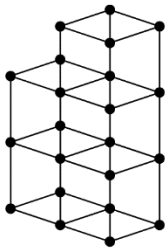

doing it together science

**Grant agreement no. 709443**

# DITOs

## Doing It Together science

*Coordination & Support Action*

# D5.2 Phase 2 project evaluation

Work Package: 5

Due date of deliverable: Month 15

Actual submission date: 29 / 08 / 2017

Start date of project: June 01 2016 Duration: 36 months

Lead beneficiary for this deliverable: Dr. Erich Prem (eutema)

Contributors: Cindy Regalado, Franz Berghuber, and Christian Nold

Reviewer: Carole Paleco (RBINS)

| Project co-funded by the European Commission within the H2020 Programme (2014-2020) | | |
|---|---|---|
| PU | Public | **X** |
| CO | Confidential, only for members of the consortium (including the Commission Services) | |
| EU-RES | Classified Information: RESTREINT UE (Commission Decision 2005/444/EC) | |
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*Put the 'X' in the correct column above and the footer accordingly*

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 709443

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## Acknowledgement

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## List of Figures



## 1. Version log

| Version | Date | Released by | Nature of Change |
|---|---|---|---|
| DITOs-D5.2-20170828 | 24/08/2017 | Cindy Regalado (UCL) | Formatting and addressing partner comments |
| DITOs-D5.2-20170829 | 29/08/2017 | Franz Berghuber (eutema) | Final formatting, addressing comments |
| | | | |

## 2. Definitions and acronyms

The basic definitions are here, but you need to add report-specific ones

| Acronyms | Definitions |
|---|---|
| CSA | Coordination and Support Action |
| DITOs | Doing It Together science |
| DoA | Description of Action |
| EC | European Commission |
| ECSA | European Citizen Science Association / Verein der Europäischen Bürgerwissenschaften |
| eutema | EUTEMA GMBH |
| GA | Grant Agreement |
| 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 |
| Tekiu | Tekiu Limited |
| UCL | University College London |
| UNIGE | Universite de Geneve |
| UPD | Universite Paris Descartes |
| WS | Waag Society |

## 3. Management summary

The Doing it Together science project (DITOs) has so far engaged approximately 45 thousand people who have taken part in 200 events across the whole of Europe. There have been 551,129 online participants. Most of the participants have been 'extremely satisfied' with the events. The majority of participants were between 18 and 35 years old and 49% of them are female. The events reached participants with a generally high level of education but this mainly due that the majority of the event during this period were hosted by universities. Future events such as the Science Bus are specifically targeting diversity and inclusion. The deliverable recommends further publicising and monitoring of events to these diverse audiences.

The formative evaluation uses the RRI criteria (Strand, R. et al., 2015) of public engagement, gender equality, science learning and social inclusion as described in D5.1. This document shows how the indicators were adapted for use within the DITOs project via detailed consultation with the DITOs partners. The most significant finding was that the formative evaluation process needs to be adapted to use indicator to capture changes over longer durations in order to capture the holistic benefits of engagement practices.

The ethnographic evaluation describes how RRI concepts have been traced empirically within DITOs events themselves. The result of this has been to identify how the concept of 'responsibility' can become specific as a local city issue. The ethnographic evaluation has also identified some tensions with existing community groups. The conclusion is to propose further monitoring of interactions with these groups and the facilitation of internal process of analysis and reflection.

Phase 2 project evaluation is Deliverable 5.2 (D5.2) from the coordination and support action (CSA) Doing It Together science (DITOs), grant agreement 709443.

# 4. Introduction

The objective of this deliverable is to present the results from summative, formative as well as ethnographic evaluations at the beginning of Phase 2. It includes analysis of the statistical data collected from the participatory events. In line with the objective of work package 5 (WP5), this report contributes to the development of a unique and robust framework for evaluating the engagement of citizens, scientists, and decision-makers in DITOs activities. This report is divided into four main sections namely, a summary of evaluation protocols, procedures for participatory evaluation, results from evaluation, and application of evaluation results.

The document iterates the Terms of Reference (ToR) of DITOs evaluation and tools (D5.1). The report presents a revision of the project's key performance indicators which have been adapted to reflect actual practices and offers more depth to the RRI tools indicators. The report also presents the new templates and guidelines for recording and documenting activities and gathering public feedback.

# 5. Summary of evaluation protocols

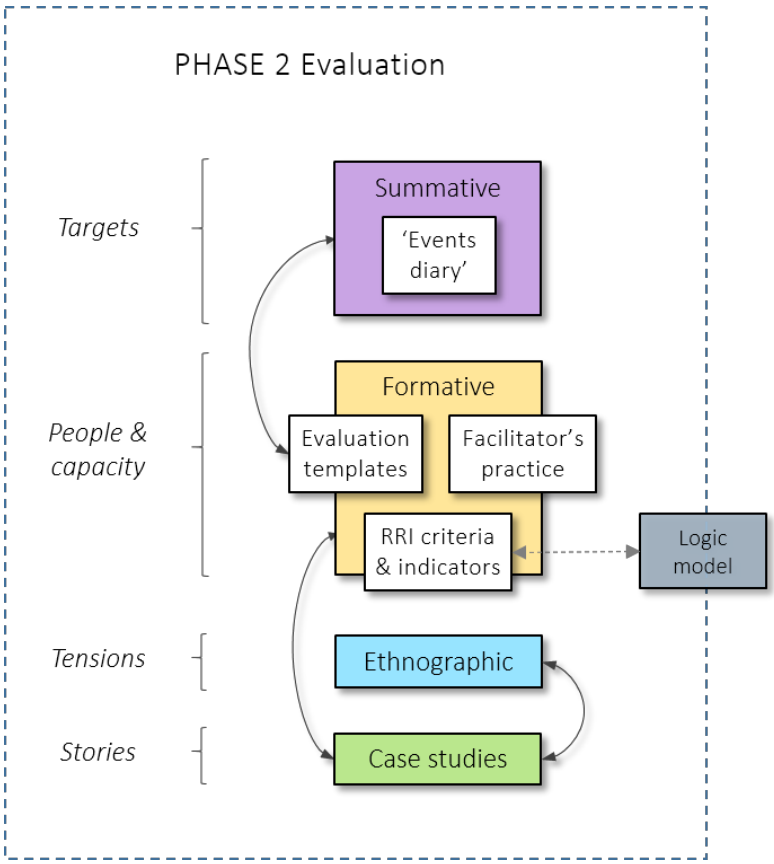


*Figure 1: Summary of Phase 2 evaluation.*

Following from the ToR (D5.1 section 5.2.1), the evaluation for DITOs has an internal as well as an external purpose. Internally, it seeks to answer whether the partners are accomplishing what they want to accomplish. The external purpose is to determine whether DITOs has managed to deliver what it promised. This approach not only tracks the progress and accomplishment of the project but also provides depth and longitude to our activities, efforts, and practices.

Figure 1 summarises the complementary structure of the evaluation for Phase 2 of the project (detailed in section 5.5.1 in D5.2). The **summative evaluation**, which focuses on the assessment of outcomes (targets, Figure 1) – external purpose – draws statistical analysis from both the *events diary* and the quantitative data from the use of event evaluation templates.

The **formative evaluation** draws its analysis from the facilitator's practice, qualitative data from the event evaluation templates, and review of the RRI tools

indicators. The focus is on people and capacity (Figure 1). Procedures for these are detailed in the next section.

The **ethnographic evaluation** narrows in on salient issues in Phase 2 (tensions, Figure 1); it provides a space to draw understanding and analyses lessons for practice and engagement strategies.

The **case studies** illustrate success stories (Figure 1) at different levels in the DITOs escalator. These draw from both the formative and ethnographic evaluation and we begin their documentation in the latter half of Phase 2 (see section 8.3 next steps).

This report focuses on the early stages of Phase 2 and thus presents, in turn, the results from each evaluation approach. The final report, will bring together the different approaches in Figure 1 into an interconnected evaluation, where these approaches function together under the four selected RRI criteria for evaluation, namely public engagement, gender equality, science learning, and social inclusion (these are discussed in section 7.2).

## 5.1 Literature review of RRI and indicators: a case for change in protocols

A review of the Responsible Research and Innovation (RRI) literature revealed that the literature on the whole accepts that RRI is a rather vague and ambiguous concept. Wickson (2014) for example suggests "*a singular universally accepted definition of RRI has yet to fully crystallize*" (p.255), while the PROSO report argues there are "*nagging questions of what RRI exactly means*" (PROSO 2016, p.2). Oftedal (2014) suggests that "*the more specific content of RRI is largely left open. Some will for this reason deem the concept too vague, but giving an exact definition of RRI is not necessarily fruitful*" (p.1). The point being that RRI is not a prescriptive set of rules but more of an umbrella argument for increasing ethical and inclusive research and innovation.

This means that criteria and indicators are in a rather precarious position of having to account for an ambiguous concept. Wickson (2014) sees this ambiguity as furthering the need for criteria: "*the articulation of quality criteria and indicators therefore seems crucial for RRI to be understood and operationalized by researchers, research funders, innovators and other relevant stakeholders*" (p.254). The indicators proposed by Strand et al. (2015) are largely procedural, such as '*Percentage of women on advisory committees*'. These kinds of procedural indicators have the advantage of materialising a concept such as gender inclusion and turning it into something that can be quantified. Yet at the same time it has two weaknesses. The first is that this criterion is analytically limited and does not allow open ended questions to be addressed. For example, these kinds of procedural indicators offer no answer to Saille's (2015, p.2-3) question of "*responsible for what? and to whom?*". Instead of procedural indicators Rafols (2012) discusses the possibility of opening up and broadening indicators to include more "*plural and conditional interpretations of the phenomena*" (p.2). Rafols for example paper suggests 'narrative-based participant observations' as one way of broadening out indicators. The second issue is that the indicators proposed by Strand (2015) provide little detail about how to account for RRI concepts within a public event itself. While the gender breakdown of advisory committees is not usually visible in these

meetings, other kinds of gendered behaviour is possible to observe within these workshops. Yet what is missing is any guidance on how to examine and translate a concept such as ‘gender’ or ‘responsibility’ into something empirically observable.

The suggestion of this deliverable is the need for a collaborative rethink of how to work empirically with RRI indicators. The deliverable documents the reworking of the RRI indicators from Strand (2015) with the DITOs partners. Secondly it documents an ethnographic approach for working with the RRI concerns. The conclusion of this is that it allows a better way of working with both procedural and ethnographic RRI indicators across the DITOs project.

### 5.2 Protocols for summative evaluation

The summative evaluation is based on data collected after the events using the event diary. In course of the project and in order to eliminate the necessity of entering events both in the website back end and in the Google Doc event diary, the consortium switched to a model of only entering the data into a database in the backend of the project website. From this database, it is now possible to download a spreadsheet that contains past, present and future events in the same way as the original Google Document. However, as some consortium members weren’t familiar with the online database, this led to some problems of partners not filling in their events and not filling in accurate numbers. While this has mostly been resolved, there is still a small number of events where not all data (for example audience numbers or locations) is available. In such cases, this is made evident in the graphs including fields such as ‘other’.

### 5.3 Protocols for formative evaluation

Formative evaluation in Phase 2 continued to follow the approach outlined in the ToR (section 5.5.1). Moving from ‘scoping and planning’ in Phase 1, to ‘implementation’ in Phase 2, the main changes to data collection were the development of ‘second generation’ event evaluation templates and change in focus of interview with event facilitators.

Specifically, event evaluation templates (Satisfaction questionnaire) took three forms:

- Surveys (physical form): based on original template (see appendix 10.3 in D5.1) and handed out to participants at end of event;
- Surveys sent out to event participants 2-4 days after the event;
- Reflection time at end of event: time allocated for participants to openly share thoughts on the event/their experience (in some cases expectations were captured the beginning of the event to be able to compare with reflections at the end).

These formats for event evaluation were adapted by event facilitators in partner organisations with consideration for context and sensitivity of the topic, length of event, and aims of event. Strategies to increase participation included making questionnaire shorter, opting for online surveys, and making announcements at the beginning and end of event about the importance of feedback to improve practice.

The issue with online surveys was their low response rate; for UCL response rates were only 12-15%. It is well known that online survey response rates are much lower than paper based surveys. According to Nulty (2008) on average response rate is 33% compared to 56% for paper-based. According to www.surveygizmo.com, surveys distributed to external audiences (as opposed to e.g. employees in a company) have a 10-15% response rate. In cases where the topic was deemed sensitive, some facilitators opted for informal reflection and post event-conversations to gain feedback. To gather quantitative information, the facilitators used estimates and at-event counting. In some cases, participants are returnees known to the facilitators. When using only reflective time and post-event conversations, not all data from the original template is gathered (e.g. level of education, previous experience/engagement in science & technology, background, etc.). However, these more open methods help not only to gain deeper feedback but also help to build trust and continuity.

The interview guide for Phase 1 (Appendix 10.4 in D5.1) focused on understanding each of the partner's context, organisational practice, and getting to know the event facilitators/coordinators. Phase 2 interviews focused on identifying specific and common challenges to practice and ways to address them. The interview was also complemented by an optional 'facilitator's diary' (written and/or audio), which provided an outlet for facilitators' reflections on practice.

# 6. Procedures for participatory evaluation

This section describes the procedure for reviewing the indicators within the four criteria for evaluation presented in D5.1 (section 5.6), namely public engagement, gender equality, science learning, and social inclusion, using formative participatory evaluation.

## 6.1 Formative participatory evaluation

The review of the indicators in section 5.6.1 in D5.1 was carried out through one-on-one interviews with event facilitators and coordinators of partner organisations. This review was done by criteria; one criterion per session (or two for longer sessions).

A series of phone calls were scheduled with partners and in a conversational manner, we discussed the pros and cons of employing each indicator within a criterion with the purpose of producing a set of RRI indicator descriptions that reflected the actual practices of partner organisations. That is, produce indicators with depth that were meaningful and relevant. Total review time with each partner was approximately 6-7 hours.

The interviews also functioned as spaces for reflection and sharing of ideas, approaches, and questions. As more information was gathered (through notes in living documents in the google drive) more examples and experiences from partners could be shared iteratively with interviewees. The latter was done with extreme care and respect for confidentiality. Through these interviews partners not only found a place where to reflect on and synthesise practice but also bring forth and reveal 'hidden' or taken-for-granted practices (or lack thereof), for example, the concept of self-care for facilitators: their well-being, emotionally and intellectually as they make

events turn from ideas on a piece of paper to real-life experiences, with inspiration, learning and impact but also mistakes and aspirations for future modifications.

At this stage, the review of indicators remained one-on-one to give full attention to each partner. The next step, from September 2017 onwards, and as discussed with partners, is to focus on salient points from this review. The aim will be to discuss through group meetings and more targeted pairing of partner organisations to identify and share relevant techniques, good practice, and lessons learnt. This will also strengthen and help to guide replication of events/techniques, in line with D1.3 and D1.2.

The analysis of the data collected through partner interviews was done through coding, a procedure in qualitative data analysis based on the inductive process of searching for concepts, ideas, themes, and categories that help the evaluator to organise and interpret data. More specifically, coding consists of "*identifying potentially interesting events, features, phrases, behaviours, or stages of a process and distinguishing them with labels*" (Benaquisto, 2008). In this evaluation, the 'labels' are the criteria and the indicators as well as additional salient themes highlighted by interviewees.

### 6.2 Ethnographic procedures

Based on the ToR (D5.1) plan the ethnographic component was started in Phase 2. The ethnographic evaluation focused on analysing the impact of DITOs beyond the existing categories of the evaluation. It used a post-actor-network theory approach (Law & Ruppert, 2013; Mol, 2002) to carry out ethnographic research on DITOs events and the dynamics of the consortium. It followed RRI concepts such as ‘responsibility’ throughout the different stages and themes of DITOs, to see what practices and categories they generate. This allowed the ethnographic evaluation to account for the fact that research methods are performative ways of enacting the world (Law & Ruppert, 2013). The goal of the ethnographic component was to act as a self-reflective way of evaluating the ontological categorisation processes of the DITOs project itself. The ethnographic work takes place and is reported in parallel to the summative and formative evaluation.

The ethnographic work consists of two components:

1. Ethnographic observations of DITOs events.
2. Mapping of tensions and issues across and within the DITOs project.

#### 6.2.1 Ethnographic observations of DITOs events

The ethnographic observations of DITOs events involves sampling a range of workshops and events across the DITOs consortium to observe in detail ‘what is acting’ within the event.

The intention is to identify common patterns across events as well as surprising and unique actors. The aim is to highlight actors of the DITOs project that are otherwise not being accounted for in the framing or evaluation of the project. So far this has involved a literature review of the RRI literature to see how it articulates indicators for RRI and how this is applicable within empirical ethnographic observation

methodology. This was followed by a 2-week intensive ethnography of the Interactivos?17 event in Madrid at the Medialab Prado. The event was the most interactive and intensive of the DITOs events so far. It is a hybrid between a production workshop, a seminar and a showcase. It is based on an international open call for participants who develop, complete and display publicly interactive projects.

#### 6.2.2 Ethnographic mapping of tensions within DITOs

This consisted of observations of events within the process of the DITOs project and interviews with DITOs facilitators. It also involved analysis of internal and external textual documents and the facilitation of collective DITOs discussion sessions around identified tensions. The aim is to identify and articulate tensions and problems within the DITOs project that would otherwise not be addressed.

## 7. Results from evaluation

This section summarises the results from the summative, formative, and ethnographic evaluation.

### 7.1 Results: Summative evaluation

#### 7.1.1 Events diary data

For the summative evaluation, the event data collection cut-off was month 12 ie. events held prior to 1st June 2017. The data from the events diary shows the following achievements of DITOs in the first 12 months of the project (Figure 2):

- In total the audience numbers are 44,594 people (online 551,129)
- A total of 200 events have been completed.
- Completed event numbers are as follows per work package:
    - *Work Package 1 - Biodesign: 112*
    - *Work Package 2 - Environmental Sustainability: 59*
    - *Work Package 3 - Public Engagement and Capacity Building: 8*
    - *Work Package 4 - Policy Engagement for RRI: 18*
    - *Other: 3*

While the project has exceeded the total numbers of events planned for the first 12 months, assuming a linear distribution of the events planned over the course of the whole project, it has not reached the total number of participants. Assuming the same distribution, 97,117 citizens should have participated in DITOs events, but only 44,594 have been actually reached. However, while a linear distribution can be assumed for the number of organised events, outreach campaigns, especially on social media, follow exponential trends and one could assume, that the number of participants per event will rise in the next phases of the project. This assumption will be reviewed in the final evaluation report.

It should be noted that these charts and numbers specifically exclude participant numbers from a total of 9 completed online events that had a total of 551,129 participants. If these numbers were included in the total number of participants reached, the project would have far exceeded its participation goals. However, more than 90% of event participants would have only attended online events, strongly skewing the numbers above. Furthermore, in the future distinctions should also be made between participants at small workshops, which require strong involvement of its audiences and for example year-long exhibitions. For future reporting and evaluation purposes, it is necessary to clarify how DITOs should count its participant numbers.

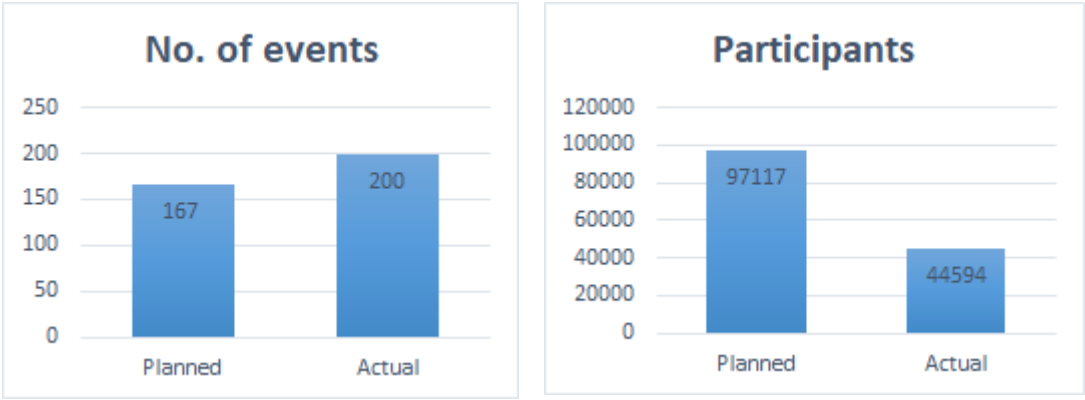


*Figure 2: Number of events and participants.*

Assuming a linear distribution of events over the course of the whole project, the graph in Figure 3 shows the number of projects held compared to the number of projects planned for each Work Package in the DoA. As a comparably higher number of events with high participation numbers such as exhibitions are planned for phases 2 and 3 of the project, DITOs can still catch up to the planned numbers.

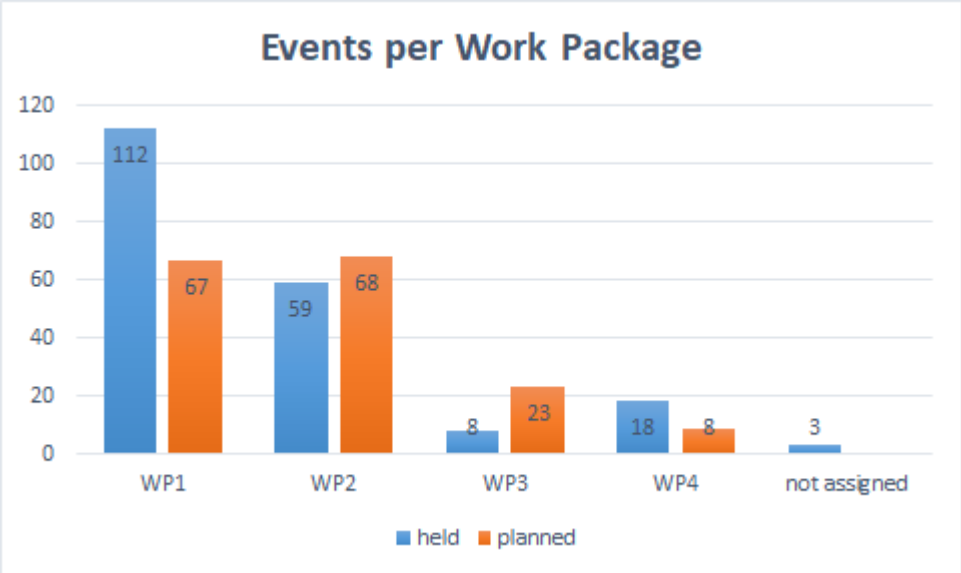


*Figure 3: number of projects held compared to the number of projects planned for each Work Package.*

While the project has been holding more events than planned in Work Packages 1 and 4, it is slightly behind its goals in WP2 and has only a bit more than a third of the events planned in WP3. However, since the total number of events planned in WP3 is relatively small, the numbers originally planned should still be within reach. Furthermore, the authors have been made aware that a lot of events have been falsely reported as having been held in WP1, when actually belonging to WP2. This fact will also be addressed in D1.2 and D2.2. Most likely, the project will have actually exceeded its numbers of events both in WP1 and WP2.

Out of the 200 events held, 119 were workshops. This type of event, with a strong involvement of its participants, makes up nearly 60 percent of all events held. Figure 4 shows an overview of the total numbers for all event types as well as the percentage of total events for each type.

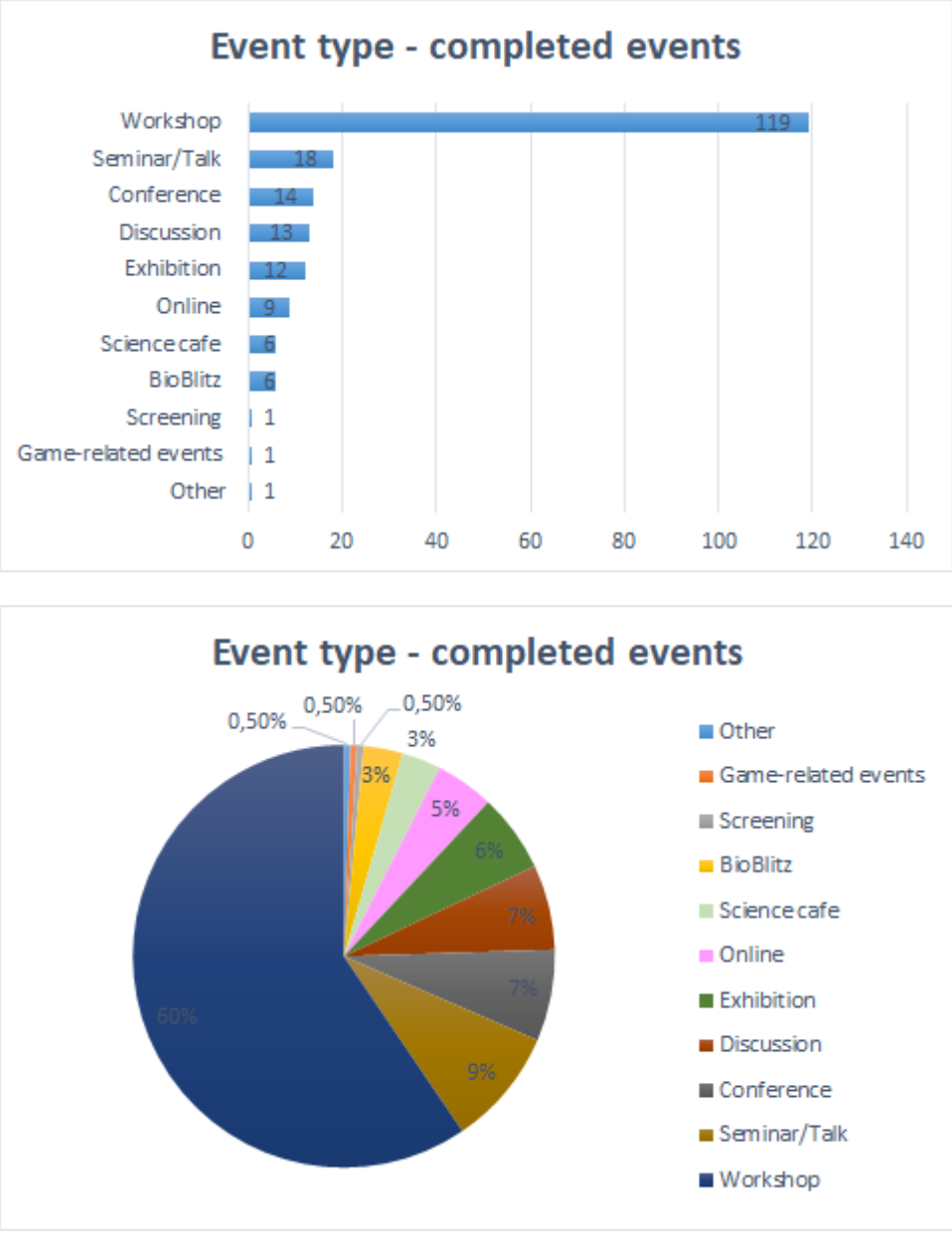


*Figure 4: Overview of the total numbers for all event types and the percentage of total events per type.*

Looking at participants for event types, the diagrams in Figure 5 show that the majority of the audience reached through DITOs has been attending the 12 exhibitions held in course of this project phase. 68% of the DITOs event participants have been attending exhibitions, which are naturally able to attract a high number of people. Again, these charts do not include participation numbers from online events.

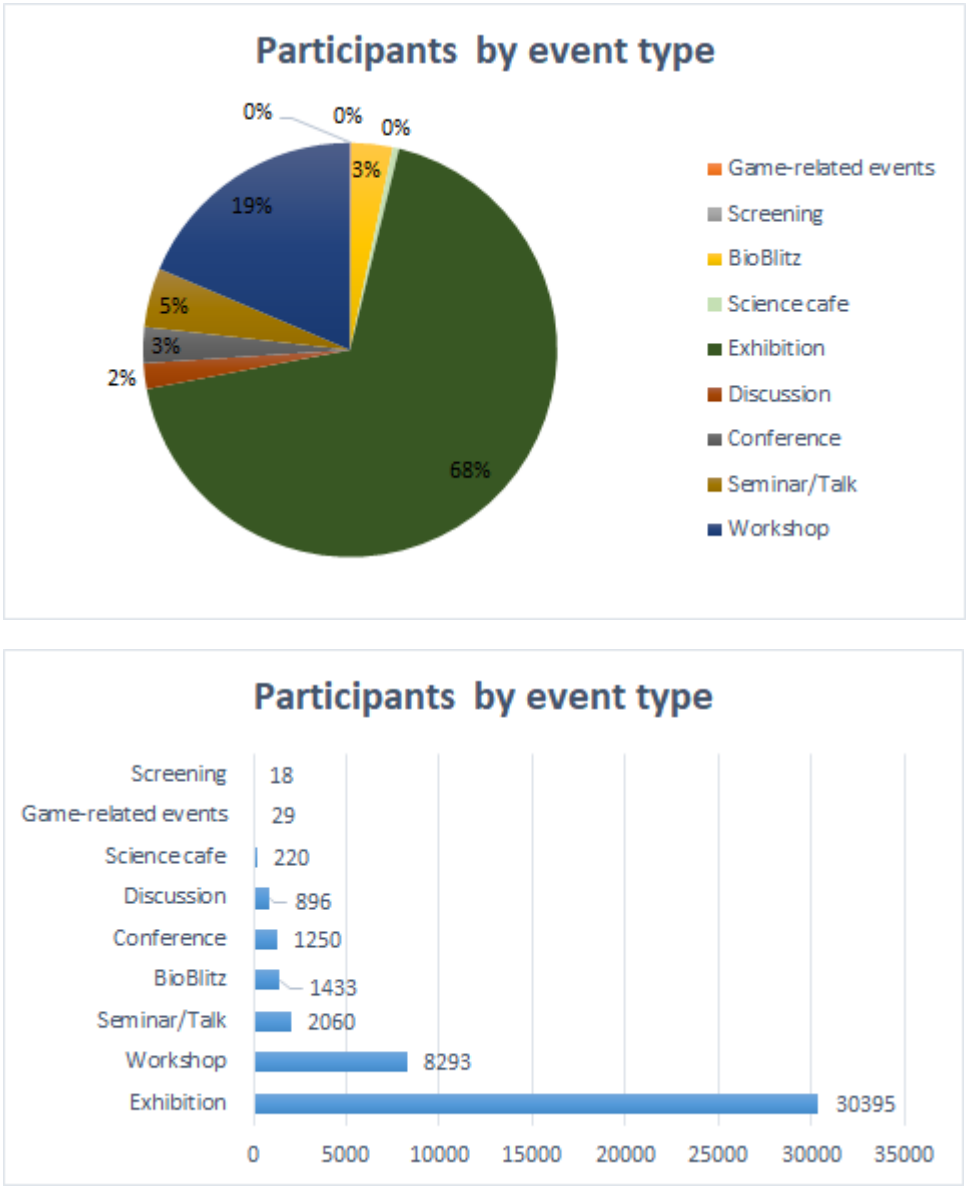


*Figure 5: Number of participants by event type, excluding online events.*

The average DITOs exhibition has been attended by 2533 people, followed by BioBlitzes which on average reach 239 people (Figure 6). It should be noted that the number of participants in workshops is comparably high for this type of events. The reason for this is that the numbers are skewed by two workshops which were reported to have had 2,117 and 3,212 participants respectively. These high numbers resulted from workshops in 'Xperialab' being reported as one event. XperiLab is a truck travelling and organizing workshops all year. If one were to exclude these two, the average participation numbers of workshops would be 43.

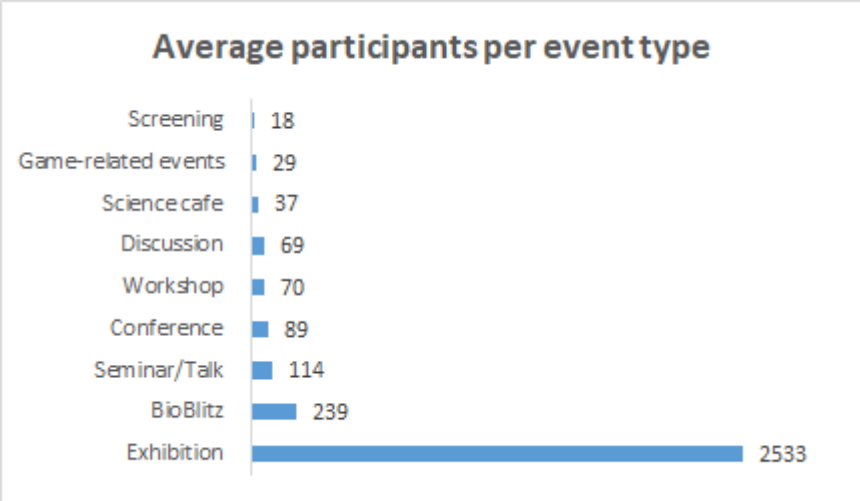


*Figure 6: Average number of participants by event type.*

In total, 48,51 % of all DITOs event participants were female. The BioBlitz and Conference formats showed particularly strong female participation with 56,67% and 54,50% respectively (Figure 7).

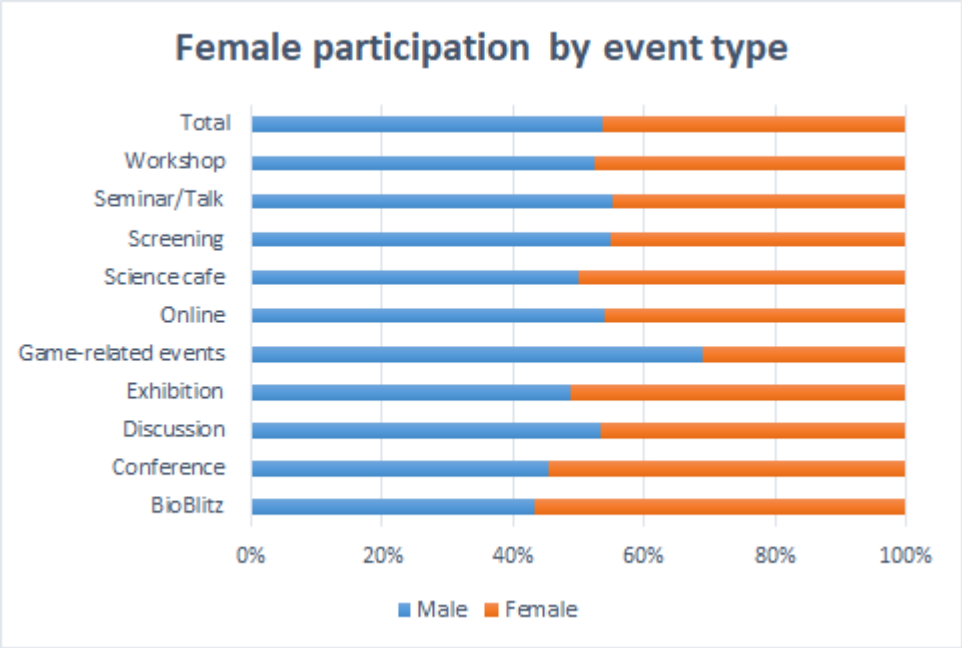


*Figure 7: Gender distribution by event type.*

Looking at the geographical distribution, Figure 8, events have been held all over Europe, with the Netherlands, the United Kingdom and Slovenia making up for nearly half of the events held. Four events by UCL have taken place in the USA.

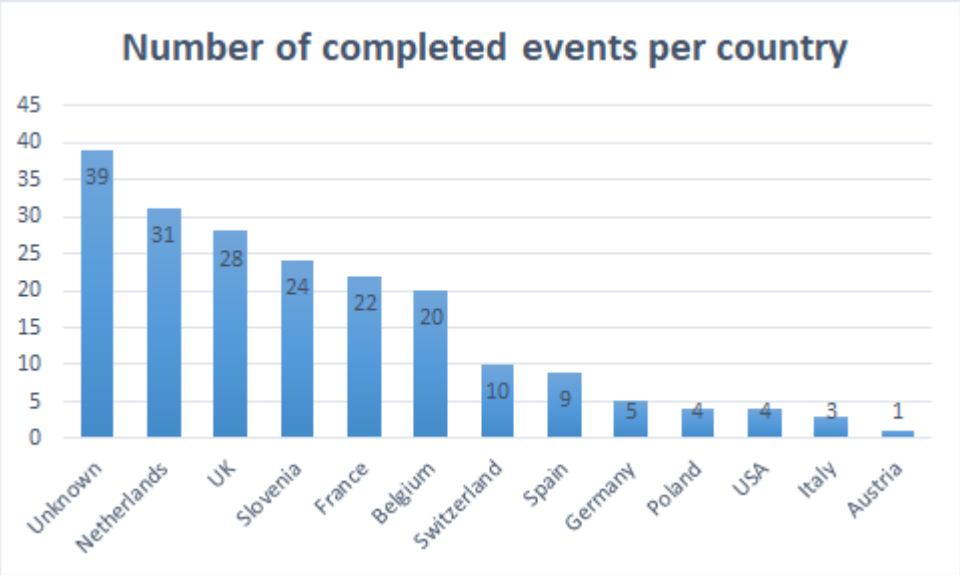


*Figure 8: Geographical distribution of DITOs events. Thirty-nine events in the database did not specify location.*

To gain more insight into the probable location of all 200 events held, Figure 9 gives an overview of events organized per partner. Assuming that the vast majority of these events has been held in the country of the respective consortium partner, the United Kingdom is in the lead, followed by France, the Netherlands and Belgium. Four events have also been held in the USA, which were mostly for dissemination purposes and are additional events initially not planned in the DoA.

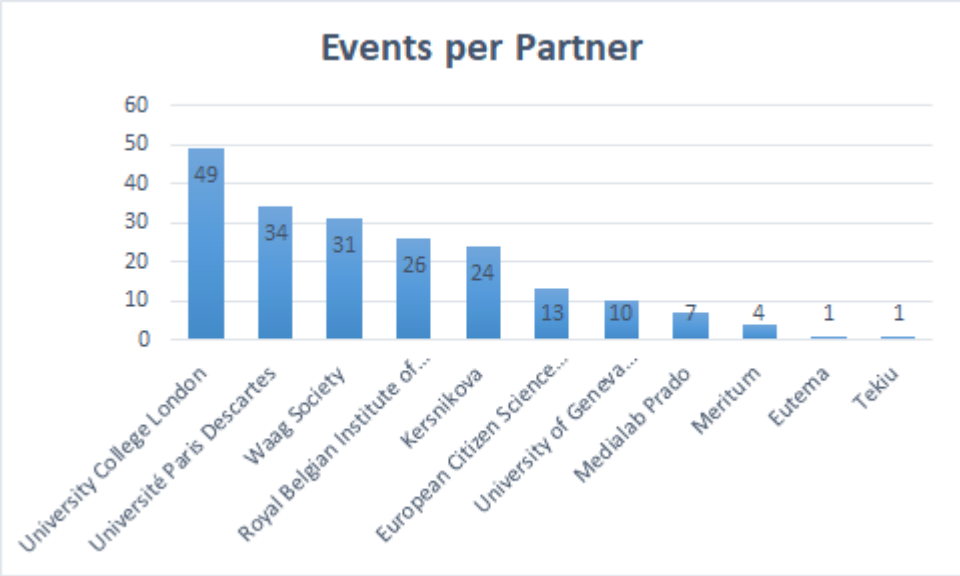


*Figure 9: Events organised by each DITOs partner.*

As the project has exceeded its goals for planned events in the first 12 months of the project, it is no surprise that most individual partners have done so too. However, looking at the planned and held events for each partner individually, Figure 10 shows that UCL has held more than double the events that were planned, assuming a linear distribution in phase 2 of the project, while some partners such as Waag and

ECSA are slightly behind projections. While Medialab Prado seems to be lagging behind, they have recently completed several of their events, which are not reported here.

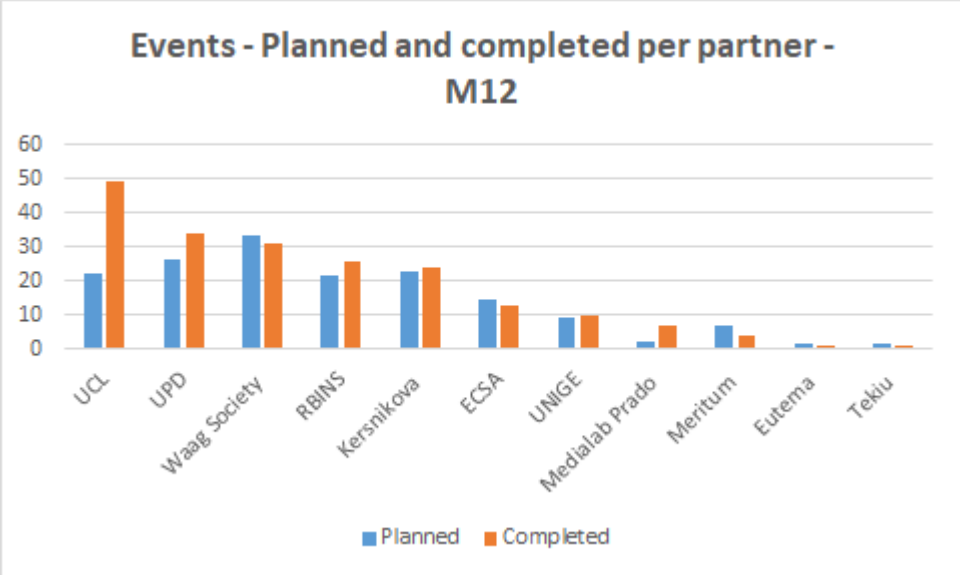


*Figure 10: Reported events planned and completed by partner.*

Looking at the temporal distribution of events over the first 12 months (Figure 11) of the project and assuming a similar pattern for the following months, it can be assumed that a high number of events will be again held in September, October and November this year, which, not surprisingly, coincides with a general post summer 'back to work' rush.

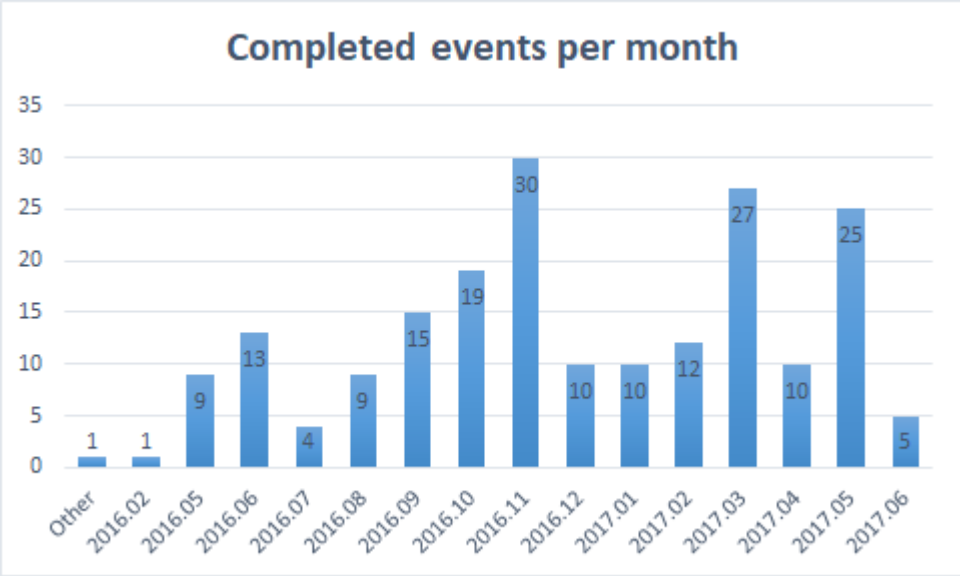


*Figure 11: Temporal distribution of events over the first 12 months of DITOs.*

### 7.1.2 Questionnaire data

A total of 287 questionnaires was filled out by event participants, although not all participants answered all questions. Furthermore, it should be noted that questionnaires were mostly used at smaller events, particularly workshops and the data presented in this chapter might be more representative for workshops (which account for nearly 60% of all DITOs events) than for all DITOs events in general. Surveys were conducted at 29 events by 5 different partners.

With an average score of 1.52 the satisfaction with the participants is very high between extremely satisfied and satisfied. Only 3 out of 241 participants gave the DITOs event a score below average (Figure 12).

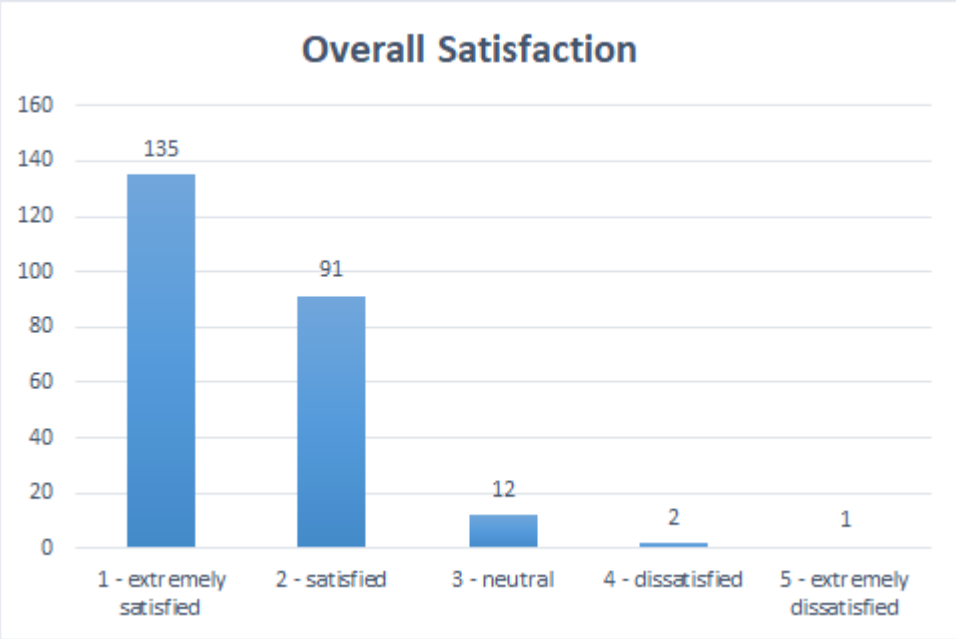


*Figure 12: Questionnaire results on overall participant satisfaction.*

On average the participants gave very high rating to the level of interaction at events - average of 3.18 in Figure 13. This high number reflects the nature of interactions of events but does not necessarily qualify whether the interaction was good or bad - for example, a seminar might be very good but has a low level of interaction. The data might suggest that questionnaires were used mostly at events with high level of interaction.

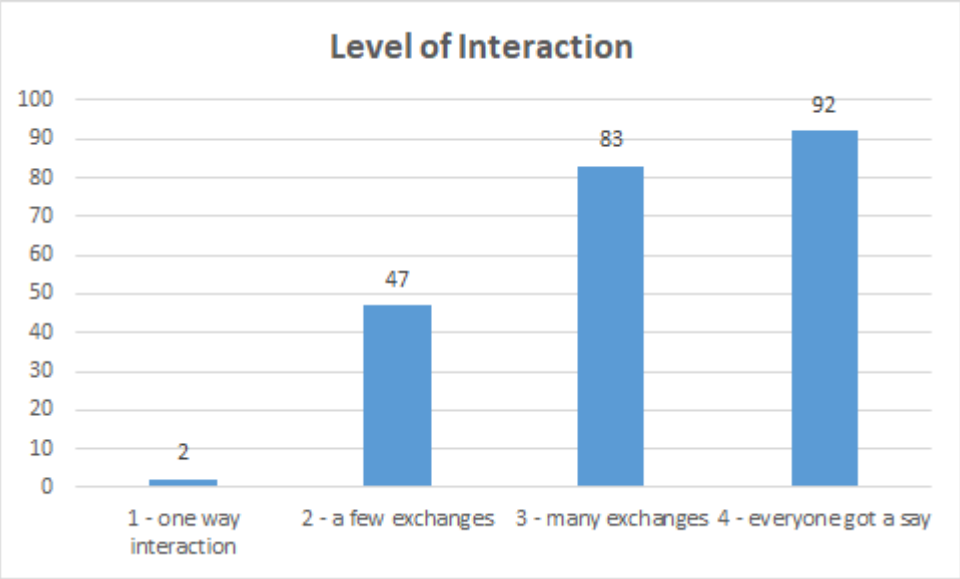


*Figure 13: Questionnaire results on participant level of interaction.*

While a majority of DITOs event participants have engaged previously in science via literature, films, talks and museum visits, only few reported first-hand experiences and even less have been engaged in citizen science (on- or offline) before (Figure 14).

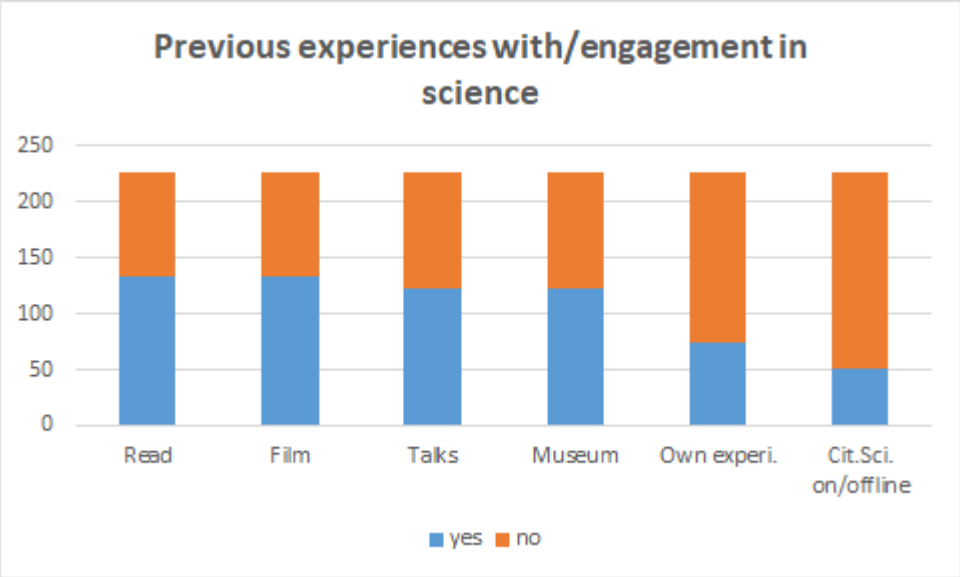


*Figure 14: Participant's previous experiences / engagement with science.*

The event participants have a high level of education. 59% of event participants have a master's degree and 22% have a bachelor's degree, meaning 81% have received higher education (Figure 15). However, it should be noted that the questionnaires were mostly filled out at smaller events like workshops, while data from exhibitions has not been collected. We need to take a closer look at this demographic data to see if the events are being targeted too heavily at highly educated audiences or surveys are being administered only at events attended by

those with higher education to avoid 'preaching to the converted'. It can be further remarked, that participants with a higher education do not necessarily have a background in science and therefore DITOs might still be reaching an audience that is new to the subjects addressed in its events.

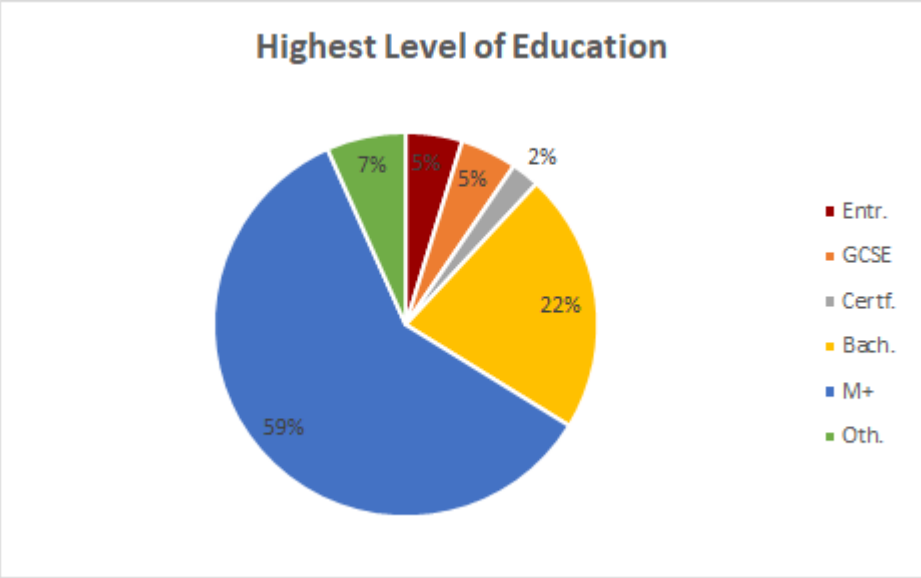


*Figure 15: Highest level of education attained by surveyed participants.*

As shown above, from the events diary data, DITOs has achieved a balanced gender ratio. Out of 245 participants who have answered this question, 125 were female and 120 male (Figure 16).

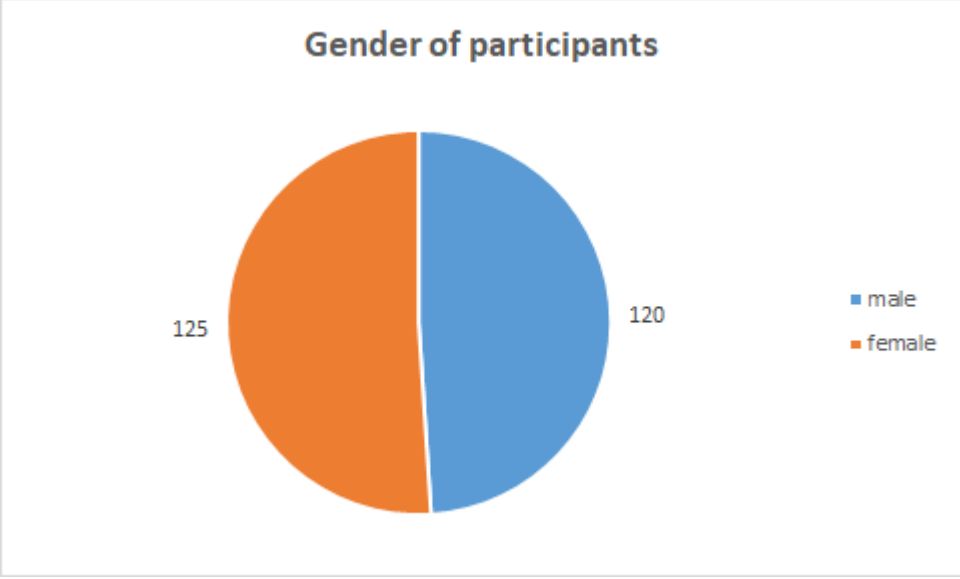


*Figure 16: Gender distribution of surveyed participants.*

Participants in DITOs events have been comparably young with the majority of respondents being between 18 and 35 years old (Figure 17).

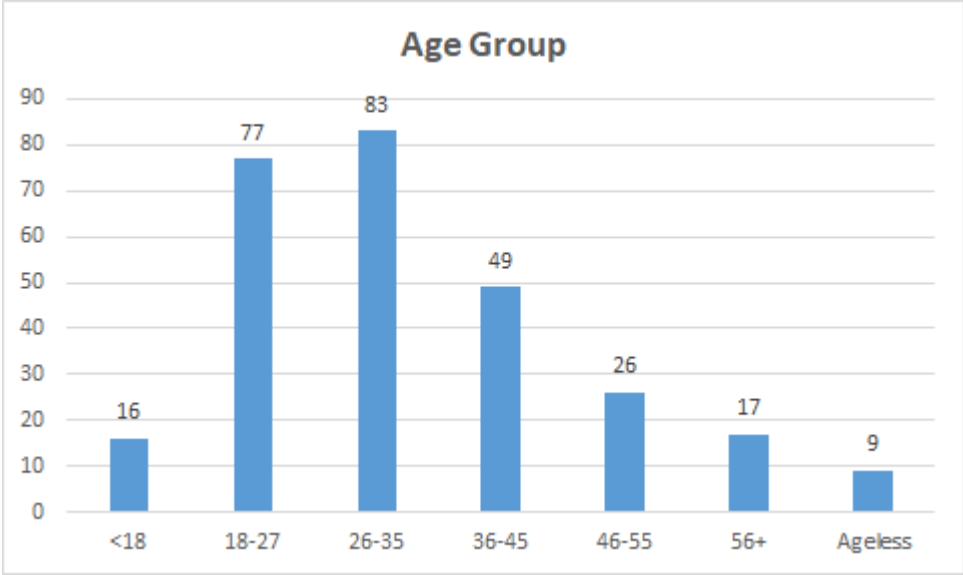


*Figure 17: Age distribution of surveyed participants.*

When asked about their background (i.e. who they felt they represented at the event), 123 respondents stated that they represented students/academia. 94 respondents represented the general public. A minority of participants stated they were representing civil society, the media, investment/funding, policy making or industry. This data raises questions about the targeting of events (Figure 18).

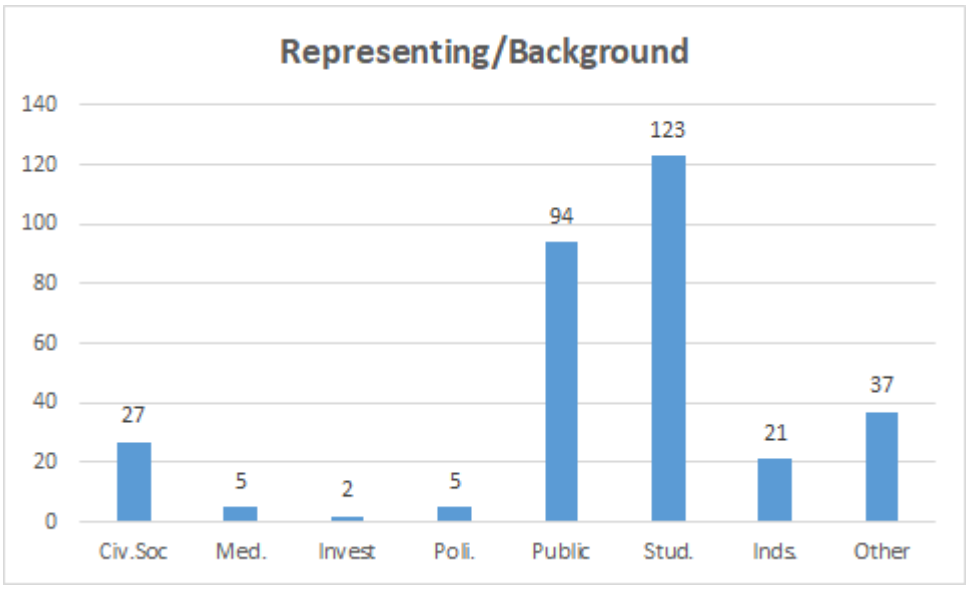


*Figure 18: Background of participants.*

Evaluation of the data collected in the questionnaires shows that DITOs events have a high level of both participant satisfaction and interaction. The project reaches a diverse audience with a generally high level of education and varying previous experiences with or engagement in science. The gender balance and representation of different age groups at the events is evenly distributed. However, we still need to understand how representative are the results of the surveys in comparison to the whole considering that surveys were not administered at all types of events.

In general, the results from these surveys point to the potential for reviewing the questionnaire in relation to social science literature on the subject of demographics, representative groups and survey methods.

## 7.2 Results: Formative evaluation

### 7.2.1 Review of RRI indicators

Two salient points from this initial formative evaluation are 1) All partners concur on the need for longer-term 'tracking' of their work (as processes and outcomes) starting from a baseline evaluation. However, there are resource limitations for follow-up with those who lead initiatives and spin-offs; also requires defining what the follow-up is for and what the organisation's responsibility to these (spin-off) initiatives are; 2) As noted by an interviewed partner, the "*commitment by facilitators should not be taken for granted – their efforts, focus, and the impact that they have*". The work of facilitators is intertwined with organisational capacity and we describe in several indicators some of the ways to identify their hidden contributions and how to recognise and capture them.

### 7.2.2 Public engagement

This criterion covers three subdimensions: at the organisational level, *policies, regulations, & frameworks*; at the activities level, *science initiatives & events*; at the level of practice, *capacity building*. After reviewing these subdimensions through interviews with partners, it was concluded that these continue to be relevant. However, the boundaries between these are much more blurred because public engagement issues that arise are complex, interconnected, and arise at different levels.

*Process indicators for public engagement*

| *Amended indicator* | *Salient insights from applying/discussing indicators (and relevance to project)* |
|---|---|
| **Commitments by institutions and organisations to PE** are linked to organisation type (e.g. social enterprise, educational institute, etc.) and structure (e.g. mission statements, values, and goals; | - Reveals the constraints that commitments have on organisations' practice (how funds are used, what topics are given priority, how responsibility is framed, etc.).<br>- Reveals that having commitments at the |

| | |
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| types of projects/programmes they hold or plan). It is also shaped by political environment and social context (including pressures). | policy level have limited weight if there is little societal support (i.e. the culture of, value for, and support for PE at social level). |
| **Number, type, and purpose of initiatives** ('locations' indicator removed because is covered in social inclusion criterion) are the commitments as per the DITOs GA, & include additional activities (not in GA), and activities from collaborations or developed with/by participants as the project progresses. Purpose indicates motivation and link to project and organisational goals. This indicator needs to be captured over time (not only single snapshots in time) from an initial baseline to the end of the project. | - Understanding the purpose of an activity helps to situate it in terms of the bigger picture: achieving project and/or organisational goals. Recognising purpose is being honest and open about stance and intention (recognising diversity in a consortium). Purpose is also linked to addressing audiences' expectations and providing multiple avenues for engagement.<br>- Highlighting collaborations reveals the importance given to building capacity outwards (how collaborations complement and expand and organisations work).<br>- Capturing the indicator over time traces the 'journey' and development of an organisation (transitions, experimentation, etc.). |
| **Number of facilitators / science communicators & Current experience and training opportunities for facilitators** is linked to the organisations' mission, goals, needs, resources, commitments, and trajectory (stage of development). Facilitators and communicators form part of the core organisational infrastructure; they need care (including training & support) and roles. This indicator helps to point out these considerations for organisational capacity: team profile, identification of training needs, who/what is missing, etc. This indicator also includes considerations for resources available for capacity development including space, materials, funds, support from other staff helping 'behind the scenes' (e.g. with administrative tasks, etc.). | - Organisational capacity requires organisational will; requires finding balance in organisational management between enabling emergence and working together toward a focused (and agreed upon) goal.<br>- The pros and cons of formal and informal training need to be collectively discussed.<br>- There is great need for reflective spaces to share practice and talk about issues during regular hours (part of organisational culture).<br>- Science communication is not only an outward but an inward strategy, which gives focus to purpose of initiative and helps to create a shared message for the team. |

*Outcome indicators for public engagement*

Some of these indicators are for the purpose of reporting on summative evaluation: has the project accomplished what it promised to deliver. However, given depth and linked to direct organisational needs, some of these indicators can reveal strengths and weaknesses, and areas where facilitator exchanges can aid in learning from other partners' strategies/techniques. Some of these indicators occur gradually and/or are easy to 'take for granted' by organisations and individual facilitators (such as tacit skills developed or hidden (non-monetary) costs incurred by facilitators (mentally, physically, and emotionally). Keeping track of these indicators at their different subdimensions (organisational level, *policies, regulations, & frameworks*; at the activities level, *science initiatives & events*; at the level of practice) does not only

help to determine project progress but also builds organisational awareness and memory.

| *Amended indicator* | *Salient insights from applying/discussing indicators (and relevance to project)* |
|---|---|
| **Changes in agendas / organisational practices as a result from PE** are defined by organisation's stances, mandates, capacity, resources, and commitments. Agendas are modified based on public perception (or lack of it), perceived and expressed audience/participants' needs, identification of opportunities for change, etc. Therefore, this indicator requires identifying 'target audiences' and putting their needs, expectations, and contributions into context. | - Requires recognising organisational capacity to meet expectations/needs, etc.<br>- Requires consideration for historic variability – what has been in place before – as point of reference to understand organisational change. |
| **Number of visitors/participants at activities** & **Types of visitors / participants** are statistics collected for project reporting using the 'evaluation tab' in the DITOs website and the event evaluation templates. Beyond tracking to fulfil requirements, this indicator needs depth of information complementing numbers and categorised profiles so that facilitators can benefit from the collected data e.g. help with understanding who is and isn't present (addressed by social inclusion criterion), what are their motivations, who returns and why? | - Purpose for tracking exact numbers needs to be linked to organisational use (not merely fulfilling reporting requirements).<br>- Partner organisations have relied on 'perceiving' the depth of engagement and expectations of visitors rather than tracking numbers. It is a tacit/attuned skill that captures the complex interactions between participants and tools and facilitators or e.g. guest speakers, the setting (environment created), how the topics or approaches used are received, the quality of the discussions, the mood of participants, etc. For ex. here the distinction between the number of visitors to an exhibition and those visitors to the same exhibition who can be considered as participants because we have been in interaction with them and have collected their feedback<br>- These indicators could benefit from linking results to the DITOs escalator: is there a correlation between type of participants and avenue for engagement (type of event)? Answers can guide design of activities and facilitator preparation.<br>- Focusing on numbers and pushing for 'increased PE' also pushes organisational capacity / threshold, creates loss of focus (or connection to bigger picture), and can lead to burnout. |

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| **Social media coverage** includes the regular social media channels managed by consortium partners and should also include blog posts/articles/tweets/etc. written by participants. | - Social media use requires more attention by all partners. While it is being monitored as part of WP3, purpose and need grounded in organisational needs is still lacking. |
| **Number of collaborations and types** refers to existing and new collaborations over the course of the project. 'Type' describes the nature and purpose of the collaboration in terms of interdisciplinarity (e.g. collaboration with technologists, activists, artists, scientists, practitioners, policy-makers, etc.), extent of collaboration (e.g. consultation, co-design of activities, outsourcing, etc.), length of collaboration (e.g. one-off, long-term), outcome from collaboration (e.g. how-to manuals, articles, blog post, and longer term new projects, etc.). | - Building and maintaining collaborations requires particular skills and allocation of resources (e.g. time for follow-up and attending collaborators' events).<br>- Partners value the nurturing of external relationships and collaborations because these extend the capacity of the organisation but also, "*they are the network that spread the message and work of the organisation*" (as word of mouth or ambassadors). |
| **Number and type of participant-initiated/led activities** vary in type and extent. These are not always apparent but can be captured through informal conversations, observations, etc. and are often the work of participants with longer-term engagement. Capturing, promoting, and celebrating these efforts can help to encourage them. Can also help to identify potential needs or synergies (which can lead to further capacity development on the part of the participant, the facilitator, and the organisation). This indicator also aims to capture over time how these initiatives develop (are they temporary, goal-oriented, intended to be longer-terms, etc.) but requires additional tasks/resource allocation. | - Citizen-led initiatives that partners are aware of are few in numbers. These are difficult to capture unless partners actively seek them out or citizens actively seek to promote them.<br>- It needs to be recognised that these initiatives come in multiple forms, occur for different lengths of time, and for various reasons – often not known to us.<br>- Partners need to decide at the organisational level if they want to support them and how so that adequate resources are allocated to them. Expectations and responsibilities from both the organisations and the initiative-taker(s) should be discussed openly. |

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| **Number and types of skills developed by participants & facilitators** include soft skills (from communication skills to ability to develop strategies) and hard skills (such as technical know-how from the use of tools and techniques). It also includes tacit knowledge gained from practice. This indicator includes keeping track of changes to organisational practice/structure to support the new skills (e.g. group debriefs, additional infrastructure, additional / temporary staff, applying to new grants, etc.). | - Tacit knowledge plays a significant role in the work of partner organisations. The creation of spaces for facilitators to share and discuss issues, ideas, and concerns with the rest of the team during working hours are a must. That is, sharing and discussing practice should be integrated into the organisation's culture e.g. through dedicated and minuted in-person weekly update meetings. Minuting can help with follow-up.<br>- For some partners, current discussions (through interviews) about number and types of skills developed by facilitators has led to reflections on their current capacity building strategies for facilitators. |
| **Costs of (increased organisational) capacity**: As these engagement activities are intended to be sustainable after the end of the project, information about the actual costs of developing and maintaining these is an important consideration. One way to explore this is by looking at budget allocation; another is by enquiring how much participants are willing to pay for such events - the difference between these can shed light on the needed cost to be covered by other means. This is useful information for funders and decision-makers. | - Costs of increased organisational capacity require consideration for *external factors* such as government funding and public valuing (e.g. underfunding of sector); *internal factors* such as retaining talent, return on investment, the need to build value of the activities and the skills provided; and general considerations for exclusion because of financial limitations. Strategies developed by partners to manage costs include the effective use of resources by matching staff/talent and with activities, creative use and reuse of resources and materials for events, learning from feedback and applying it, and (re)defining roles that enable furthering goals. |

*Perception indicators for public engagement*

Capturing these indicators require multiple approaches to evaluation both formal and informal feedback (e.g. conversations, indirectly obtained from surveys, etc.) and observation. However, how and what is captured depends on what the data capture is for. Partners need to consider if it is for merely for evaluation requirements or organisational/facilitator improvement. The latter requires questioning practices and capacity. We encourage partners to obtain a sense of both participants and facilitators' expectation through one-on-one or group discussions. We found that organisations that are able to create spaces for informal conversations or group reflection find that they are not only able to obtain timely feedback but are also able to develop trust and in some cases, long-lasting relations with attendees (e.g. moving from participant to mentor over time).

A recurring theme for partners is the need for a focused approach that outlines the greater of purpose and strategy that binds activities as a collective – what do they all add up to, what is the bigger picture of public engagement for the organisation? Linked to the latter is that, as an interviewed partner notes, the "*commitment by*

*facilitators should not be taken for granted – their efforts, focus, and the impact that they have. For example listening to what people think and want creates a space for them to engage*". For the purpose of DITOs, it is important to note that the work of many partner organisations is based on hands-on learning. Partners are interested in finding ways to capture the stories that reveal the power of hands-on engagement and the level of empowerment gained - something that can be achieved through case studies and vignettes (and will be done in the latter part of Phase 2 - see section 8 below).

| *Amended indicator* | *Salient insights from applying/discussing indicators (and relevance to project)* |
|---|---|
| **Public interest on impact of science & technology**: These are very general perceptions but point to the broader interests of the public - hopes, concerns, and aspirations from science and technology & range from intellectual curiosity to active engagement in activities. The focus in DITOs in on increased knowledge about applications of science and technology and the scientific process by engaging hands-on / through first-hand experiences. | - An important consideration is that perception on the 'impact of science and technology' is also influenced by larger sociocultural factors such as political climate and media narratives.<br>- This indicator raises questions about the organisation's responsibility to 'impact' and to whom? How does 'impact' relate to gains for the organisation (e.g. return on investment)? |
| **Public expectations of engagement in decision-making processes** at various levels of decision-making - from organisational to governmental. It ranges from participants feeling that they have a say in the structure of the organisation (e.g. agenda or programme) to feeling empowered to participate in bigger societal issues. The EC RRI report warns that "*absence or declining public expectations of being involved might be an indicator of the acceptance of technocracy*". | - Partners note that there is limited impact on institutional science. While there are collaborations these do not necessarily lead to increased 'Public expectations of engagement in decision-making processes';<br>- 'Public expectations' are linked to the perceived role of the organisation (or what is known about the organisation – therefore raises concern for visibility, communication strategies, and framing of role/stance on issues)<br>- It is the will of citizens that makes things happen; there is a necessary interplay between what the institution provides and commits to and what the public makes/wants to happen. |
| **Perceived 'level' of participation/contribution**: can be captured in an atmosphere of trust, where participants feel able to freely share their thoughts, build on ideas, discuss what they got out of their experience, and feel free to make mistakes. Perception is influenced by the local science culture within which the organisation and participants operate. | - Partners strategies range from active encouragement of public opinion and voicing of thoughts in their activities to passive efforts e.g. through their website or subtext in exhibitions.<br>- It needs to be recognised that while the longer-term tracking of participants' engagement would be useful to learn about the success of their strategies, such an indicator would be biased towards those who can commit to engagement. |

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| **Attitude toward facilitator and organisation**: This will have an effect on the engagement of the participants (e.g. perception of facilitator's competence (even perceived charisma, enthusiasm, and commitment to science), adequacy of facilities, status of organisation, etc. As above, these perceptions will more likely be shared in an atmosphere of trust and when participants know how their answers will be used. | - Public perception and attitude cannot be looked at separately from the organisation's commitment, its mandate, and stance as well as the facilitators' position or focus because these are reflected in the activities through design of content and setting.<br>- Capturing this information needs to be linked to need for it; to be significant to partners, 'perception' needs to be captured over time because these can change with subsequent participation. |
| **Understanding of science**: This is based directly on the EC (2015) classical indicators for public understanding of science "*knowledge of science in terms of textbook facts, methodological processes and awareness of and beliefs about institutional functioning*" and it applied to both facilitators and participants. However, they also note that "*knowledge is not a driver of positive attitudes but a cognitive component of public perceptions*". | - A key aspect of engagement is managing expectations, that is, what different types of events are for, what people can expect to get out of different types of activities. This is important both for the public and the facilitators. |
| **Attitude towards science**: Includes the perception of science in broader terms (e.g. social gains from science and technology - medicine, environmental protection, etc.), relevance or science to daily lives, etc. | - Attitude towards science and technology is linked to longer term engagement; therefore the focus of evaluation needs to be on the journey and not just a snapshot of attitudes. |
| **Attitude towards their own abilities**: This is for participants, facilitators, and organisations as a whole - it points to a level of (self-)confidence and acknowledgement of abilities, aspirations, and limitations. Limitations can be technical but may also be attitudinal. This indicator also aims to capture facilitators' and participants' lessons learnt, openness to change, willingness to share thoughts on room for improvement, etc. | Attitude towards participants own abilities is linked to partners' organisational mission and goals as well as their stance on engagement. For example, teaching facts versus transcending fields and promoting interdisciplinarity. |

#### 7.2.3 Gender equality

The EC literature on gender equality in the context of RRI policy identifies two dimensions: promoting the equal participation of men and women in research activities (the human capital dimension); and the inclusion and integration of gender perspectives in R & I content (Strand et al., 2015, p. 27). The literature on RRI pinpoints several obstacles in advancing the gender equality agenda: decision-making processes that reinforce status quo; formal and informal institutional practices and organisational culture (which often hide unconscious bias against women); unconscious gender bias in the assessment of issues and definition of

problems/identification of solutions; lack of recognition of the LGBT perspectives in design, definition, and problem-solving in science and technology and public engagement.

The EC (Strand et al., 2015) report on RRI criteria/indicators recommends that the focus for gender equality should be on processes of institutional change to see whether general ambitions for equality and inclusion are translated into concrete forms of action. We, as DITOs evaluators and partners, recommend that indicators should include looking at external relations and collaborations as these influence approaches and strategies to address gender equality. For example, collaborators might have different attitudes toward/awareness about gender equality (e.g. mismatch in values, invisibility of gender discrimination in practices). Looking at relationships with collaborators also sheds light on how organisations shape (enrich or adapt) their practices and strategies.

*Process indicators for gender equality*

| *Amended indicator* | *Salient insights from applying/discussing indicators (and relevance to project)* |
|---|---|
| **Gender equality commitments/frameworks**: The structure of projects and commitments to gender equality need to be looked at in terms of first, how organisation's ideals align with team members' stances and knowledge about gender equality. This includes formalised practices and specific actions towards recognising and minimising discrimination and advantage of one sex over another, or commitments towards change. Second, how commitments and understandings (can) translate into practice. This includes looking at relationships with collaborators to sheds light on how organisations shape (e.g. enrich or adapt) their practices and strategies. It also includes processes for documentation of good practice toward gender equality and training/support for gender equality actions. | - Gender equality issues and strategies to address them need to be looked at in terms of social and historical contexts of the organisations' region/country. For example, as some partners note, there might be political will (e.g. through regulations and policies) but these are not necessarily abided to by everyone. It is compulsory but importance given to it at the societal level is still lagging.<br>- Partners note issues that arise from treating 'gender equality' as separate from other criteria; "t*hey are not independent from each other*" and singling out gender (or any other difference) can exacerbate it. Another issue raised is if "t*here compromise in pushing forth gender balance over merit?*" That is, by trying to abide by percentage of women dictated by frameworks, are other issues/opportunities being pushed to the side? |
| **Number and type of events discussing gender**: This includes events specifically designed to have a dedicated space to discuss gender issues/opportunities in science or that promote the discussion of the role of gender in science and technology. It includes considerations for how to introduce or open up sensitive subjects with tact but impact. Again, the skills of facilitators who know their audiences should not be taken for granted. Support for them to achieve this also | - Looking at the indicator in depth reveals strategies in content production e.g. how workshops are structured or exhibits curated to reflect women's role in/contribution to science and technology.<br>- This indicator also intends to reveal the strategies that facilitators develop to create content and how content is linked to event setting and relevance to everyday life. Documenting this facilitates sharing good practice.<br>- Partners who promote action-based |

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| requires assessing organisational capacity (extra staff (help during event, preparation of content), materials, spaces for sharing practice, etc.) and match with mission statement. | approaches find that there is more impact when something practical/material is produced during the activity, e.g. in MLP "*we have activities promoting women in science - Wikitons - getting together to add or edit women scientists' biographies; it is direct action rather than just having discussions. Sometimes just discussing doesn't get you very far. It should be about doing something - research and edit, or make - to contribute directly to change*" |

*Outcome indicators for gender equality*

| *Amended indicator* | *Salient insights from applying/discussing indicators (and relevance to project)* |
|---|---|
| **Percentage of women a) attending events; b) facilitators and collaborators; c) in Advisory Boards.** Quantitative tracking is given depth by linking it to the local conditions such as event settings (e.g. design of safe environment in workshops to redefine participants' relationship to failure), context/culture (awareness of and social value given to gender issues), and the role of facilitators (e.g. facilitators' skills to note patterns of behaviour and enable equal participation or when they act as role models themselves). | Counting number of women says little about gender equality. An interviewee notes "*just because you are there as a woman – and you are a tracked percentage – it doesn't reflect the depth of your engagement*". Quantitative data needs to be complemented by qualitative data (over time if possible) that sheds light on depth of women's experiences.<br>- Through this indicator recognition can be given to the various strategies created by organisations to address gender inequality (including what these are rooted in). For example, approaches that focus on confidence building to empower women rather than highlighting differences in gender thereby exacerbating divides. |
| **Percentage of women initiating/leading citizen initiatives**: This includes leading discussion, raising issues and actively taking part in shaping events, starting their own initiatives/events (as part of or outside of the project). This indicator is given depth by looking at the conditions and context of participation that makes 'initiative-taking' possible. | - Considerations to understand what makes 'initiative-taking' possible include: what is the status/standing of the organisation? Why/do people want to be associated with the organisation? What are the communication and outreach strategies of the organisation -are they targeted? |
| **Percentage of women sharing feedback** (surveys & interviews): The female voice in understanding the performance of the events and project as a whole should be captured through surveys and one-on-one exchanges - what is relevant to them, what is of interest, what is missing, etc. in terms of content. | - Linked to the above, this indicator requires looking at what relations of trust and respect are developed and how these can be tracked in a meaningful way. This can shed light on how women feel empowered to share their experiences. However, these types of tracking is time-consuming and requires an existing culture of support and awareness. |

*Perception indicators for gender equality*

Through informal conversations, observations, group discussions, and indirectly from surveys, facilitators can gain insights into what influences these perceptions. Perception, for example, is linked to the organisations' communication strategies and it also hinges on its PR.

| *Amended indicator* | *Salient insights from applying/discussing indicators (and relevance to project)* |
|---|---|
| **General perception of gender equality**: includes perceptions at the social, organisational, group, and individual level | - Most partners' approaches are practice-based and this impacts outcomes and perceptions by a) creating immersive experiences through hands-on learning - these enable creating meaning and awareness, developing capacities, and building confidence through the act of 'making', and b) cross-cutting issues because "*it is not only about gender*" i.e. issues are incorporated into partners' work "*not as something you tackle but as a theme in itself, included in the work that is done for example taking a feminist perspective instead of looking only at gender inequality*".<br>- When gender equality and social inclusion are not part of or incorporated into the practice and culture of the organisation but are rather imposed and required as measurement, it leads them to work toward a measure instead of working toward an organisational goal/value. This may leave facilitators feeling that addressing gender issues is an afterthought "*slapped onto an activity rather than designed purposefully and explicitly to tackle issues*".<br>- Perspectives of facilitators also need to be acknowledged in these indicators because as an interviewee noted "*being aware of your practices makes you, as facilitator, consciously shift your practices*". |
| **Perception of opportunities for women in science**: for themselves, for youth and younger generations (tells about perception about the future trajectory of gender equality), in their lives (incl. work environment) | |
| **Perception of gender equality efforts**: in society, science-related organisations, at DITOs events | |
| **General perception of gender equality issues in science & technology**: These are more likely to be shared if there are dedicated spaces to explore and discuss them during activities. Group discussions might raise awareness and invite sharing of ideas/concerns. Some of the issues that initially arise might be contentious and therefore good moderation is advised | |
| **Perception/awareness of gender equality efforts/initiatives in science & technology:** These are efforts both at the social level as well as the organisational level - the event itself - did women feel they had an equal experience, where some gender biases debunked, etc. Answers to these can be obtained from one-on-one interviews following a group discussing, which 'breaks the ice' on gender issue discussions | |
| **Perception/awareness of gender equality issues in science & technology relevant to their own lives**: Do participants feel that the gender question or role of gender equality in science and technology is relevant to their everyday life? | |

### 7.2.4 Science Learning

Although there is an overlap between science learning and capacity building in PE (above), the latter is focused on planning and delivery of events, whereas the former is focused on providing participants, facilitators, and organisations with the capacity to engage in science and technology. These are the specific skills and techniques shared and (co)developed to engage in citizen science. For DITOs these are for the most part informal science education initiatives and the two dimensions for this criterion are organisational scientific capacity (partner capacity to plan/deliver science learning) and scientific capacity of the public (the gains from science learning in the public sphere). Organisational infrastructure was added as a process indicator.

*Process indicators for science learning*

Strategies for science learning (and event design in general) occur at multiple levels and time scales and these indicators need to reflect this – e.g. strategies for the creation of settings (communication, familiarity with people and physical space, etc.), strategies for building community (how to make people feel like they are contributing, etc.), personal strategies (e.g. developing and instilling humility and inclusivity, sensibility and awareness of interactions and use of space), group strategies (e.g. 'how to acknowledge the skills of the other facilitators'). In addition, all partners exhibit flexibility to make changes to strategies to incorporate emergent opportunities. However, the nature of this flexibility is not clear and the link to a great or longer-term goal is often lacking.

Exchanges between facilitators/coordinators in this project serves to increase capacity and enrich strategies; we recommend one-on-one exchanges between partners (online) for specific topics (e.g. management, decision-making, and self-care have been identified) and then targeted group exchanges, in person at consortium meetings.

| *Amended indicator* | *Salient insights from applying/discussing indicators (and relevance to project)* |
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| **Capacity building initiatives at the organisational level & organisational infrastructure** includes considerations for how facilitators prepare for their science activities (what training, sources, guidance do they use); how they are supported (infrastructurally on- and off-line, in terms of content and resources, etc.); what learning plans are in place (e.g. scientific procedures, philosophical orientations, technical issues, learning methodologies, etc.). It also includes looking at the organisational frameworks that support these infrastructural modifications and what was already in place, as a baseline but also as a way to promote and facilitate these | - To avoid abstraction, the indicator should link capacity to 'purpose of the programme', the requirements for team members running the programmes, and what capacities the team brings. This sheds light on who is being targeted and how (i.e. in recruitment).<br>- Organisational infrastructure has been added to this indicator and includes 'Space and equipment upgrade' as well as 'material capacity', which includes 'discussions about uses of the space' such as 'promotion of openness and awareness of practices'. Organisational infrastructure and material capacity is linked to the role of facilitators in creating and maintaining them "*because they know what works and does not work* – |

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| processes. Capacity is a complex and multi-layered process. In addition to organisational commitments and infrastructure, capacity building is also driven by or born out of organisational, citizen, or mutual interest, which in turn pushes for the development / acquisition of new capacities. | *they feel and know what happens in the space and they also propose the solutions - they are a resource linked organically to the space*".<br>- Considerations for external collaborations (e.g. experts or communities that can bring (local) knowledge, training, equipment, funds, co-facilitation) sheds light on a) how organisational capacity is increased/complemented by these, and b) what additional capacity and resources are needed to be able to work with externals. However, it is organisational management that sustains capacity building. |
| **Strategies for science-learning outcomes at events** includes considerations for what approaches or methodologies partners employ to promote science learning during an activity; how existing skills/expertise of participants are recognised/harnessed? A baseline of methodologies have been collected by leads from WPs 1 and 2 (see D1.1 and D2.1). Each partner organisation has over the years developed various engaging forms of informal science education. They have employed multiple tools and methods and lengths of time to enable skill development. In this evaluation these will be gathered together with leaders from WPs 1, 2, and 3 to create a collection of good practice in informal science learning initiatives in D1.3 and D2.3. | - 'Co-creation' is a theme expressed by all partners; they see the value in creating multiple avenues for engagement in the 'incubation process' of activities and throughout the initiative/project cycle (i.e. at different stages, which reflects the value of the DITOs escalator); as a process, 'co-creation depends on several factors including internal support for design, facilitator skills/experience (e.g. sensibility), development and maintenance of trust (internal and external e.g. by creation of safe spaces, demonstrating commitment, etc.) and motivation of all involved (e.g. through materialisation of results); a key aspect of 'co-creation' valued by partners is the power of a safe environment – helping to build people's skills, develop their own ideas, ground learning, and materialise it.<br>- "*Believing in and loving what you do*", as a partner commented, is the supporting pillar for all strategies; in addition to having the skills and confidence, motivation of the facilitator is a key aspect of creating content for, facilitating, and promoting 'science learning'. |

*Outcome indicators for science learning*

Events and workshops run by most partners are open so that the outcome of the activities reflect the needs and interests of the participants. However, the key point of interest for partners (linked to capacity building) is understanding "*how well does this work?*" For this and other indicators, there is an overarching need to create purposeful and dedicated spaces for coordinated and collective exchange for facilitators and management on a regular basis that can help link purpose to goals, design, and needs. Regular participation of other staff in events can help to also get a sense for "*how well did this work?*" and give constructive feedback at group meetings. This feedback and discussions helps to build capacity (personal and

organisational). "H*ow well does this work?*" is mainly collected through group discussion, open-ended questions in surveys, informal conversations with participants, etc. The main challenge to organisations is dedicating time and resources to properly analyse, learn from, integrate, and document them.

In some organisations, it is expected that staff (facilitators and coordinators) bring skills, including knowledge and experience of methods that complement the organisation instead of having standard organisational methods, which are then taught to staff. The main issues that arise are that while there is flexibility in how methods are developed and facilitators/staff become rich resources, the organisation may maintain low organisational memory/capacity if knowledge 'lives only' within facilitators/staff and is not actively shared (e.g. due to lack of time dedicated to sharing or documenting methods/experiences). In this case, 'methods' or skills remain tacit knowledge passed down through practice, which is 'lost', at least in part, when facilitators or key staff with this knowledge leave the organisation.

The importance for facilitators to understand the difference between an "*ideal and actual situation*" – i.e. what are the facilitator and group's aspirations and which are the actual contributions (to e.g. promotion/facilitation of science learning, confidence and capacity building, empowerment, adding to a CV, etc.) that have been highlighted by the partners? Linked to this, a facilitator asks, "*how can we enable participants to acknowledge their own skills and how can facilitators recognise skills gained – what mechanisms are out there and that we can use for this?*" There can be a move toward answering these through DITOs facilitator exchanges.

| *Amended indicator* | *Salient insights from applying/discussing indicators (and relevance to project)* |
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| **Methods for science learning at the organisation level**: These include shareable methods developed by DITOs partners. Development of methodologies is also driven or started due to external collaborations (e.g. "*provision of support to citizens and involving amateurs to curate exhibitions where facilitators acquire the skills to include and support them*"). Developing methodologies therefore also involves changes in attitudes and perceptions of facilitators/coordinators and citizens/participants alike. | - Understanding the development of methods for science learning at the organisational level necessitates looking at the mission/mandate of the organisation, the type of organisation (e.g. educational, cultural, etc.), and programmes for which methods are associated;<br>- Most partners do not have formal guidelines or 'manuals'; instead, there are practices, as tacit knowledge, on how to e.g. train volunteers and create a culture about what can and cannot be done.<br>- In cases where methodologies have been documented by partners, these have been for established or longer-term programmes e.g. "*revision and adaptation of scientific protocols developed as online resource with methodologies to organise scientific workshops*", which can mean that the way initiatives are perceived plays a role in the development of methodologies e.g. "*this is for sustainability of initiatives - not a one-time only or running events for their own sake*". This has been the case for gamefication at the CRI. |
| **Skills gained**: Type of skills gained by participants. These include both those expected (outlined in the event | - The indicator requires disambiguation; 'skills gained' has multiple variations and manifestations such as a) know-how of |

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| description) and unexpected learning. These can be gathered through surveys as well as through one-on-one conversations with participants, especially over time to follow their journey - this allows time for the skills to be 'transferred' to their everyday lives/work. 'Skills gained' also include 'less tangible' aspects of learning such as learning about oneself and how to work with people (what is needed to be able to interact - same language, understanding, etc.), realising that one can actually work with people in different kinds of settings (humility and surprise at breaking misconceptions and not putting people in the same mould), appreciation of collaborative work, and developing confidence one's own abilities. 'Skills gained' are not necessarily linked to change of mindset or behaviour change. | scientific process ("*including critical analysis and ability to question*"); b) knowledge and understanding of relevance of science and scientific process in other aspects of life, c) appreciation of the value of science and the scientific processes in connection with the contemporary world (e.g. "*there is a wider appreciation (understanding) of science - even if you are not able to do certain experiments you gain an appreciation for how science works*"), d) appreciation and respect for what a scientist is and what their work entails (e.g. "*an understanding by putting yourselves in the scientist's shoes – i.e. skills gained include an empathetic understanding on both sides*", e) curiosity about and respect for the environment, and f) "*the proof skill gained is embedded in the prototypes*".<br>- Part of disambiguating 'skills gained' involves asking "*what skills have been gained that lead to autonomy?*" – a question asked by partners who have a scalability mind set. |

*Perception indicators for science learning*

In general terms, perception of 'science learning' is linked to the perceived standing of the organisation. Specifically, it is linked to the length of engagement, to the way the information was presented, the amount of interaction and/or discussion we allocated, and the general setting created. Therefore, it is important to identify what 'perception' is being captured and if possible follow it over time.

| *Amended indicator* | *Salient insights from applying/discussing indicators (and relevance to project)* |
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| **Level of ownership over science learning**: Seek to understand if participants/facilitators feel they have gained skills and if they feel that these skills are relevant / transferable / replicable. It also seeks to understand if in the long run they feel they have gained (local) expertise that they are able to engage with scientific experts, participate in the decisions about their local environment, etc. | - There is a need to look at what promotes ownership and at what level this ownership is manifested. This requires looking at the 'depth' or ownership and some aspects highlighted by partners include ownership as mutual learning (e.g. "*connections made between artists and participants – as collaborations for mutual learning*"), ownership as personal development (e.g. "*enrichment of practice from both volunteer experts and in-house experts and ability to share their expertise*"), ownership as gained humility (e.g. "on both sides – taking care to not patronise but rather focus on learning from each other. Ownership is not about seeking truth or owning knowledge but being curious and being able to be wrong"), ownership as governance (e.g. "*ownership over decision about environment or* |
| **Level of creativity in science activities**: to what extent do participants/facilitators feel they were able to engage creatively (verbally, hands-on). | |

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| | *research into it*", ownership as commitment, ownership as community (e.g. building a community of practice), and ownership as meaning and relevance (including "*joy for what you do and meaningfulness of work*". |

### 7.2.5 Social inclusion

While DITOs activities aim to make science tools and techniques more accessible, address exclusion of marginalised groups, gain access to information and find ways to make positive changes in their lives, following how these aspirations translate into actual benefits and for who is a challenge.

A salient theme during formative evaluation interviews was openness, as a component of social inclusion. However, there are tensions with regards to openness as a stance toward social inclusion. 1) For some partners openness is a value embedded in the organisation's culture e.g. "*All activities are open and public; it is our ethical commitment as a public institution. Openness is in the design of the activities and includes the means but also the availability. For example, through open documentation, knowledge and tools so that groups and people can document their work - their path, process, failures, etc. It is our emphasis on 'free culture'*". 2) In terms of beneficiaries the emphasis is on the culture of sharing "*we are building on the knowledge that others have developed and therefore you have to make them public for others to benefit from that as well. And beneficiaries are not only the participants but beyond - time and place*". 3) However, for other partners, the issues with 'openness' is that "*open knowledge might be readily available but who is the one who is actually going to go look for this? Are we making the already knowledge rich richer?*" This highlights that openness does not immediately equate to access and a narrowing of the exclusion gap.

*Process indicators for social inclusion*

It was also found that the capacity to address social inclusion is 'boosted' through collaborations with external organisations (e.g. as part of consortium or an association). These collaborations or commitments provide pressure and/or support to develop strategies. Partners who have implemented strategies over a long period of time conclude that "*you can never be everything for everyone*" and "y*ou can never please everyone*".

Numerous strategies for social inclusion have been developed by partners and examples include:

- **Collaborations with organisations with expertise working with disadvantaged groups**. This involves seeding the collaboration and maintaining it by co-hosting events but also inviting the collaborator to e.g. mentorship programmes and organisational meetings to build understanding of process and trust "*we always have a place/seat at our events for representative from those organisations at our events*". This strategy is resource intensive.

- **Modifications to infrastructure**. This includes renovation of access routes for wheelchairs. It also includes considerations for the design of exhibitions e.g. text for exhibition that targets a broad audience; considerations for the height of text, font type, etc. for visibility and ease; audio devices that are not intrusive; QR codes for more information, etc. Many of these have been tested and is an ongoing process.
- **Being mobile**. Through traveling exhibitions (e.g. RBINS' Xperilab truck, which tours Belgian school classes proposing hands-on experiments new to the class; and MLP's satellite activities in local context "*reflecting those localities' needs and issues*"). These are longer-term strategies that require much local liaising and local knowledge/sensitivity.
- **Creation of reflective spaces to explore hidden instances of exclusion**. This is done through discussions during or at the end of an event. The creation of these safe spaces depends on facilitator sensibility – to know their audience, know how to ask questions and moderate discussions so that fruitful learning can come out of it. The facilitator needs to have the capacity to address/respond to issues during the event as they happen.
- **Have issues of social inclusion as the theme**. "*Talk in terms of social issues, trends, or taken-for-granted practices*". This involves designing an event with social inclusion as the central theme. This can enable the audiences to also identify issues or share input on how to address them.
- **Targeting children to reach to their parents**. Some partners have found that the way into some social groups is through their children and thus have designed activities that invite children and motivate their parents to attend.

| *Amended indicator* | *Salient insights from applying/discussing indicators (and relevance to project)* |
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| **Strategies for addressing access issues from disadvantaged social groups**: Number and type of strategies for e.g. the disabled, illiterate people, migrants, elderly people, single parents, etc. | - Partners have passive and active strategies for social inclusion. Two types of strategies were identified: passive (e.g. documentation and Instructables as open access) and active (e.g. collaborating with organisations who specialise in or have expertise in working with disadvantaged groups). |
| **Considerations/strategies of ethical issues and values in the design, development and implementation of activities**: This includes a tally of existing and development of strategies for the use of technologies/methodologies (are these affordable/accessible to the participating population), issues/topic discussed (are there multiple interpretations/perspectives, are these contentious (and how is it moderated), are there resolutions/follow ups?), suitable event times and locations (provisions such as day care or meals). As above, a baseline | - Ethics and values in design and implementation of activities is strongly linked to organisations' mission, approach, and values. The approach of some organisations is based on provoking debate and challenging the status quo, others focus on providing accuracy and depth of scientific information, and others have strong organisational commitment to openness. What all organisations have in common is trying to find a balance between compromising what they stand for and excluding certain audiences. |

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| compendium of partner good practice and challenges was collected and is presented in D1.1 and D2.1. | |
| **Considerations/strategies of benefits from activities**: This includes a tally of mechanisms to determine/analyse who benefits, who does not, can there be a negative impact on individuals or groups? E.g. existing or building of links to local authorities and industry to address issues of long-term engagement and sustainability for those who do not have the luxury of 'free time'. | - As mentioned above, while DITOs activities aim to make science tools and techniques more accessible, address exclusion of marginalised groups, gain access to information and find ways to make positive changes in their lives, following how these aspirations translate into actual benefits and for who is a challenge – in particular, when the goal becomes tracking, rather than developing a strategy for social inclusion in a way that connects needs to the design of activities for longer-term benefits. |
| **Considerations/strategies for the design of communication and outreach strategies**: These have been in part addressed in D6.4 Self-assessment plan. These include a tally of the existence of those stated in our GA such as links to existing groups and organisations that already engage with disadvantaged groups (and how those links are maintained), consideration for language/cultural barriers, etc. It also includes the measurement of new strategies and considerations developed throughout the project. | - The design of communication and outreach strategies is also determined by organisational values, mission, and resources: who will be 'targeted' and how. Outreach is a "*is a multi-layered process with internal design and then outward communication with schools and teachers - another level is promotion at ministry and municipality level but there is no strict plan - each case is different*". |
| **Number of stakeholders who actively review/show interest in research results that have an impact on social justice**: E.g. AB members, collaborators, external researchers, community leaders, etc. | - Number of stakeholders with interest in social justice outcomes is determined by the surrounding political context and the organisational capacity of organisations that they collaborate with. There are also differences in requirements between national and E.U. level in terms of collaboration and funding, which adds levels of bureaucracy. |

It is important to relate here the numerous issues and questions that arose from the above process indicators during the one-on-one interviews with partners:

- The main struggle for partners is still reaching out to and having disadvantaged groups attend their events; all partners are dissatisfied with the current level of engagement they have from disadvantaged groups;
- Some partners have dedicated considerable amount of resources and time to developing strategies for social inclusion thus reflecting the importance given to it. However, documentation of these strategies including their impacts, how they are developed and changed over time is scant but still of great interest to partners, especially to share good practice;
- The main issues that arise from collaborating with organisations who specialise in or have expertise in working with disadvantaged groups is that "i*t*

*adds resource strain*" (in reaching out, accommodating/adapting to their needs, keeping collaboration alive over time);

- Some partners realise that not everything they do "*fits within the moral or ethical frameworks of others*"; their work tends to push boundaries through provocations and thus they ask, "*what sort of strategies or framework should we have in place to address these reactions of 'offense' in a constructive way?*" or "*could we purposefully design activities with different levels of shock?*"
- Partners struggle with ways to 'keep the conversation going' after an event is over. This is linked to issues of longer term engagement and follow-up. Strategies such as post-event blog post have little reach and/or opportunities for further discussion.
- Fulfilment of 'social inclusion' is problematic for various reasons identified by partners. As a parameter it is not defined; it is not a formal strategy. The focus, partners perceive, is on achieving numbers on 'pre-designed activities'. Some facilitators (in particular new staff who were not part of drafting the project proposal) feel that "'*social inclusion' was a 'secondary consideration'*". Hence, for a 'social inclusion strategy' to take shape, not only do 'parameters' need to be critically defined but also the 'target' groups: who are they, why them, and why are these separated from other 'audiences'? From this a strategy can be identified based on organisational values and mission and a realistic assessment of organisational capacity so that considerations for social inclusion can be integrated into the design of the initiative or activity. An interviewee comments: "*social inclusion should be at the centre of event design because it helps to define the purpose of the activity and then you can draw from existing organisations or frameworks as a starting point*";
- An organisation's capacity to create a strategy for 'Social inclusion' depends strongly on having personnel with the experience, sensitivity, and maturity to reach out to and (co)design activities with disadvantaged groups (including ability to identify which topics, settings, tools, and techniques to use in a way that does not separate 'social exclusion' from everyday issues). It also depends on strong collaborations with organisations whose mission is to address social justice issues.
- Some partners recommend building a common understanding and common capacity on approaches for social inclusion from the beginning of the project. This will help address expectations that facilitators have about the work that needs to be done and what those expectations are embedded in.

*Outcome indicators for social inclusion*

A particular issue that was raised by partners was that tracking "*the percentage of participants attending events from disadvantaged groups*" is problematic because it assumes that "*just because we reached them does it mean we reached them well?*" It was not clear whether their needs were met. This particular indicator created a lot of discussion as seen from the many points raised below.

| *Amended indicator* | *Salient insights from applying/discussing indicators (and relevance to project)* |
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| **The percentage of activities purposefully delivered in accessible locations**: e.g. at community centres. | - All partners are aware of conditions for accessibility and importance of taking activities to external locations to increase reach. For them, it is not only about how many activities were made accessible but what and who make them accessible, organisationally (funds, communication, PR strategy, commitments, collaborations, etc.) and methodologically (setting, sensitivity, physical and cognitive accessibility, creating, connection and relevance, etc);<br>- The indicator does not make sense because over time, as an organisation gains experience to make events accessible, less modifications need to be made. However, it does make sense when considering modifications of accessibility in the digital age;<br>- Social justice and social inclusion need to be defined and agreed upon by partners in the project in order to facilitate exchange of good practices and techniques, and so that there is a collective understanding of what the shared consortium values are and where the project is going. For example, "*social justice is equal opportunity to take part but we need considerations for difference between equality and equity*". A common understanding helps to guide the expectations from the facilitators including requirements e.g. personal involvement, maturity, etc.;<br>- 'Percentage of activities that may have unintended negative effects on social justice' as indicator needs depth and a definition of 'negative effects'. For example, in some cases in order to build safe spaces and create inclusivity, some exclusions are created. That is, "*some events are tailored for specific audiences - they're closed events, and therefore exclusive*". An issue with this indicator is that negative effects cannot be known until after the fact. In addition, organisations need to experiment and try out different approaches, that is, learn from consequences and transitions, which initially might have negative impacts; and<br>- Partners have awareness (tacit knowledge) of who is and isn't at an event but numbers are not statistically. |
| **The percentage of activities purposefully modified to address issues of social justice and inclusion**: e.g. translated methodologies and techniques, linked to the needs of a specific community, etc. | |
| **The percentage of participants attending events from disadvantaged groups**: This includes inquiring how these participants found out about the event. | |
| **The percentage of activities that may have unintended negative effects on social justice**: (e.g. activities that benefited for only small portion of the general population or created additional barriers) | |

*Perception indicators for social inclusion*

Partners found that many of these indicators are relevant because how organisations are perceived e.g. by other organisations, the media, etc. affect the public perception (Will they promote or critique their work?). However, as seen below, these indicators require more depth, specificity and analysis, which partners have helped to begin shaping.

Some partners note that the DITOs evaluation has had an impact on their practice already. For example, they have revised institutional practices and it makes them reflect on "*what rules and guidelines do we need and which we do not?*" They also highlight the importance and need for 'facilitator's exchange' to learn from each other's' techniques, strategies, and which 'rules' and considerations to use;

Partners also highlighted the formative evaluation interview process as a necessary first step to identifying key issues in practice to then be followed up by 'facilitator exchanges' for facilitators and coordinators to share their practices; and

Partners also highlight the importance of a baseline evaluation and continuous review at different points in time because there is the need to value the stage at which the organisation is and keep track of "*its journey of development*". They critique that RRI prescribes behaviour and then evaluates it without looking at different points in time (stages and development) or contexts.

Main issues that arise from these indicators include 1) that certain activities raise awareness but more targeted forms of gathering feedback are needed. These would be useful to justify allocation of resources; 2) as partner noted, "*people come and go and you cannot follow up with them on how the activity impacted them. In cases like this it would be great to know what moves people to engage with the organisation but how do you capture that and how do you capture it a different points in time?*"; 3) these indicators become more challenging to track if partner organisations are doing their work in collaboration with other organisations because activities and goals often need to be aligned with that of external partners; and 4) A main problem with the RRI evaluation is that it is mostly after the fact; it lacks formative evaluation.

| *Amended indicator* | *Salient insights from applying/discussing indicators (and relevance to project)* |
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| **Level of importance given to social justice/inclusion by organisations, facilitators, the public.** | - This indicator needs to reflect how themes of social justice are communicated through activities. And issue raised with this indicator is that it could be biased: participants with innate (or at least some existing level of) interest will be the ones attending and therefore "*we are preaching to the converted*". Additionally, this indicator needs consideration for "*who is developing this awareness or level of importance because who they are reveals something about the importance given*". Reflection on this indicator also revealed that the level of importance given to social justice and inclusion is a problem even within the consortium – it is not necessarily clear to everyone what the terms of the indicator mean. |
| **Level of organisational importance and commitment given to development of methodology and implementation of social justice/inclusion strategies.** | - This indicator needs to consider that some organisations are bound by laws and regulations and they must purposefully make these visible through action and practice. Reflection on this indicator reveals that it is a problem at the organisational level as well, that is, it is a practice that is lacking within partner teams – there is awareness but there is no strategy in place. |
| **Public belief on the impact of activities** on (a) actively promote/contribute to achieving | - This indicator is evident through volunteers and longer-term participants, highlighting the importance of case studies to follow the development of these |

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| social justice/inclusion and (b) have a negative effect on social justice. These can help identification of good and bad practices. The EC (2015) notes that the indicators for social justice/inclusion require substantial resources to be monitored and thus need to be considered accordingly. Much research in this area of monitoring is still needed - one that also weighs claims against real impact. | people. However, the indicator requires considerations for "*what is the local context and trends in society which could influence public opinion*"? The indicator is challenging to track because impact on perception depends on the type of activity; different activities will use different modes of engagement, themes, techniques, etc. For example, a partner notes "*some topics are more controversial and provocative others are more informative. In other activities you learn with your brain and in others you use your hands – so we would like to know how do you compare these? Or how do you create a dialogue process?*" This indicator also needs to be qualified – what constitutes positive and negative? |

## 7.3 Results - ethnographic evaluation

This results section is divided into two parts the ethnographic observations of DITOs events and ethnography of the project.

### 7.3.1 Ethnographic observations of DITOs events

**Case study: Interactivos?17, Madrid**

This 2-week long workshop focused on **mobility in the city** (living beings, material goods, pollutants) and the intersection of three perspectives: citizen science, environmental sustainability as well as creative art with digital tools. The event was facilitated by inviting an international team of mentors who led a group of 30 international participants. The participants applied to take part in this workshop via an open call. The workshop was run as an intense 2-week-long event, where participants worked together morning till night on a series of prototypes in relation to the topic of urban ecology in Madrid**.** These prototypes had to be developed, built and exhibited within this 2-week period. Christian Nold's role was as both ethnographer and mentor organising the workshop. This provided specialised access and insights into the process of the workshop.

At the start of the workshop, many of the participants framed their goal as wanting to 'make the public aware' and 'educate them'. The language revolved around an amorphous concept of a public deficit, where 'more' knowledge was framed as leading to 'more' sustainability. Yet strikingly this rhetoric disappeared to be replaced by specific engagements during the prototyping process. In an experimental game focused on urban pollution, the dynamics, assumptions and actors changed dramatically. Initially the concept of the game was that '*air quality data is the enemy*', with the player taking the role of battling against pollution in real-time. Yet in the process of building a paper prototype and playing testing games, the team received requests to add 'citizens' as an additional player. While the city report articulated governmental interventions, it was less clear what citizens could do to improve pollution. The final game became a cooperative relationship between citizens and public in reducing air quality. At the same time, the prototype also became the site of heated arguments about the political assumptions within the game, with one of the

mentors arguing strongly for the need to include industry as a key actor. While the prototype was conceived as a piece of political messaging, the material qualities of the prototype opened it up as a site of politics. At the end of the workshop the game was a working prototype that was visually very polished, yet the prototype still showed evidence of these unresolved frictions between who were the relevant responsible actors.

Similarly, many of the other prototypes were left this is this unresolved state. This contributes to their ambiguous status, where documenting the process is more important than the end point with the workshop organisers saying, "*the project is part of the documentation".* Thus, rather than solving urban mobility the workshop participants were carrying out a process of prototyping that didn't require resolution.

Analysis of the workshop suggests that the notion of 'prototyping' was an important actor that directed the actions of the participants during the workshop. The suggestion is that prototypes create specific kinds of political objects that can combine '*politics-as-activity*' whilst also becoming sites of politics and political pedagogy (Brown 2015). This means prototyping is particularly useful for a workshop context where the prototype can function as pedagogical tool for self-reflection of the participants as well as analysis of the larger political structures. Thus, prototyping functions as an approach that uses the political variability of devices identified by Marres (2012) to become a way of exploring and experimenting with politics that goes beyond public messaging.

Secondly the workshop identified a concrete site of responsibility as the city of Madrid where the workshop was taking place. While many of the participants had initially started off talking in a very abstracted model of the deficit model. This changed during the course of the workshop. The notion of responsibility from RRI thus ceased to be an abstract concept and became something very specific with material properties. This approach allowed the participants to collaborate directly with the local city authorities who became stakeholder in the projects. This localised specificity differs from the largely procedural notions of responsibility framed within the RRI literature. What is remarkable then is how the workshop offered a very specific answer to Saille (2015) question of '*what and whom to be responsible to'*. In the context of this specific workshop the abstraction of RRI was translated into the concrete city of Madrid. Thus, the prototyping approach demonstrated in this workshop seems to offer a way of concretising the aspirations of RRI. This observation of localised responsibility was also observed in the UPD Co-lab workshops, were the activity was greatly improved by being framed in relation to local issues and challenges. This experience suggests the need for ethnographic follow-up of the impact of designing workshops towards targeting local issues.

### 7.3.2 Ethnographic mapping of tensions within DITOs

This ethnographic component focused on the most pressing issue observed in the project so far. This turned out to be relationships with existing stakeholder communities. This tension was materialised during an incident after the stakeholder roundtable in Berlin and then continued at subsequent stakeholder roundtables and blog posts. After the event one of the participants wrote an email that was reposted on a mailing list. The post raised a number of general issues about the relationship between the DIY Bio community and academia in terms of unfair payment practices,

the 'buzzwordy' research projects and the hijacking of community practices. While some of these issues are related to the broader way these biohackers frame themselves in opposition to academia, other critiques were highly specifically targeted at the DITOs project and partner organisations specifically. This incident led to follow up sessions where DITOs facilitators followed up the issues raised with the author of the original email. The result of this incident was that the DITOs team chose to organise a session at the Paris roundtable and BioFabbing 2017 to address the role and possible avenues for funding for these communities. While these events were very positive and managed to ease some of these tensions, they didn't resolve the issues which continue today. This can be seen in the way they resurfaced again in online discussion forums after the BioFabbing 2017 conference.

*Tensions*

1. There are tensions around the DITOs project's relationship with the DIY Bio community that creates day-to-day problems for the DITOs facilitators. One of the facilitators said, "*it's unpleasant position to be in between institutions and the people insulting you*". The point is the need to reflect on the role and status of the facilitator in this mediation role. To what extent do individual facilitators have the agency to transform upstream policy or downstream relations with external groups?

2. There is a need to establish designated time and space for DITOs facilitator to reflect, analyse and respond to critical issues arising from DITOs activities. One of the DITOs facilitators said, "*it's good that you pulled this incident out again, and using this as an opportunity finally taking time to look at this*".

The conclusion from this incident, observations and discussions within the consortium was that it raised the need for continuing monitoring of these tensions within the project. Secondly there needs to be continued development of a space for reflection and analysis for DITOs facilitators.

The issue with the community groups is not the only tension within the project. There have been discussions that the need to gather data on participants in the events is affecting the focus of the project. Thus the ethnographic mapping will additionally examine the internal impact of the mechanism that are being used to account for the number of face-to-face as well as online participation numbers promised in the DOA.

# 8. Recommendations and next steps

## 8.1 Summary of key success and learning of the project thus far

- DITOs events reached a diverse audience all over Europe and were able to achieve a balanced gender ratio.
- The project managed to exceed the number of planned events but might be somewhat behind in terms of participant numbers (apart from online events).
- While far ahead in WP1 and WP4, the reported data suggests more events need to be organised in WP2 and WP3.
- Participation numbers were particularly high at exhibitions, followed by BioBlitzes and Seminars/Talks.

- Participants reported very high levels of satisfaction and interaction at DITOs events.

## 8.2 Recommendations

- Appropriate measures need to be taken to make sure the number of participants continues to grow in line with the DOA. The distribution of events and participants may not be linear across the duration of the project, so there might be no issue at all.
- As the analysis shows, DITOs reaches a highly educated audience. To increase diversity and inclusion we recommend targeted publicising of events to broader audiences
- Establish more holistic long-term evaluation of the project to identify the benefits of engagement beyond event snapshots.
- There should be some analysis of the workshop category to see if it is being applied correctly or needs to be broadened out.
- There are tensions with engaged and organised communities that require further monitoring.

## 8.3 Next steps

- The numbers and diversity of participants and categorisation of events needs to be monitored and communicated closely at regular intervals. This will be carried out by organising a series of meetings with consortium partners to relay evaluation results and jointly discuss and interpret the figures. Tentatively, beginning with online meetings (Sept/Oct) and then in-person sessions at the next consortium meeting (Nov). This will help to guide evaluation outcomes with DITOs management for the next two years.
- Organise one-on-one meetings between partners to share good practice. One-on-one meetings offer dedicated time between partners to ask each other questions, share, and discuss in detail their strategies, methods, and insights into what works, what doesn't, and why. These paired meetings will be based on the results and insights presented in section 7.2 and run throughout September and October in order to prepare for a focused ‘facilitators’ exchange’ workshop at our next consortium meeting in November 2017. The paired meetings will be documented as a living document in our shared online drive and will be of guidance for the development of D1.3 and D2.3 reports on good practice. It is expected that these conversations will enrich partners’ practices and thus inspire replication not only of science events but of techniques and approaches in management, decision-making, facilitator ‘self-care’, etc.

- The need and benefits for longer-term tracking is evident from interviews with facilitators. Through vignettes, or case studies, the impact of engagement on participants' lives can be captured and shared - not only for the purpose of reporting but to aid organisations in documenting stories of impact that can inspire others and can help recognise the commitment and joy of engagement of participants who have given meaning and importance to particular issues or topics. For example, at RBINS, there is a 83 y.o. volunteer who now after 15 years of engaging with the museum is now able to publish his own taxonomic work in scientific journals. These draw from both the formative and ethnographic evaluation and we begin their documentation in the latter half of Phase 2, aiming to document different types/levels of engagement along the escalator.
- Continue ethnography analysis of DITOs events and produce academic dissemination around the issues observed.
- Set up additional support and discussion spaces for DITOs facilitators and organisers to critically analyse and reflect on the process of the DITOs project.
- Further analysis to capture summative, formative, and ethnographic reporting but to also dedicate space to the qualitative data collected by each partners through the ‘Satisfaction questionnaire’.

## 9. References

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