5.6 Co-designing with policy makers

Co-designing involving policy makers, sharing with the previous section the absence of necessity to produce something tangible. The main goal is to share advances and passion for a scientific topic. In the case of DITOs, this topic was citizen science. These events are about raising awareness on specific topics among policy makers in the perspective of co-creating a legal and political framework.

5.5.7 Stakeholder RoundTable

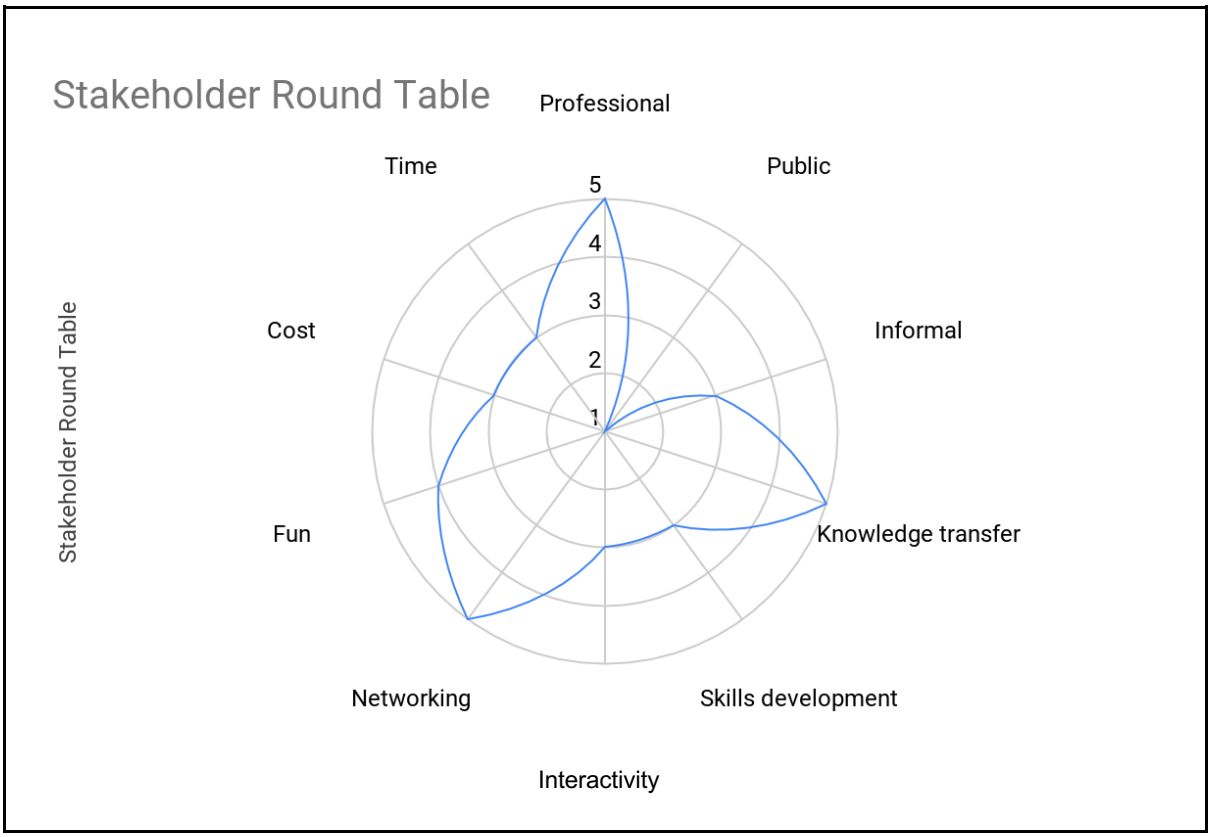


Figure 40: Main features of the Stakeholder Round Table format.

Description:

Stakeholder Round Tables are deliberative workshops involving representatives of different stakeholder groups on a given scientific issue such as citizens, scientists, people from business and policy makers.

Case Study #11: European Citizen Science Forum - *UPD*

Photo 12: Roundtable discussing the motivations for citizens to engage in citizen science projects.

Credit: Ada Loueilh

https://cri-paris.org/news/the-european-citizen-science-forum/

The European Citizen Science Forum, ESCF, organised by the DITOs partners Université Paris Descartes (UPD) and Tekiu Ltd, took place on March 25th 2019 at the Center for Research and Interdisciplinarity (CRI), based in Paris. This event, got the support of the French Secretary of State for Higher Education and Research and the City of Paris. It consisted of a European Stakeholder Roundtable Session on Citizen Science & Do-It-Yourself Biology (DIY Bio) and a participatory music concerts to introduce and conclude the day. It aimed at tightening the links existing between policy makers, research institutions and citizen science initiatives, it encouraged discussions between representatives of the many different stakeholders that are vital to the practice of citizen science and its future. The five main topics of the roundtables sessions were: Ethics & Responsible Research and Innovation (RRI), Infrastructure & Support, Regulation & Data, Motivations for Engaging and Learning Through Research. Two discussion rounds were followed by a feedback session to highlight the main issues that had arisen.

Objectives:

These events are about bringing together people who do not usually meet and have the opportunity to understand each other's perspectives. It is fundamental to know what other actors do and think and what matters to them, in order to be able to collaborate.

Objectives from different perspectives		
Organiser	*Contributor and guest speakers*	*Participant*
● Meeting new people ● Contact networks ● Expand learning on certain topics ● Get to know some communities better ● Raise new questions ● Plans for new cooperation / better cooperation ● Start projects ● Identifying needs ● Map a topic from diverse perspectives		

PROS	**CONS**
● Bring together different perspectives to create seeds for future cooperation. ● Bring people from different stakeholder groups in contact with each other. ● This very flexible event format so it can be adapted to any topics and concrete aims.	● Since people bring with them different concepts, languages and needs, creating a good basis for exchange is difficult and needs dedicated effort. ● Due to the short duration of the event and potentially different perspectives of participants it's difficult to create meaningful encounters in order to move beyond surface interactions.

Figure 41: Objectives, pros & cons of stake holder round tables

Citizen engagement

This event format is not meant to directly engage with the public, but it is important that citizen representatives still take part in the discussions. The aim here is more to advocate citizen science and DIY science, to create a better framework for citizen engagement.

Main characteristics

STAKE HOLDER ROUND TABLES	
Target audience	Policy / decision makers, people from several stakeholder groups
Facilitators and possible partnerships	Scientific mediators, students, etc. It is all about partnerships from different sectors; diversity is the key.
Number of participants	40
Optimum location	Several rooms (for working in subgroups) and an auditorium (for introduction, restitution)
Optimum duration and time slot	1-2 days There is a trade-off between the different stakeholders' communities. Professionals often prefer weekdays but freelancers, citizen scientists and other volunteers often prefer weekends. Friday and Saturday can be a good compromise.
Indicators to monitor	Number of propositions, connection established, outcomes

Figure 42: Characteristics of stake holder round tables

Structure of the event

- Welcoming session
- Icebreakers
- Lectures
- Workshops
- Closing session

Communication

Before the event: Twitter, Meetup, Email & websites. Personalised invitations for policy makers and institutional representatives.

During the event: Photos, Videos, Interviews,

After the event: Post on social media, create a report to send to all the participants, track outcomes.

Key points

- Organise it keeping in mind what the topic is and who is coming in order to provide the best value for them.
- Ask attendees what they want to know and whom they would like to meet.
- Make an inclusive event with a diversity of participants.
- Dedicate effort to move beyond shallow exchange by creating a common vocabulary and results that have added value for different groups of participants.

- Aim to have the same people working on a specific question to get deeper into a topic.
- Try to encourage people to mix, as some people are influential and others may gravitate around them.
- Follow up on the results.
- Make it fun! Create an enjoyable atmosphere of exchange.
- Ignore formality, create dedicated spaces in which it can be ignored, or play with it.
- Enjoy the event and take care of yourself during it.
- Make people experience the message you want them to take home.

Story

"It was a big challenge for us to manage to gather stakeholders from very different backgrounds (policy makers, NGO representatives, DIYBio communities, students, artists, researchers, etc.) around a table without any consideration of hierarchy between the participants. According to some DIYBio people, it was the first time for them that they were able to express their concerns and receive feedback from policy makers thanks to the help of mediators who made sure all voices were heard and understood by others. The aim of the event was to invite them to build together key recommendations on a 'win-win' basis to improve the framework for CS in terms of infrastructure and support, regulation and data, ethics and RRI, education and research. Following the event, these propositions were integrated in the political agenda at a National and European scale. That multi-stakeholder collaboration was a huge achievement for us! "

Imane Baïz - UPD

6 Good practices in citizen science events:

In this section, we chose not to focus on how to organise events in a holistic approach as many resources related to this topic can already be found on the web. We rather bring attention to what, from our experience, appears to be the most important features in relation to citizen science.

1. **Keep in mind your objective throughout the event preparation:** organising an event is resource intensive. Start by outlining clear objectives that are achievable given the resources available.
2. **Citizen science events should not only target the general public:** it is just as important to create an international network of institutions, policy makers, scientists and practitioners supporting this global societal change, as it is to work with citizens. Furthermore, citizen science necessarily requires partnerships, so as to share resources and work together to achieve common aims.
3. **Keep the event format as informal as possible:** citizen science aims to produce robust data for research purposes, but given its participatory nature and involvement of the public, informal event settings are more favourable. They allow for a better quality of experience and the opportunity for greater

participation. Furthermore, ensuring some level of flexibility in the event format and design can also enhance the overall experience.

4. **Cover the costs of volunteers and account for this in budget planning:** events are often very costly, and while institutions and industries are able to pay for entry fees, citizens are rarely able to pay 100-500 euros. In the process of lowering social barriers and reducing inequality in accessing events, organisers should cover volunteers' costs as much as possible. Furthermore, it is important to be careful not to ask too much of participants. Sometimes, contributions need to be acknowledged with proper reimbursement.
5. **Use simple, jargon-free terminology:** Citizen science is an interdisciplinary field involving a range of academics from varying disciplines, the general public, policy makers and many others. Knowledge transfer requires strong mediation skills, and as jargon-free language as possible, so as not to discourage people from participating.
6. **Ensure you have adequate human resources**: transmitting knowledge requires training, skills, and a minimum ratio of staff to participant. It is challenging to run a hands-on activity with only 1 facilitator for 50 people. Thus it is crucial to strike the right balance of expertise to the number of participants, in addition to significant amounts of coordination to take into account the specific requirement of all those involved in the activity (this topic is discussed in deliverable D2.3).
7. **Plan your evaluation methods:** adequate attention needs to be paid to evaluation from the outset, rather than leaving such considerations to after an event or activity. Planning the use of appropriate evaluation methods and then thoroughly evaluating an activity is crucial, particularly in terms of considering future projects and setting up new partnerships.
8. **Showcase outcomes:** events are tiring, time-demanding and costly. When organising an event, it is necessary to give due consideration to appropriate methods for documenting the activities, so as to get the most out of it afterwards. Within this, considering the audience of such documentation, the particular ideas or prototypes coming out the activities, and being creative about potential dissemination tools (podcasts, videos, articles and other outputs) is crucial to ensuring successful knowledge transfer.
9. **Events as a way to sustain a community:** whilst it is important to acknowledge that one-off events have their own value, repeated events are an efficient method to sustain and animate a community, to enable it to grow and continue to be active. Events should be organised with consideration of both the previous ones, as well as potential future events, and they should be planned using a well-defined strategy.
10. **Protect and take care of yourself:** the role of the facilitator is highly demanding, requiring significant levels of agility, troubleshooting, and problem solving. It is important to be responsive and responsible, whilst also giving due attention to self care, given the demands of role.

7 Conclusion

Citizen science events are a powerful way to engage the public in science at different levels. Depending on their format, the objectives may differ: from empowering young people by offering them tools and methods, to raising public awareness about the major current societal issues, CS events can also aim to involve participants in data collection for research purposes, or to invite a variety of stakeholders to codesign innovative solutions through collective intelligence. Furthermore, citizen science events play a strong role in social cohesion, as they contribute to the creation and development of interdisciplinary communities in Europe and around the world.

Yet public outreach events are very costly and take up many resources. Organising them requires a lot of coordination, taking into consideration everyone's needs and sensitivities, gathering the right material, establishing the right partnership and research funds. This cost is what makes it important to start from important needs and precise objectives. Contents can be adapted and shaped in different formats. What matters is finding the right event format, inventing new formats from scratch or combining already existing ones to enable organisers, contributors and participants to find out what works for them.

The contribution of this deliverable has been to categorise ten DITOs citizen science activity formats into four different typologies according to levels of engagement (see Table 2). This table makes it easy to pick the relevant event format when trying to achieve a particular goal such as raising awareness - then using a Film Night might be appropriate in order to achieve this.

Public science events allow people to refocus on local issues as they happen at a specific place. They permit a better engagement of local actors to answer questions they have at heart, and this is where events connect with the Sustainable Development Goals (SDGs). Empowered with methodologies, equipped with theoretical concepts and tools and supported by the right resources, society could support governments and industries in a global effort to solve the 21st century's most important issues. Events in CS is only the launch pad and we hope this deliverable will help others build their own.

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