ORION
open science

Deliverable 5.5.
Final evaluation report on trainings

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 741527 and runs from May 2017 to September 2021.

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Contents

Executive summary

This report is part of ORION (Open Responsible research and Innovation to further Outstanding kNowledge), a European project funded under the Science with and for Society (SwafS) work programme within Horizon 2020. As part of Work Package 5 (Evaluation), this document presents the results of the evaluation of the training activities organised within Work Package 4 (Training in Open Science), mainly:

- A series of face-to-face workshops and a Massive Online Open course aimed at training scientists and funding bodies in Open Science concepts and methods.
- An online course aimed at specifically enabling its participants to deliver Open Science trainings (Train-the-Trainer course).

Results are presented according to the different evaluation perspectives that have been followed to assess the impact, and can be summarised as follows:

From a monitoring perspective, most participants to the ORION trainings are early-stage researchers (mainly PhD students, who represent 40.7% of attendees), followed by management and administrative staff (20.1%). The main dissemination channels for ORION trainings were personal invitations and information received through other colleagues. Sustainability of the ORION trainings involves replication and adaptation of the face-to-face workshops and continuity of the online trainings (MOOC and Train-the-Trainer course).

A majority of participants claim the ORION trainings met their expectations (95.8%) and would recommend them to others (94.7%). Most training participants find that the content and structure of the trainings are adequate: 97.5% think the information and materials provided are relevant and useful to them, and 91.3% consider that the overall structure and length is appropriate. Interaction, innovative methods, professional and knowledgeable trainers, and the friendly atmosphere of the face-to-face events are the main positive aspects highlighted by ORION training participants.

Most ORION training participants claim to have learnt valuable knowledge about Open Science after participating in the trainings. Overall, ORION training participants have a very positive perception of Open Science prior to attending the trainings, and most of them do not change their initial views after the trainings (with more positive than negative changes). Overall, ORION training participants think that science should be very open to all stakeholders, but especially to those directly involved in scientific research: scientists from the same area/discipline, scientists from other disciplines as well as funders and policy makers. After attending the ORION trainings, participants do not significantly change their views regarding openness to different stakeholders.

In terms of disposition, **more than 85% of attendees agree that after the ORION trainings they feel more confident and enabled either to practice Open Science or to train others in it,** and claim that **they will use the information and materials presented in their everyday work/life**.

1. Introduction

The ORION project aims to trigger evidence-based institutional, cultural, and behavioural changes in Research Funding and Performing Organizations (RFPOs), targeting researchers, management staff and high-level leadership. The project long term vision is to “embed” Open Science (OS) and Responsible Research and Innovation (RRI) principles in RFPOs, in their policies, practices and processes to organise, do and communicate research. To do so, the project carried out diverse open experiments and training actions involving multiple stakeholders.

Within ORION, **the aim of Work Package 5 (WP5) is to evaluate the project** to evidence to what extent and how the implementation of the project has achieved its expected impact. **The present document provides the final version of the ORION evaluation report on the Open Science training activities organised within Work Package 4 (WP4)**. This evaluation represents one of the main portions of the project evaluation, with the objective to provide evidence of the contribution of WP4 action and strategy to the project overall objectives of a) enriching and improving quality of existing training on RRI and Open Science and b) increasing the general knowledge on RRI and Open Science practices. The evaluation reported here is part of an ensemble of three different evaluation efforts: evaluation of the impact of ORION trainings, evaluation of the impact of ORION open experiments, and evaluation of o the changes produced in the ORION RFPOs along the project. The overview of this ensemble of efforts was detailed in an interim report (Deliverable D5.1 "Evaluation and Quality Plan: Instruments, strategies and indicators"), that has been updated along the project to describe contextual adaptations and changes along the project.

1.1. Objectives of the evaluation

The evaluation of ORION training activities organised under WP4 aims to assess three specific aspects for each of the different training efforts used in ORION, including both face-to-face and online trainings. These objectives are:

1. To monitor the scope (in terms of variety of attendance) and sustainability of the different types and formats of ORION trainings.
2. To assess the overall impact of the different training actions on participants, both in terms of satisfaction and change in participants’ views, knowledge, attitudes or believes about Open Science topics.
3. To provide data that will help to improve and enrich the general quality of Open Science trainings.

2. Methodology

2.1. Context

To achieve the goals presented in the previous section regarding the evaluation of the WP4 training effort, different actions were undertaken, each of them including a series of specific activities, as shown in Figure 1. The specific training actions of WP4 include:

- Design of training on Open Science concepts and tools for scientists and staff at funding agencies (Task 4.1).
- Train scientists and funding bodies in Open Science concepts and methods through face-to-face wokshops and a Massive Open Online Course (MOOC) for the Life Sciences (Task 4.2).
- Dissemination of ORION training to larger scientific and science funding communities through educational materials and a Train-the-Trainer program (Task 4.3).

This report focuses on the evaluation of the actions under task 4.2 (that is, the impact of the face-to-face workshops and MOOC on Open Science) and task 4.3 (that is, the impact of the Train-the-Trainer course addressed to enable its participants to deliver Open Science trainings).

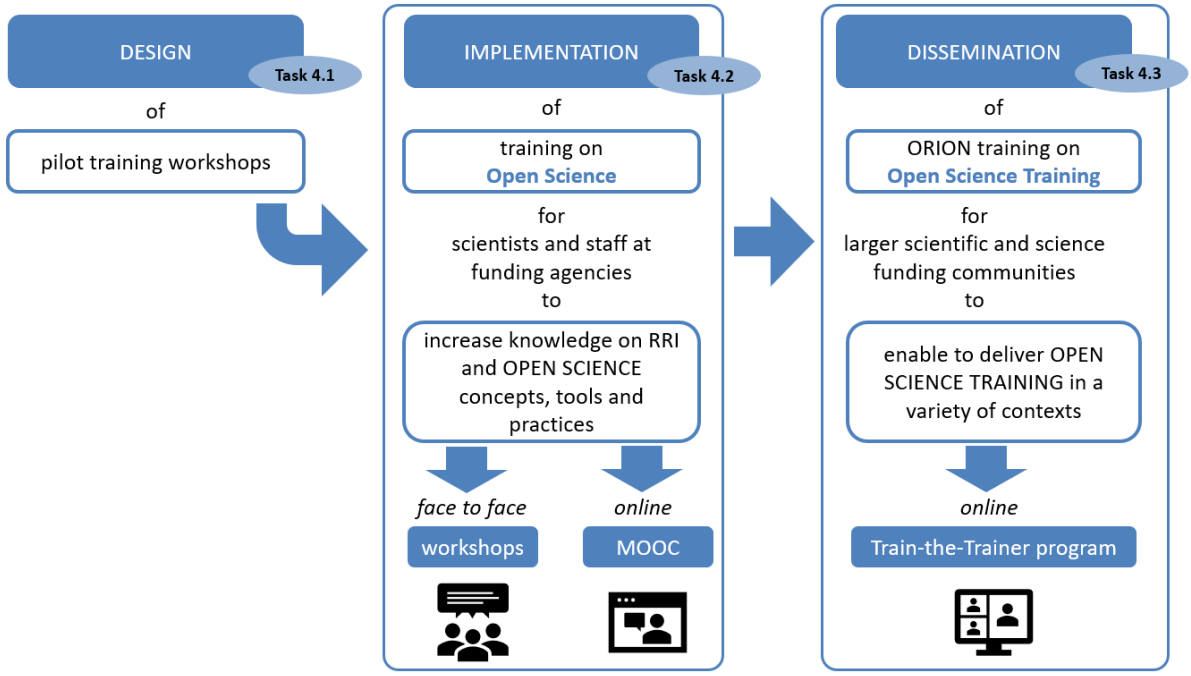


Figure 1. Scheme of training actions developed within WP4.

ORION trainings actions evaluated under WP5

The **ORION OS face-to-face workshops** took place in different locations around Europe (see Figure 2) from January to December 2019. A total of 10 workshops (summarised in Table 1) were delivered, some of them at ORION participant institutions and some others at external ones (mostly part of the EU-Life network). The friendly atmosphere of these workshops is captured in Figure 3.

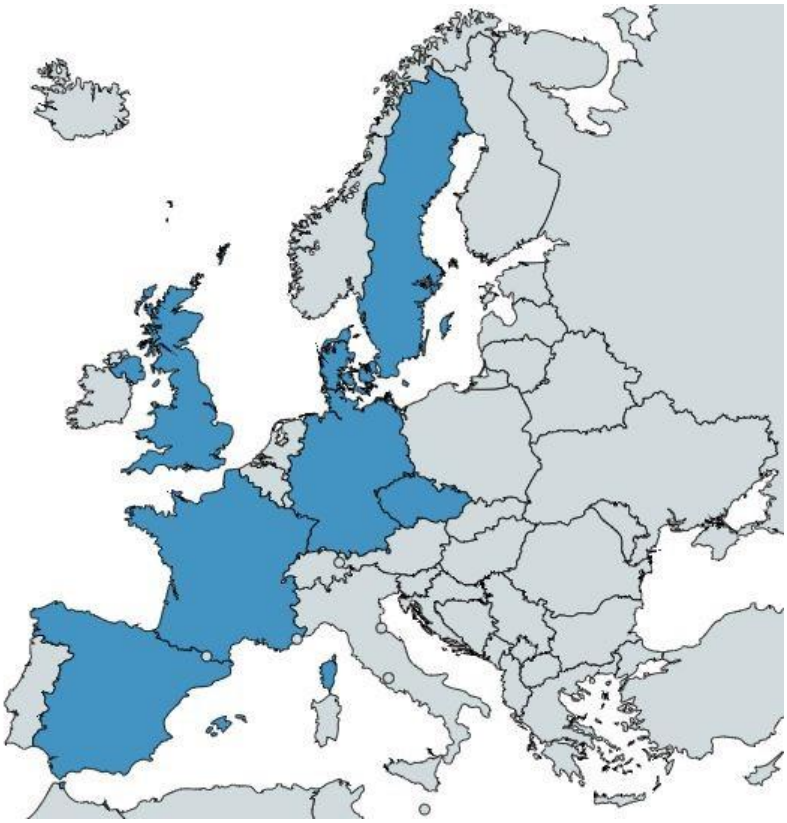


Figure 2. Map of locations of the ORION face-to-face workshops (2019).

Workshop	Organizing institution	Country	Date	Duration
1	TU Brauschweig	Germany	18/01/2019	Full day
2	Institute Curie	France	21/03/2019	Full day
3	Universitat Pompeu Fabra	Spain	08/04/2019	Half day
4	Universitat Pompeu Fabra	Spain	10/04/2019	Half day
5	JCMM	Czech Republic	02/05/2019	Full day
6	JCMM	Czech Republic	03/05/2019	Full day
7	University of Copenhagen	Denmark	14/10/2019	Full day
8	VA	Sweden	10/10/2019	Full day
9	BI	United Kingdom	14/10/2019	Half day
10	UAB	Spain	21/12/2019	Full day

Table 1. Face-to-face training workshops carried out in ORION WP4.

Figure 3. Picture of one of the ORION face-to-face training workshops.

The **ORION OS MOOC**, designed as a six-weeks guided course (see Figure 4), was launched in October 2019 for the first time, runing along October and November 2019. A second edition ran in a semi self-paced format from February to April 2020.

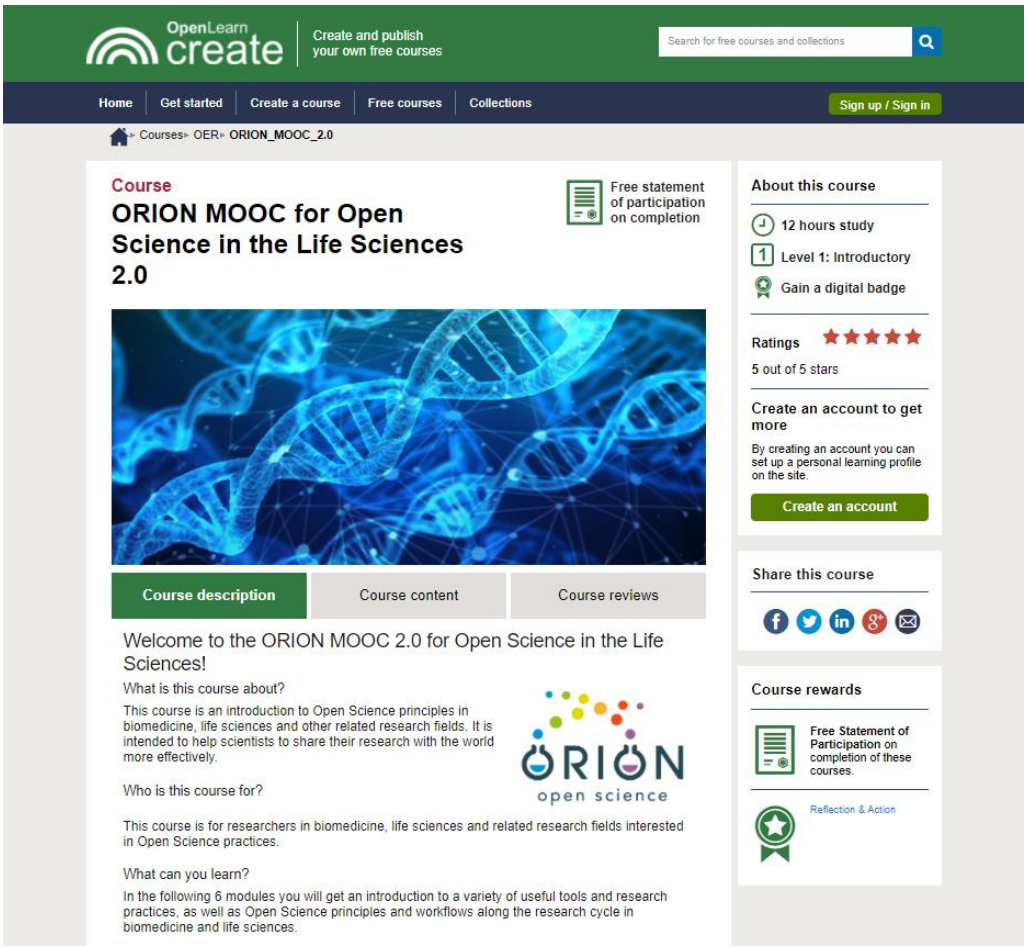


Figure 4. Screenshot showing the ORION MOOC as by February 2021.

More details on both the ORION OS face-to-ace workshops and MOOC can be found in the ORION Deliverable D4.1 "Optimised offline and online trainings".

The **ORION OS Train-the-Trainer course** ran from October 19th 2020 to November 4th 2020. It featured two webinars, two modules of an online module course (hosted on OpenLearnCreate from Open University), and it culminated in the participants delivering a 20 minute talk or micro-training at a live-streamed online event for Berlin Science Week called the Open Science Cafe. As advertised in the ORION website (see Figure 5), previous knowledge of Open Science was required.

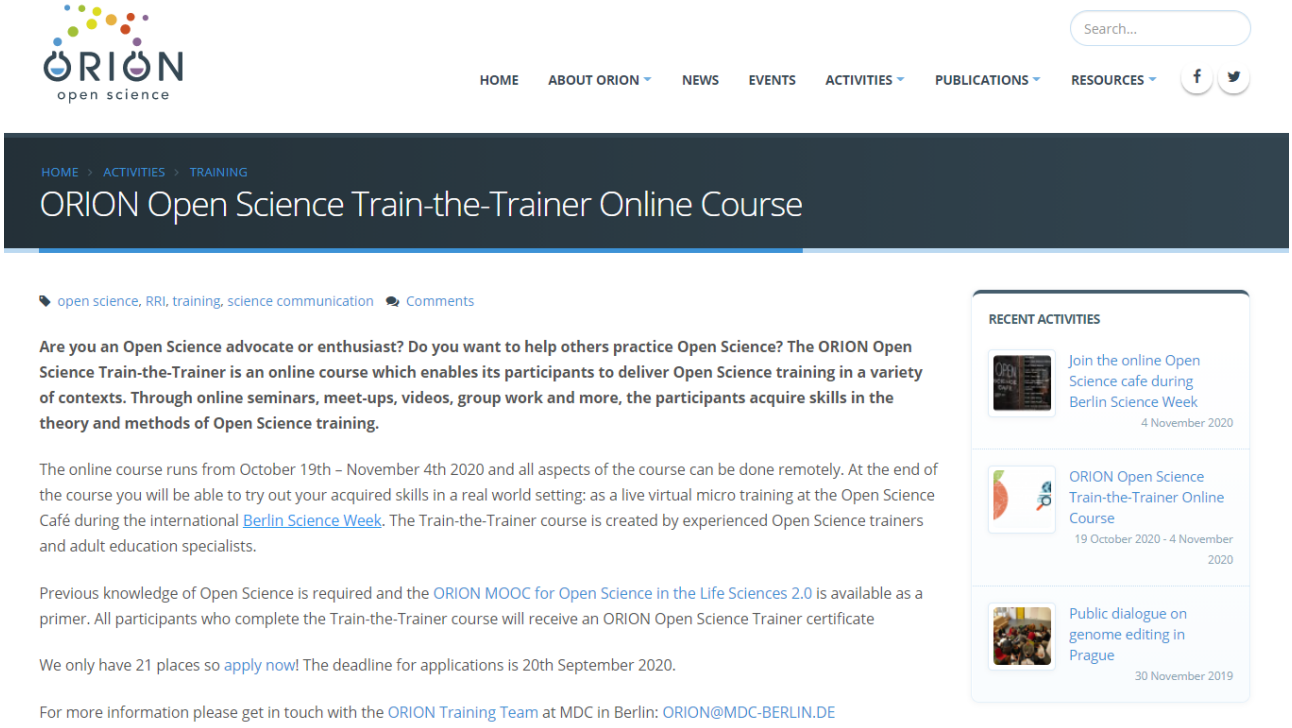


Figure 5. Screenshot showing the ORION Train-the-Trainer Online Course.

2.2. Instruments and data gathering

To evaluate the actions of WP4 a series of data gathering instruments were designed, piloted[1] and used, in compliance with those planned in the ORION Deliverable D5.1 "Evaluation and Quality Plan: Instruments, strategies and indicators". Pre, post and post-delayed questionnaires as well as interview protocols were used as main instruments for all ORION training actions. To allow comparison, these instruments were designed with a common core of questions for each of the different types and formats of ORION trainings, despite adapted to the current characteristics of each of them. The instruments used can be

[1] Particularly, the instruments were piloted during the researchers' pilot workshop that was organised, designed, and hosted at the MDC headquarters on 9th October 2018.

found in Annexes from I to IX and are summarised in Table 2, which also includes which informers have been used in each case and the indicators that were evaluated through them.

Trainings to deliver content on RRI and Open Science (workshops and MOOC)  		
Informers	**Instruments and methodology**	**Indicators**
All participants (workshops and MOOC)	Questionnaire (pre-post)	Scope and diversity of participants Changes in opinions about Open Science
All participants (workshops and MOOC)	Questionnaire (post-delayed)	Satisfaction and perception of usefulness of the trainings Perception of learning about Open Science
Selection of participants to workshops	Interview	Satisfaction and perception of usefulness of the trainings Improvement in knowledge about Open Science Changes in opinions about OS
Workshop leaders/trainers	Interview	Successful and limiting design principles Perceived impact at project institutions
Trainings to enable delivering training about (Train-the-Trainer course) 		
Informers	**Instruments and methodology**	**Indicators**
All participants to TtT course	Questionnaire (pre)	Scope and diversity of participants Opinions about Open Science
All participants to TtT course	Questionnaire (post)	Satisfaction and perception of usefulness of the training Perception of learning about how to train others on Open Science
Selection of participants to TtT course	Interview	Satisfaction and perception of usefulness of the trainings Perceived changes in competences for training

Table 2. Description of Instruments used in the evaluation of WP4 training actions.

The questionnaire's design

To evaluate the impact of the training actions, different types of questionnaires were used.

For the ORION OS face-to-face workshsops and MOOC:

- Pre-post questionnaires (Annexes I and III) addressed changes in behaviours and opinions about Open Science, and for this reason they were designed using some of the questions included in the quantitative analysis that produced the ORION Deliverable D2.2 "Analysis and Benchmarking: Self-assessment", which assessed views and practices of Open Science at ORION institutions. These questionnaires include likert scale questions, multiple-choice questions, multiple-choice grid questions and open questions.
- A post-delayed questionnaire (Annexes II and IV) also included a mix of multiple-choice grid questions, open questions and likert grid questions mainly assessing overall satisfaction with trainings as well as perception of improvement of knowledge about Open Sciences. In this case, while a majority of the questions remained the same, a set of "extra questions" was included in the online training questionnaire, as per suggestion of the ORION training coordinators, in order to assess some of its specific formal features (such as user friendliness, flow, etc.).

For the TtT program a slightly different approach was followed:

- The pre-questionnaire (Annex V) included some of the questions addressing behaviours and opinions about Open Science, while the post-questionnaire (Annex VI) included a minimum amount of these questions and was manly focused on assessing overall satisfaction with the course and perception of learning and improvement. The types of questions in both cases were the same as in the previous questionnaires (likert scale questions, multiple-choice questions, multiple-choice grid questions and open questions).

The interview protocol

The trainers' interview protocol (Annex VII) aimed at gathering monitoring data of the workshops assessing its design and inquiring about perceived impact in participants and at project organizations.

The participants' interview protocol aimed at analysing the impact of the face-to-face workshops (Annex VIII) and the TtT course (Annex IX) in participants in terms of satisfaction, changes in opinions and perceived improvement of either knowledge about Open Science or competences for training others about Open Science.

All the protocols followed a semi-structured approach with open questions, with some particularities:

- For the trainer interview protocol, the questions were grouped in three blocks:
  - Fist block: focused on the monitoring of the action and including questions related to its accessibility, scope and variety of participants and sustainability.
  - Second block: aimed at exploring aspects related to the design of the face-to-face workshops, including questions about trainers' experience in organising these trainings, empowerment, benefits/potential, difficulties/drawbacks, etc.
  - Third and fourth block: dedicated to assessing the perceived impact on training participants (including questions about reaction, actions, burdens for Open Science, etc.) and at institutions (including questions about institution culture and next steps at the organization).

- For the workshop participants' protocol, the questions were grouped also in three groups:
  - First block: assessing the general impact of the training, including questions about starting point (reasons to attend the workshop), reaction (most/least liked), knowledge (degree of learning) and disposition (willingness to act in any aspect of Open Science).
  - Second block: exploring knowledge and opinions about Open Science (first time that heard the term, perceived barriers and benefits of Open Science, empowerment, etc.).
  - Third block: focused on Open Science at their institution (including questions about starting point, institution culture and next steps).

- For the TtT course participants' protocol, the main aim was to assess the general impact of the training, so it was less extensive and just included questions about the starting point (reasons to attend the course), reaction (most/least liked), knowledge (what was learnt) and disposition (willingness to give trainings about Open Science in their institutions).

Workshops' data gathering

The pre and post-questionnaires were distributed in paper form both at the beginning and at the end of each workshop. The questionnaires were filled voluntarely by participants. The post delayed questionnaires, sent to participants through email, were also voluntarily filled. No incentives were used. Table 3 shows the total number of respondents per workshop.

In addition to the use of questionnaires, more qualitative data was gathered by selecting key persons of interest (training participants and training leaders/collaborators), who were contacted and asked to volunteer for an online interview. ORION trainers/collaborators were only interviewed once all the trainings for which data was collected had already taken place. The relation between institutes and respondents is shown in Table 4.

Workshop	# respondents pre-questionnaire	# respondents post-questionnaire	# respondents post-delayed questionnaire
1	9	8	7
2	11	11	11
3	13	9	0
4	15	14	2
5	14	9	5
6	12	8	0
7	8	7	1
8	25	15	9
9	11	8	3
10	11	10	0
TOTAL	**129**	**99**	**38**

Table 3. Number of respondents to the different questionnaires of the ORION face-to-face training workshops (2019).

Institution	Position	Date
MDC	ORION trainer / WP4 leader group	Nov. 2019
CRG	ORION collaborator / training support	Jan. 2020
CRG	Workshop attendee / postdoc	Feb. 2020
JCMM	Workshop attendee / manager	Dec. 2019
BI	Workshop attendee / postdoc	Nov. 2019
External to ORION	TtT course attendee / manager	Dec. 2020
External to ORION	TtT course attendee / manager	Dec. 2020
External to ORION	TtT course attendee / PhD student	Dec. 2020

Table 4. Details of the interviews carried out to both ORION trainers and training attendees.

MOOC data gathering

Pre and post-questionnaires were integrated as part of the structure of the MOOC within the online platform in which this was developed. Respondents completed this online questionnaire at the beginning of the course and at the end of it. The post-delayed survey was sent to all participants by email, once they had finalized the course. The total number of respondents can be found in Table 5.

MOOC	# respondents pre-questionnaire	# respondents post-questionnaire	# respondents post-delayed questionnaire
1st run (2019)	53	27	21
2nd run (2020)	34	28	27
TOTAL	**87**	**55**	**48**

Table 5. Number of respondents to the different questionnaires of the ORION MOOC (2019 and 2020).

TtT course data gathering

The pre-questionnaire was sent to participants before they began the course, and the post-questionnaire was sent after they completed the final event (presentation at the Berlin Science Cafe). A total of 18 responses (85.7%) were obtained for the pre-questionnaire, and 9 of those who finished the course (64.3%) responded the post-questionnaire.

The total sample considered for the evaluation of ORION trainings is shown in Table 6.

	Open Science trainings		Train the Trainer
	Workshops	**MOOC**	**TtT Course**
General data	10 events along the year 2019	2 editions 1st: Oct-Nov 2019 2nd: Feb-Apr 2020	1 course along Sep-Oct 2020
Format	Face-to-face	Online	Online
Number of attendees	140	300+	21 14 finished the course
Types of questionaires used	Pre-post (same one distributed before and after the training) See ANNEX I Post-delayed (some time after the training) See ANNEX II	Pre-post (same one distributed before and after the training) See ANNEX III Post-delayed (some time after the training) See ANNEX IV	Pre (distributed before the training) See ANNEX V Post (distributed after the training) See ANNEX VI
# respondents pre-questionnaire	129	87	18
# respondents post-questionnaire	99	55	9
# respondents post-delayed	38	48	

Table 6. Comparison of data collected for the different ORION trainings.

2.3. Data analysis strategy

The analysis of the gathered data followed standard procedures of data preparation (such as digitalising data and entering data on an analysis programme), data validation (removing incomplete data) and data edit (correcting mistakes in data). An important effort was done regarding the matching of same participants pre, post and post-delayed questionnaires when needed.

For the quantitive analysis of quantitative data, including the analysis of likert scale, multiple-choice and multiple-choice grid questions, the analysis consisted in a simple descriptive statistics based on calculating percentages and frequencies of the different options selected by the participants. The analysis have included comparison of results among different types and also formats of the ORION training, comparing the face-to-face and MOOC trainings among them and with the Train-the-trainers training.

For the qualitative analysis of qualitative data, both rearding open questions in the pre, post and post-delayed questionnaires and mostly answers to the participants' and trainers' interview protocols, discourse analysis methods have been used. In particular, qualitative open data has been analised using the constant comparative method (Miles and Huberman, 1994), by identifying similar and different key ideas, connections among ideas and possible regularities between ideas.

In order to assist the interpretation and provide reliability and validity to the analysis done, different researchers (partners responsible of WP5) and knowledgeable participants (ORION leaders and partners) have participated in the analisys, either at coding and interpretation level. Triangulation has included data coding from two different researchers and triangulation among different instruments, mainly questionnaires and interviews. Limitations in the interpretative capacity and need of more or different data has been explicited when needed.

2.4. Ethical concerns

The different evaluation and quality assurance practices and methodologies presented in this document ensure consistency with the strategies stated in other closely related important deliverables (EQP and benchmark assessment) as well as with the strategy for data management stated in the Data Management Plan (Deliverable D1.4) and the views and practices regarding Ethics of Deliverables D7.1 and D7.2.

Specific actions that have been done to ensure the above mentioned are the following:

- Low or high compromising data (different data with low identifiable informers, but easy identifiable profiles or with easy identifiable informers) has only been obtained from informers alongside a signed consent letter (templates are available in Annexes

X-XII). Both the data and consent letters have been stored in the ORION data management system.

- Non compromising data, which is different data with no identifiable informers, and collected in an anonymized way has been used to collect datasets. Only ORION partners in WP4 and WP5 have access to these datasets and it has been stored in the ORION management system.

Any public document derived from low compromising data analysis will assure the confidentiality, in such a way that identifying information will not be made available to anyone who is not directly involved in the study.

3. Results

This section presents the main results of the evaluation of **ORION WP4 training actions**, including the results of: (i) a series of **face-to-face workshops;** (ii) two editions of a **Massive Open Online Course** or **MOOC** and (iii) a program to train people with initial knowledge on OS on delivering Open Science training (the **Train-the-Trainer course**), as described in the previous section. Results have been selected according to their informative nature and organised around descriptive and comparative questions to ensure usefulness of the analysis.

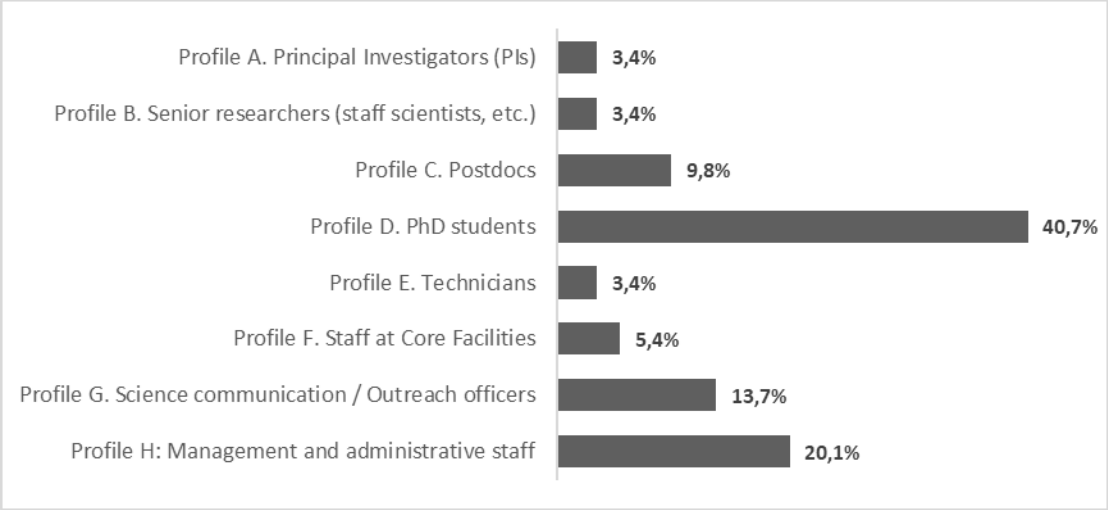
For each result section, we have selected main messages that have been summarised and highlighted in light blue boxes at the beginning of each section. As discussed before, depending on the number of valid responses for each result, the number of respondents might vary. For the sake of brevity and readability, results refer to training participants or training attendees, despite they only represent the views of those training attendees that actually filled the complete questionnaire in a valid form.

3.1. Who attended the ORION training actions? Monitoring perspective

- Overall, most attendees to ORION trainings are PhD students (40.7%), followed by management and administrative staff (20.1%).
- The main dissemination channels for ORION trainings were personal invitations (31.7%) and information received through other colleagues (31.7%).
- Sustainability of the ORION trainings involves replication and adaptation of the face-to-face workshops and continuity of the online trainings (MOOC and TtT course)

The ORION training actions have targeted mostly early-stage researchers and management and administrative staff

Globally, the variety of attendance to ORION training actions, in terms of professional profile, shows that **participants to the ORION trainings were mainly PhD students (40.7%) and management and administrative staff (20.1%)** (see Graph 1). Participation of researchers in other stages of the research career, from postdocs (9.8%) to senior researchers and principal investigators (PIs) (3.4%) was smaller the highter their position. Technicians also show a very small attendance rate (3.4%)



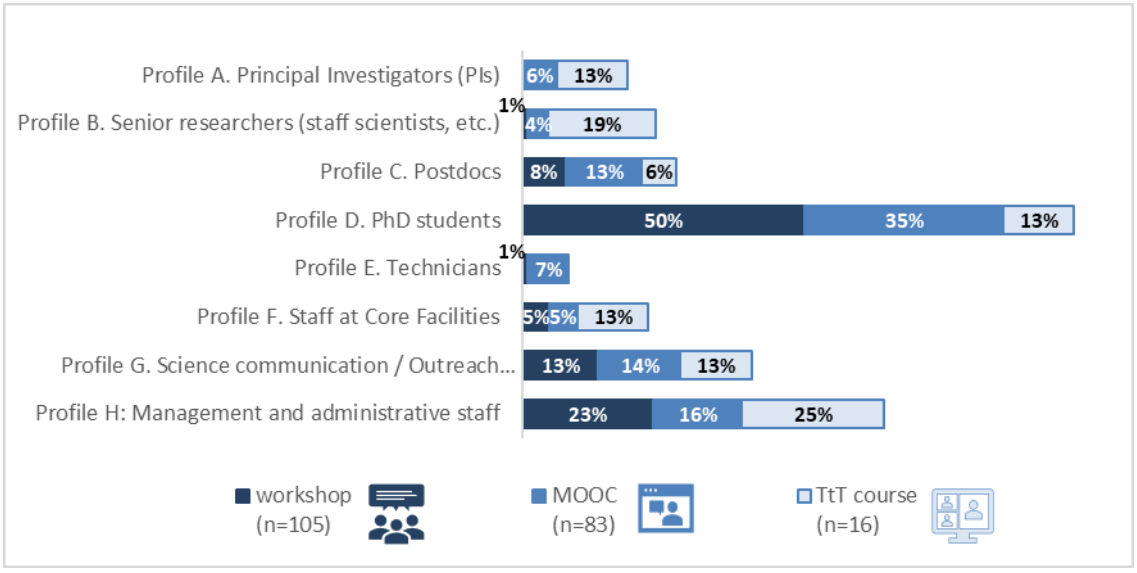
Graph 1. Professional profiles of participants to ORION trainings (global perspective) (n=204).

The high participation of PhD students is not surprising, since the ORION training efforts were mostly targeted towards early-stage researchers. Regarding management and administrative staff, a genuine interest was also pointed out by one of the ORION training leaders who was interviewed:

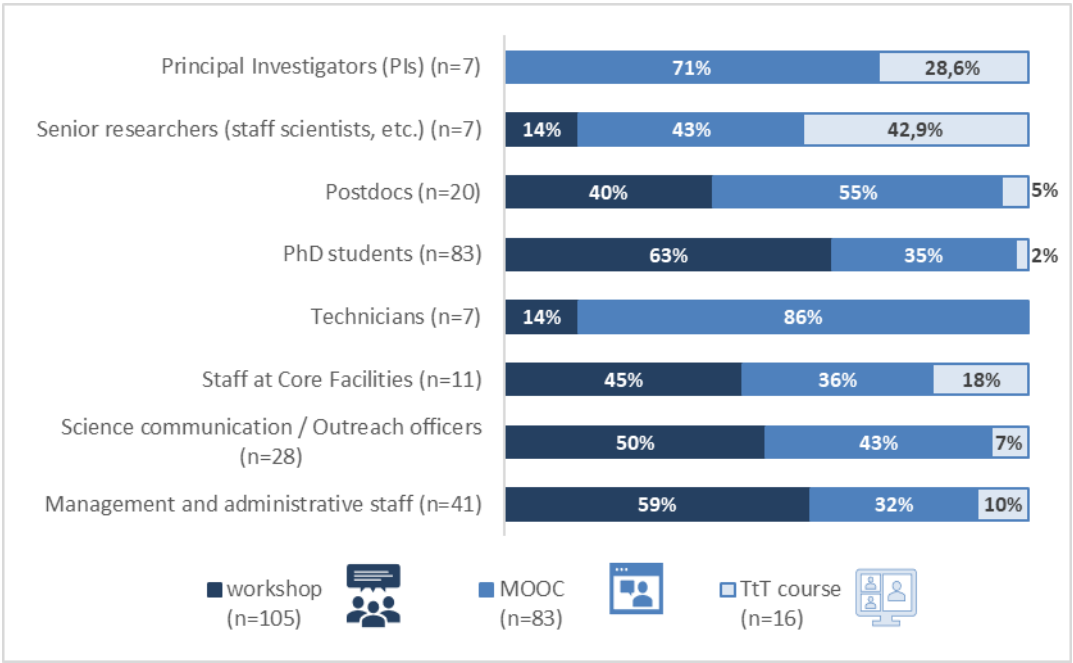
> "***anyone who bridges the gap between funders and researchers seems to be very interested in Open Science***." (Trainer/Interviewed 1)

When looking at the audience to the specific trainings (see Graph 2), we find that **PhD students and management and administrative staff were the main public attending both the face-to-face training workshops** (49.5% and 22.9%, respectively), and the **MOOC** (with 34.9% of PhD students and 15.7% of management and administrative staff). This implies these are profiles that are the most targeted by trainings since providing initial knowledge on OS could benefit them. The scenario is different **for the TtT course, where the main audience were management and administrative staff** (25.0%) **followed by senior researchers** (18.8%). This evidences that the low attendance of senior researchers and PIs to the global ORION trainings can not be interpreted just as lack of interest or time or other reasongs, but also to some extent to existing OS knowledge in a small but relevant percentage of these professionals, which signals the importance of more advanced courses specifically addressed to them.

Regarding the distribution of the attendance of each of the different profiles in the different types of ORION trainings (see Graph 3), we see no participation of technicians in the TtT course, while this training action was the most followed by senior researchers (42.9%) and principal investigators (28.6%).



Graph 2. Percentage of participants of each professional profile that attended each type of ORION training activity.

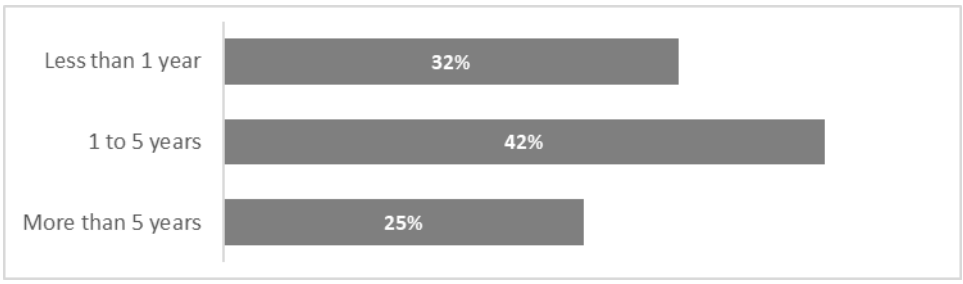


Graph 3. Distribution of participants in each ORION training activity per professional profile.

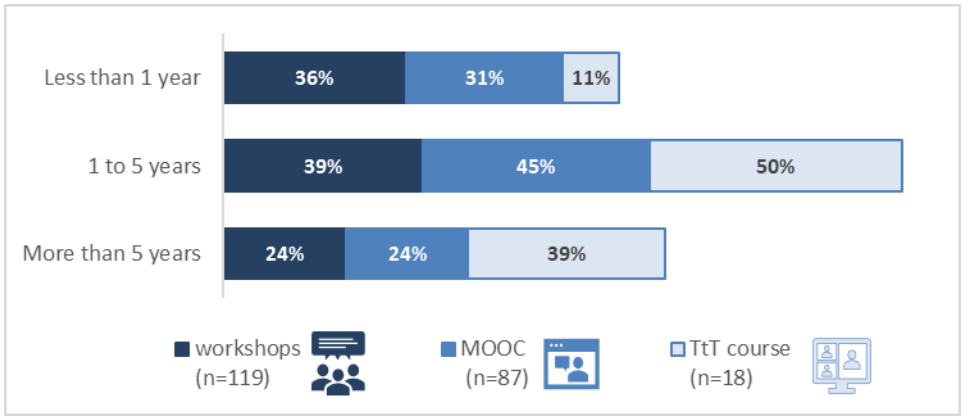
Regarding the role of professional experience in the attendance to the ORION training actions, we see that most participants to the ORION trainings have **early-stage professional experience in their current institutions** (Graph 4), since 74.6% of attendees claim to have been working there for less than 5 years. This is the case for all of the types of training actions (Graph 5), as we see that in all cases **participants with 1 to 5 years of experience in their current institution are the main profile of attendees to all ORION trainings**. On the other hand, when analysing the distribution among the different types of

trainings of professionals from each stage of professional experience, (Graph 6), we see that despite more experienced participants are more interested in attending the TtT course than less experienced ones, as expected, this does not mean that professionals with more than 5 years in an institution do not need initial training in OS: almost 90% of those with more than 5 years of experience still choose those face-to-face and MOOC training that were addressed to those non-knowledgeable in OS.

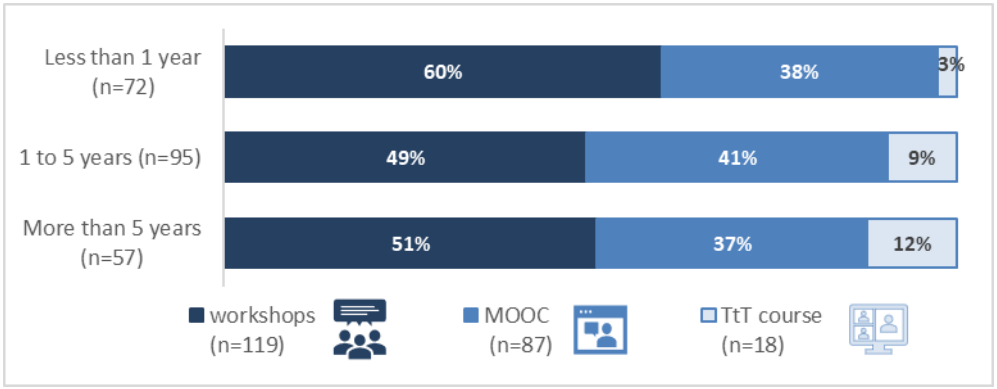
Results from Graphs 4 and 5, when combined with results in Graphs 2 and 3, implies that the role of the researcher in the research career has more influence than the experience in the institution in their selection of training courses.



Graph 4. Professional experience of participants to ORION trainings (global perspective) (n=224).



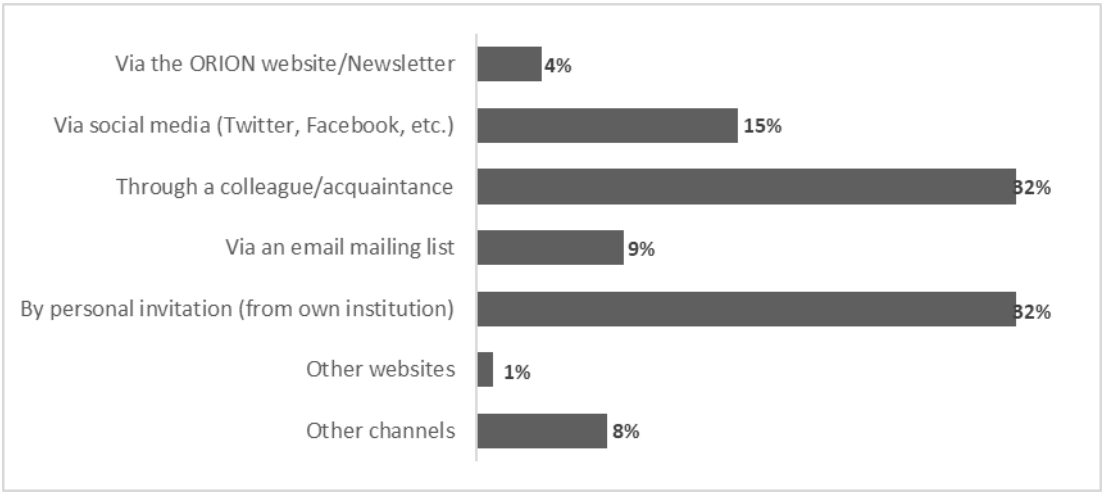
Graph 5. Percentage of participants for each professional experience group per type of ORION training activity.



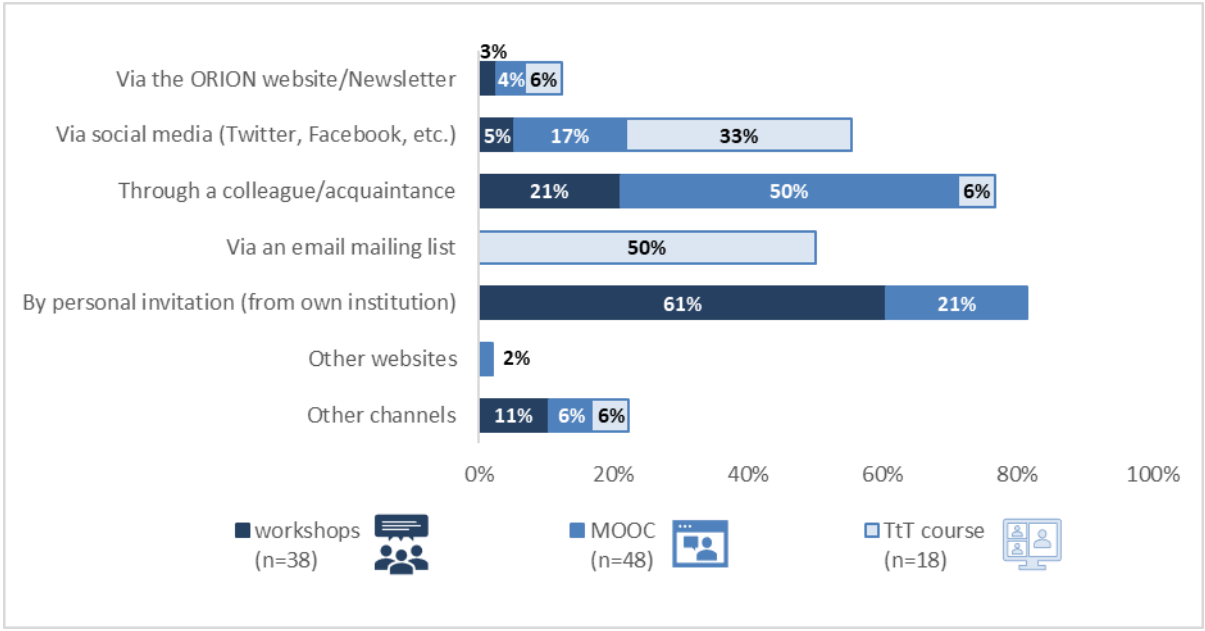
Graph 6. Distribution of the attendance to the different ORION trainings per each professional experience group.

The main dissemination channels for ORION trainings were personal invitations and information received through other colleagues

Overall (see Graph 7), most participants stated having become aware of the ORION trainings **through other colleagues/acquaintances** (31.7%) and **by personal invitaitions** (31.7%), followed by **social media** (15.4%). When comparing the three types of training (Graph 8), we find that personal invitations from their own institutions were the most effective channel to attract participants to the ORION workshops (60.4%), which is a demanding dissemination normal at initial statges of a project (the first training action at ORION). At later stages of the project, however, it seems that its dissemination channels and networking capacities improved, also becoming specific. Whereas the MOOC attendees signal colleagues and acquantances and social media as their main channels of information for the ORION online training, the TtT course required more personal and targeted invitations via a mailing list.



Graph 7. Dissemination channels of ORION training actions (global perspective) (n=104).



Graph 8. Dissemination channels of ORION training activities per type of training.

Sustainability of the ORION trainings involves replication and adaptation of the face-to-face workshops and continuity of the online trainings (MOOC and TtT course)

During the lifespan of the project, the ORION training leaders had received several invitations to carry out trainings at different research institutions around Europe. Quite often they involved participants who, after attending one of the workshops, took the initiative in recreating them in their own institutions. As a consecuence, a series of **similar trainings to the ORION workshops were carried out in institutions external to the ORION consortuim and allowed disseminating ORION trainings to a wider scientific community**. This has been justified in terms of the usability of the trainings and has usually involved the actual ORION trainers, which speaks about the suitability of ORION trainings, the expertise of the ORION partners in charge and how this tool was needed in the research community.

> *"We get emails about once every two weeks asking us to do things because they've heard about us or whatever (…)* ***usually from participants who are now organizing my own event or own conference, can you come and give that workshop again 'cos I found it useful****"* (Trainer/Interviewed 1)

> "*In almost all the cases where they [the extra trainings] were outside ORION institutions, we were invited.* ***So, someone saw us at a conference, or at an event at [our institution] and said can you do the same thing or something similar (…) and invited us***." (Trainer/Interviewed 1)

On the other hand, **the digital character of the MOOC and the TtT course allowed to reach a higher level of internationality** (for instance, the 21 participants to the TtT course represented 17 countries from 4 different continents). The materials and activities created for these online trainings were all under a CC-BY license to be shared and reused freely, and were adapted to be self-paced and standalone to allow sustainability after the lifetime of the ORION project.

3.2. How did participants value the ORION training actions? Motivations and impact in terms of satisfaction

- Participants of ORION trainings were mainly looking for knowledge and understanding of Open Science and were driven by the need and demand to have trainers in this field.
- A majority of participants claim the ORION trainings met their expectations (95.8%) and would recommend them to others (94.7%).
- Most training participants find that the content and structure of the trainings are adequate: 97.9% think the information and materials provided are relevant and useful to them, and 91.3% consider that the overall structure and length is appropriate.
- Interaction, innovative methods, professional and knowledgeable trainers, and the friendly atmosphere of the face-to-face events are the main positive aspects highlighted by ORION training participants.

Participants of the ORION trainings were mainly looking for knowledge and understanding of Open Science and were driven by the need and demand to have trainers in this field

After their participation in the ORION workshops and the MOOC, attendees were asked, through an open question, about the reasons/motivations for having attended the training (see Q2 in Annex II and Q2 in Annex IV). The qualitative responses of those filling in this question after the workshops (n=38) and the MOOC (n=48) were grouped under five main categories, which are shown in Table 7 together with a summary of the results of the qualitative analysis. According to these, the main motivation for participants to attend these trainings were, on the one hand, to gain a "**General understanding of OS**" (which mainly include reasons such as **curiosity and interest in learning about OS and RRI principles in general**), with around 70% of respondents for both trainings. To a lesser extent, those attending also refer to, as a second expectation, "**Learning to practice OS**" (the **will of getting to know tools and practical ways to implement OS**), which was mentioned by nearly 14% of respondents.

On the other hand, after attending the TtT course, participants were asked through an open question why they think there is a need to train people on how to train others to implement OS. There were few answers (n=18), which were grouped under three categories shown in Table 8. The results of the qualitative analysis show that the main motivations of attendees of the TtT were the "**Need of content knowledge about OS**" (basically, to the need to increase knowledge about OS in general, in order to properly implement it and put it into practice) and the "**Need of qualified trainers in OS**" (i.e., to have more trained people who can both provide knowledge and tools to others, contributing to enhance skills and teach on emerging issues on OS, as well as promote and spread knowledge about OS).

Category	Examples of answers	% responses workshops (n=38)	% responses MOOC (n=48)
General understanding of OS	*"I wanted to learn more about the different aspects of open science"*	**71.1%**	**70.8%**
Learning to practice OS	"*To learn how to implement and promote open science"*	15.8%	14.6%
Learning to teach OS	"*I already deliver training and research support on open access and open data, and wanted to see how other institutions taught it."*	0%	2.1%
External motivations	"*My Science Director encouraged me to take part... he wants us to be more familiar with the concept of Open Science as an institute*."	0%	4.2%
Non-specified	"*Very interesting and well-constructed online course!*"	13.2%	8.3%

Table 7. Qualitative results of the analysis of answers about motivations to participate in ORION Open Science trainings (workshops and MOOC).

Category	Examples of answers	TtT course % (#) responses (n=18)
Need of content knowledge about OS	*"Open Science is big and scientists don't know much about it. There is too much information out there for an individual to self-inform."*	44.5% (8)
Need of qualified trainers in OS	"*So that we spread knowledge about Open Science to those that need it and can implement it"* *"Because training in data science is in demand, and the trainers usually have experience in data science but not necessarily in teaching"* *"Libraries often take responsibility for providing training on open science. Much of our training offer focuses on open access to publications, but I think there is an increasing demand for a more intersectional offer that aims to provide support and advice on other open science practices"*	44.5% (8)
Other	"To raise awareness in the best possible way"	11% (2)

Table 8. Qualitative results of the analysis of answers to the question on why there is a need for training on how to train others to implement Open Science..

This need to get knowledge and improve skills on how to teach others on OS was particularly highlighted by participants to the TtT course who were interviewed, as can be seen in their references to this aspect. Training participants refer to a variety of reasons for wanting to become trainers, including an existing demand regarding OS training that goes beyond technical training both for improving funding for all researchers and to guide those already interested in OS:

> *"… I work in the Research and Innovation Unit (…) and I have responsibility for development of research applications, supporting the researchers applying for funding both at national level and EU level (…) as a young university we have to see where can we try to do things different, and* ***Open Science is one of the areas that is being a bit over the focus on (…) because it is becoming such an integral part of applying for research funding*** *then it was time to up my skills (…)"* (TtT Participant/Interviewed 7)

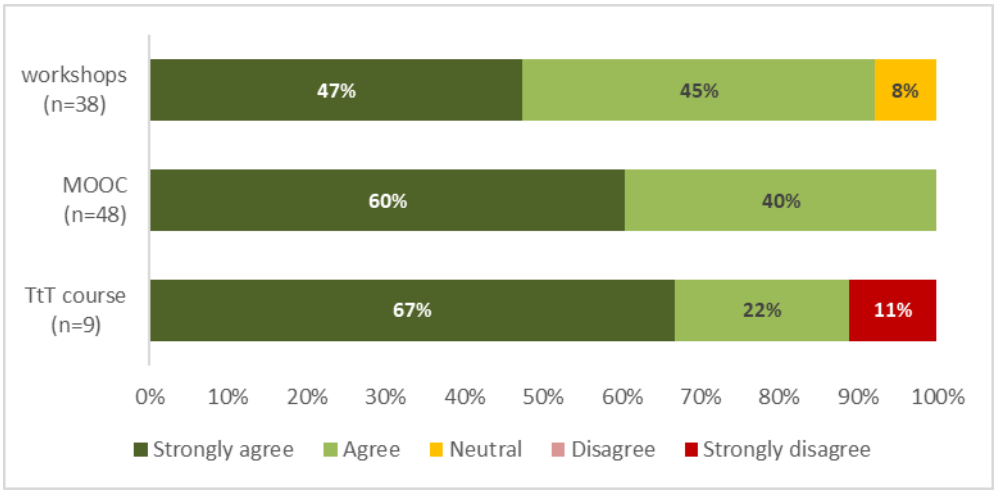
> *"… I came to the ORION course because my organisation (…) is working in a project (…) and* ***my role in this project is in training*** *(…) So,* ***I came to the course as a way to learn how to teach, how to make training materials for the scientists in the (…) project*** *(…) We realized the training is about not only practical, you know, what is Zenodo, or how do you upload your data, and how do you make metadata, yes, that is also needed, but also* ***there is training needed in why should I do this, and how can I make it easy for myself and my team to make my research open*** *(…) I found that there's is a lot more to Open Science than what I thought* ***(…) I thought I knew that Open Science was about open access publishing and maybe putting your data, you know, in some site, but as I was searching for trainings I learned that Open Science is about a lot more****"* (TtT Participant/Interviewed 6)

> *"… I'm a PhD student at University (…) my thesis is on Citizen Science and Philosophy of statistics, and then* ***I also organize the local Open Science club*** *where we have meetings once a month and we discuss (…) the people who I was doing the club with, a lot of them are now finishing their PhDs, and so I had to go and do it on my own going forward****, thought it would be good to get a bit of training to actually deliver good Open Science events****."* (TtT Participant/Interviewed 8)

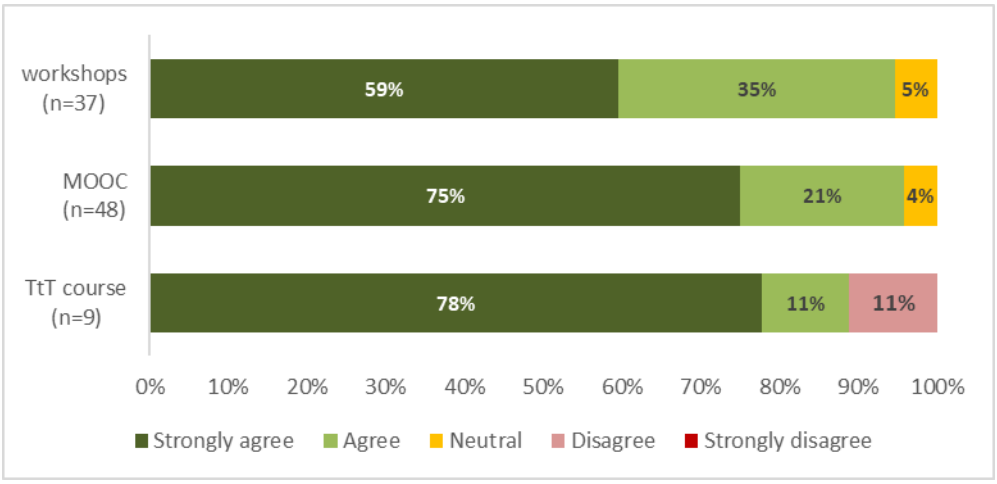
Participants to the ORION training actions are in general highly satisfied with them

According to their responses, training participants are in general very satisfied with the actions, since **most of them claim the ORION trainings met their expectations** (see Graph 9) and **would recommend them to others** (see Graph 10). Overall, **95.8% of participants consider that the trainings fulfilled their expectations**. Particularly positive results were obtained for the MOOC, which is normal considering that the online nature

allowed that only those satisfied remained in the course. Globally, **94.7% of participants would recommend the ORION trainings to others**.



Graph 9. Degree of fulfilment of expectations according to ORION training participants per type of training.



Graph 10. Degree of recommendation of the ORION trainings to others according to its participants.

The satisfaction with the MOOC was an important trigger of attendance to the TtT course, which means that there is a connection between these two sorts of trainings, that implies a training path for some of the participants:

> ***"I jumped to the chance straightaway to take the TtT course because I was so satisfied with the MOOC"*** (TtT Participant/Interviewed 7)

Only one participant to the TtT course expressed negative views, scoring unfavourably both to the question about expectations and to whether they would recommend the training to

others. The reasons for such a dissatisfaction can be found in the answers to two open questions: Q3, in which they were asked to describe, if any, those aspects of the course which were found as less positive, and Q10, where they were asked to add any other comments they wished (see Annex VI). In these answers we can see that despite the TtT course did not meet the participant's expectations, the knowledge and attitude of trainers were highlighted, and the comments were of a constructive nature. As such this view, despite non generalisable, raises concerns about how the TtT course.

> *(Q3): "Unfortunately my understanding of a train the trainer course was that we would be trained in how to teach open science. However**, we were mainly trained in how to teach and run a course from a generic perspective**. There was little specificity to open science and how to teach it. [the trainers] are clearly very knowledgeable of open science and I feel this was wasted as we didn't really tap into this knowledge much. **It would have been great to have heard more about how best to teach open science, topic by topic**."* (TtT participant)

> *(Q10): "I hope you find my feedback constructive. You had a real enthusiasm and ran the course very well. **It just wasn't what I signed up to**".* (TtT participant)

This issue about different expectations was pointed out as well in an interview to one of the participants who had taken both the MOOC and the TtT course:

> *"… **I was expecting basically what was delivered**. So, I was expecting how will be then put in practice and what are good ways to do this. **But I did realize there was a number of the participants who hadn't taken the MOOC on Open Science and their expectations were different, because they also expected content and not just delivery of the content. But from my own perspective the course was very much in line with what I expected**"* (TtT Participant/Interviewed 7)

This signals that an interesting training path, recognised by those participating in ORION trainings, is that of doing the ORION workshop or MOOC before the TtT course, understanding this initial training or some other training equivalent to it as a pre-requisite for a successful participation in the TtT course.

Thinking also in meeting the variety of needs of future trainers in OS and following this idea of a training path, we consider useful to explore in the future more personally adapted formats for the TtT, such as personal mentoring or exchange and learning communities, for instance.

> "*We have created a Horizon Europe action plan and as part of preparations of Horizon Europe and because we see there's going to be a bigger focus on Open*

> *Science then one of the things as a gap in our services is providing enough specific Open Science training to our researchers, so we will early next year sit down with the Open Science coordinator of the library, who I said is focused mostly on Open Access and Open Data, and discuss how should we,* ***what type of courses should be prepared both targeted at the researchers but also at the management, so the management understands more the importance of Open Science, the fact that is taking more time for the researchers to make their data FAIR****, for example, and there may be other they need to consider as a manager, so we'll have some very brief, sort of maybe 30 min lunch session on what is Open Science from a manager's perspective at the department, and we'll have some more targeted training on different parts of Open Science for our researchers. So, we have planned to develop those and it's in our action plan"* (TtT Participant/Interviewed 7)

It is also worth mentioning that, when the interviewed participants were asked about the factors that would make them want to attend to similar events to the TtT course in the future, they pointed out to **relevance for their work** and **flexibility of the training**:

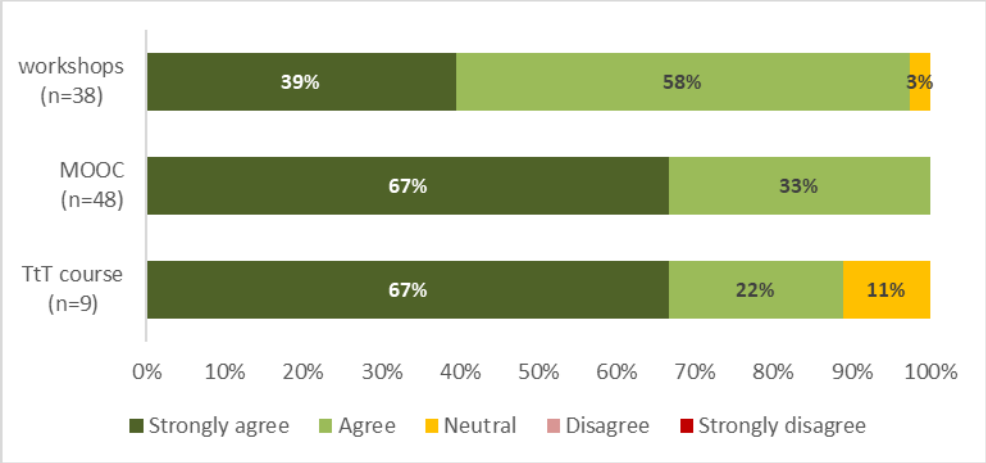
> *"… the relevance and the flexibility, but yes, I would want to do more courses like this, it's very useful"* (TtT Participant/Interviewed 6)

> *"… it has to be relevant for what I am working with (...) the Open Science [MOOC] course was that type, because it was at the right time and it was something I didn't have enough knowledge about…."* (TtT Participant/Interviewed 7)

Most participants find that the information and materials provided in the ORION trainings were both relevant and useful to them

The information and materials presented and used during a training action are essential to guarantee its quality, and training participants were asked about their satisfaction with these, in terms of relevance and usefulness.

Results gathered were mainly satisfactory, as **most participants (97.9%) claimed the information and materials of ORION trainings were both relevant and useful to them** (see Graph 11). The MOOC was particularly well rated (since 100% of responses were positive). Examples of learning materials specifically mentioned by participants were the manuals for citizen science, the quizzes, the interactive exercises, the slides with interactive question elements embedded within them and the factsheets. This signals the importance of two types of training materials in OS trainings: brief materials that provide clear information on specific aspects of OS and dialogic and interactive materials that challenged the participants' knowledge and views.



Graph 11. Relevance and usefulness of the information and materials provided in the ORION trainings according to its participants.

The data gathered through the interviews also shows how workshop training leaders perceived participants responding quite well to the materials used, taking an interest in them and being able to carry out a discussion after examining them. The characteristics that these trainers perceived as most useful in OS training materials were their usability, the inclusion of examples and the focus on the attendees' scientific area (in this case, life science).

> *"… **I was quite pleased because we were able to use the fact-sheets, and people did seem to be writing in it**, and they were asking "can I", I think I literally had to take it off one girl so I was like "no, I will send them to you"; so, I think that was quite positive as well. **That something we've produced, people seem to be engaging with, so that was good**."* (Trainer/Interviewed1)

> *"… [about materials] we used them. **I think they are good also focused on life sciences because it's difficult when it's too general** then people don't get identified (…) there was relevant examples. **There was always an interesting discussion that evolved around this. I cannot say they were perfect, but they were useful to the trainer**."* (Trainer/Interviewed 2)

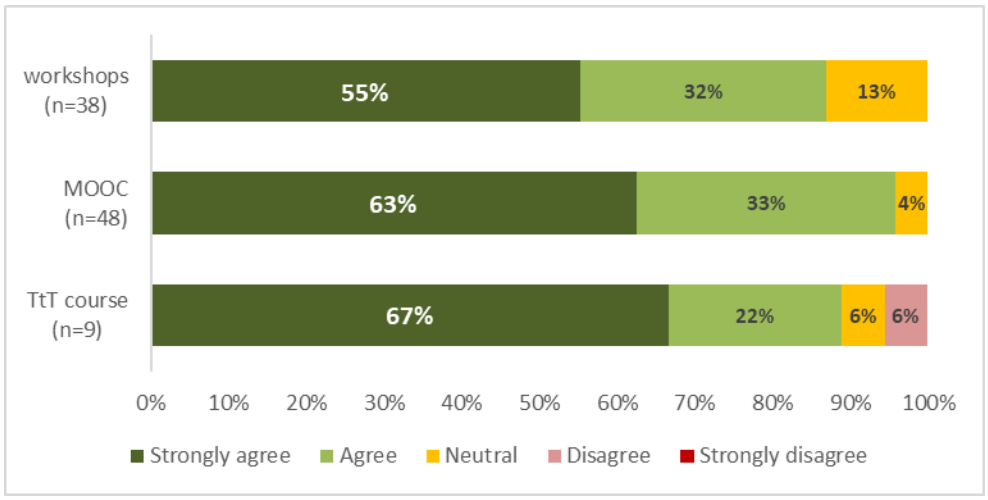
In addition, two of the participants to the TtT course stated in the interviews that they were already using some of the materials in their training activities:

> *"Oh, yeah, absolutely. **I am already copying some of the things I learnt, using things from the course** (…) the video that, I think [the trainer] made it, about comparing open data to like a treasure hunt (…) **I'm already using this as a way to tell people about FAIR, what FAIR data is**."* (TtT Participant/Interviewed 6)

> *"…**everything that was there was relevant**. I've looked through everything, yeah. And I'm definitely going to go back and use it because we are being challenged on making the online trainings for example, better."* (TtT Participant/Interviewed 7)

Participants to the ORION trainings are mostly satisfied with the overall structure and length of the training actions

Training attendees were also asked about the overall structure and length of the training actions. Results show that, in general, most participants are satisfied, since **91.3% of them agree or strongly agree with the statement "the overall structure and length of the [MOOC/workshop/TtT course] was appropriate**" (see Graph 12). When analysed per type of training, the 6-week MOOC was the best rated (95.8% of participants agreeing or strongly agreeing with the statement).



Graph 12. Degree of participants' satisfaction with the overall structure and length of the ORION trainings.

In the case of the workshops, there was a highest proportion of neutral opinions (13.2% of participants), which could be related with an excesive length. As one of the participants suggested, "*maybe [it should be] a bit more brief because people who have trouble concentrating (like me) have it tough after the first 4 hours*".

On the other hand, despite 88.9% of participants to the TtT course agreed or strongly agreed with the appropriateness of the structure and length of the course, extending it was suggested by some participants.

> *"I suggest that it is a little longer to allow more time to work together on the group activity. The ability to drop in was a good approach but personally I would have like one more 'booked session' with my group before Berlin Science week. I think also think [sic] that a couple of more sessions would had even more depth to this already fantastic course. when I compare to the MOOC there was a lot more*

course units and learning from the MOOC and I guess then I was expecting a few more Units. But saying this I was really happy with the course!" (TtT participant)

> *"…**the course could be a little bit longer** so that, cause [sic] there was a lot of really good read material, I scanned everything and everything I've marked to go back to, but the problem often is that you never get to go back again"* (TtT Participant/Interviewed 7)

These views combined can be used to inform a post-ORION, more structured training path that could start with short initial workshops (similar to ORION workshops or smaller) which can be continued online with deeper training on the content (a course similar to the MOOC) and, in the required cases, followed by longer trainings on how to train in OS (either in an extended TtT form or following the TtT with additional, more personally adapted training or guiding experiences.

Interaction, innovative methods, professional and knowledgeable trainers, and the friendly atmosphere of the face-to-face events are the main positive aspects highlighted by ORION training participants

Through the qualitative data gathered via open questions and interviews to training attendees, we found that they positively valued the **interactive** character of the trainings, the **innovative methods** used to promote discussion and reflection, the **presence of professional and knowledgeable trainers** and the **friendly atmosphere of the face-to-face events**.

> "*…I thought the didactic part was interesting, I thought that was positive, I found poor the content of the discussion. I mean, I thought what was discussed did not live up [to the workshop] (…) **I did like how interaction and the participation of everyone was promoted***." (Workshop Participant/Interviewed 3)

> *"…**I loved the friendly atmosphere**; it was very personal. Both the presenters, the ladies were understanding the needs. They knew what they were doing. **Probably the approach, I loved, it wasn't too big of an event and there were I don't know 20 participants altogether, which was very pleasant**. Because when it is too big it becomes overcrowded, and too much is too much. Maybe also the size of the event (…) **I liked the methods they use**"* (Workshop Participant/Interviewed 4)

> *"…it was **interactive**, the **methods were innovative**, the **organizers of the course were lively**, and they had different kind of activities, and that was really important, **kept my interest**"* (TtT Participant/Interviewed 6)

> *"... one of the good things about the MOOC was that **there was a lot of learning together**, even though we didn't meet anyone virtually, there was no meetings in the MOOC, but you could see the answers from the other students and build on their answers and **you felt like you were communicating and interacting anyway**. And then, **the TtT course left it up to another level,** where you actually had to be part of the team, you had discussions and again, that was, I mean **I find that the best way for me now in my stage of career to learn is actually through discussion also with others** (…) there was clear deadlines, clear expectations, short learning units (...) they managed to keep that enthusiasm and focus"* (TtT Participant/Interviewed 7)

> *"…**it's such a good course and so interesting and so well planned, so professional**, you know, and also I love the way, I must say that [the trainer], she made you feel so comfortable (…) I often feel I'm not good enough when I'm going to do some training, I know my content but I don't know how to deliver it very well. But [the trainer] had such a very professional but relaxed way of doing things that it made everyone feel that they were good, so her approach was very good and I think it was a very positive thing, **having the right trainers doing these course**..."* (TtT Participant/Interviewed 7)

The personal component was not only highlighted by participants. Also, the training leaders who were interviewed, when asked about their role as OS trainers, mentioned a few aspects that they believe to be essential when leading a workshop, and particularly, they expressed their thoughts about the importance of having **practical knowledge on OS, the empathy towards training participants' needs and good communication with them as crucial to under their experiences and needs**.

> *"… I think a first-hand knowledge of research is essential, otherwise you're just not [sic] want to relate to the world of researchers, **I think empathy for researchers and for project managers** (…) or research support officers, **is also really important** and yet some kind of experience in education and some kind of experience of policy or institutional culture shifts. (…) **you need to have had that experience on having to try and persuade people to do some things differently that they have before.**"* (Trainer/Interviewed 1)

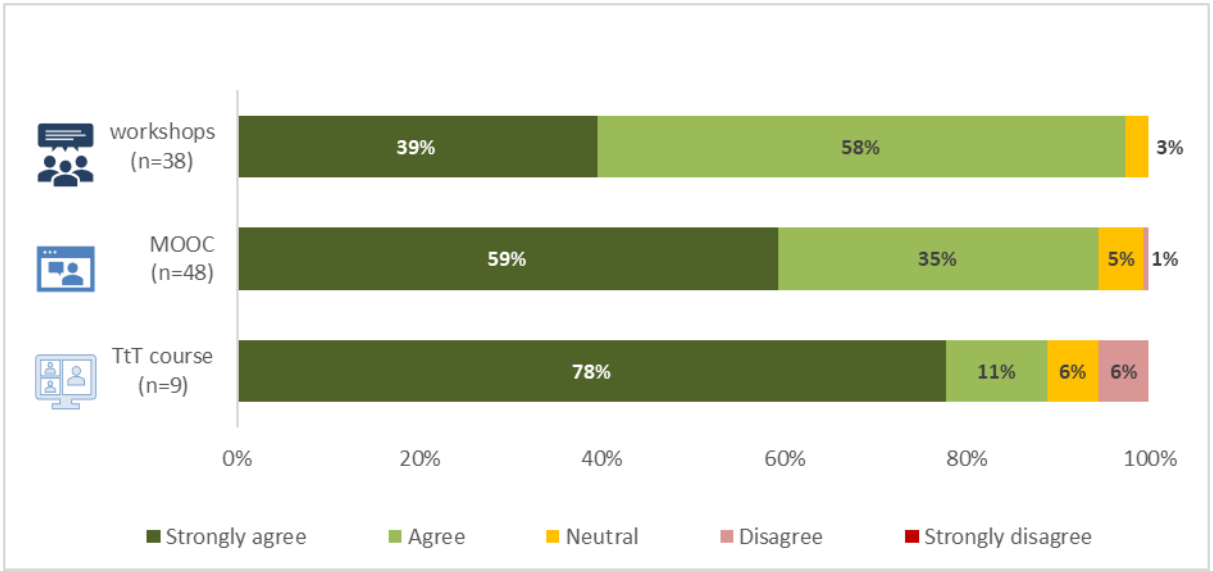
> *"… Open mind, open ears, open eyes, **but most important is the open ears**. It's not only for these trainings (it is particularly but not only) because when discussing open science there is a lot of unknown doubts, **you really need to listen to people. Why they react to [sic] in particular? [sic] What is behind [their reactions]?**"* (Trainer/Interviewed 2)

3.3. How did participants increase their knowledge on RRI and Open Science practices after the ORION training actions? Impact in terms of perception of learning

- Most participants to the ORION face-to-face trainings (97.4%) claim to have learnt valuable knowledge about Open Science after participating in them.
- Most participants to the ORION MOOC (94.4%) agree or strongly agree to have learnt valuable knowledge about different aspects of Open Science (open access, open data, academic publishing and peer review procedures, citizen science and research data management).
- Most participants to the ORION TtT course (88.9%) agree or strongly agree to have learnt valuable knowledge about theory, formats, and training methods to train others on Open Science.

Most ORION training participants claim to have learnt valuable knowledge about Open Science after participating in the trainings

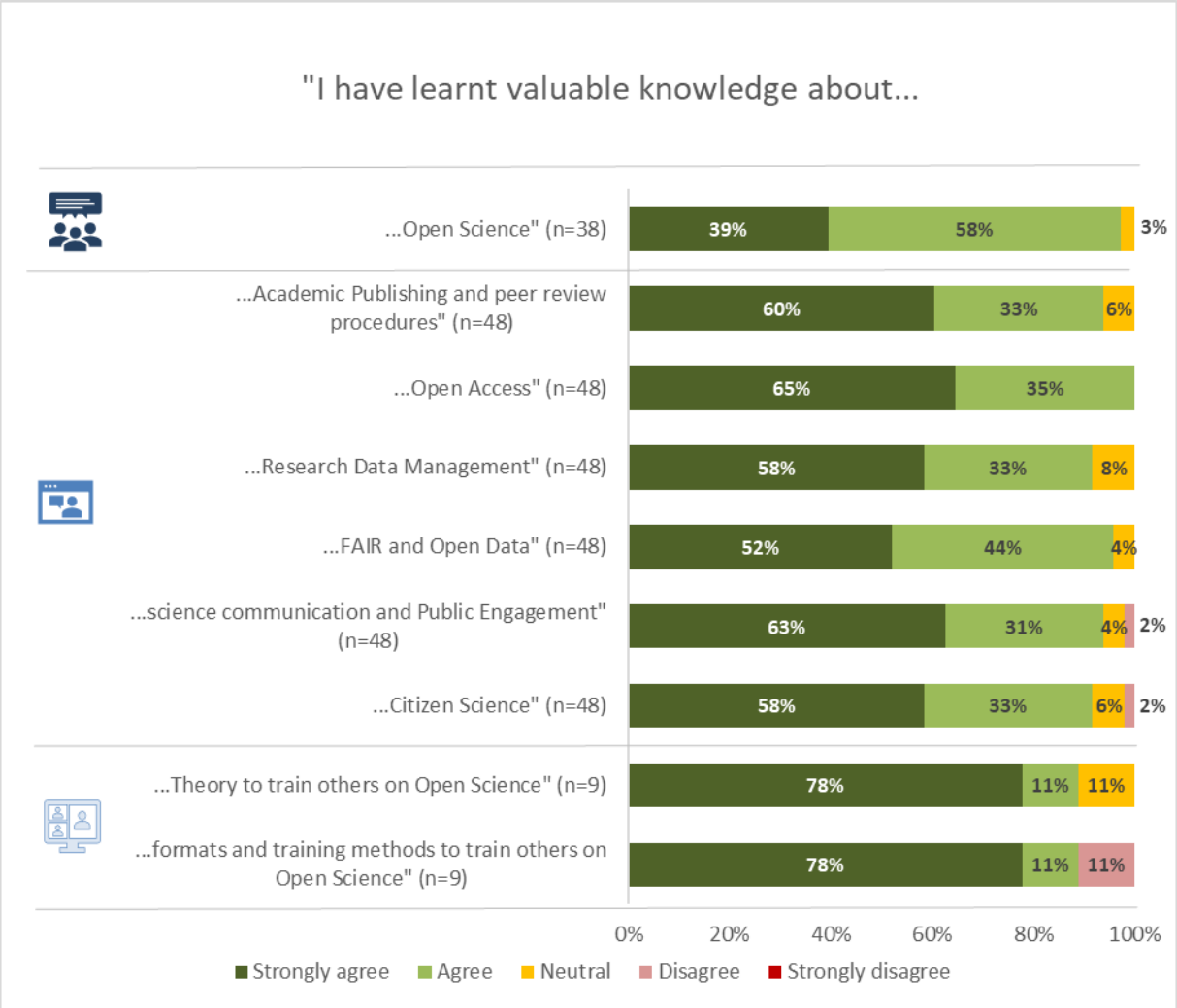
Participants to the ORION training actions were asked if they had learnt valuable knowledge about OS (or different aspects of it) after participating in the three trainings (see Q4/item 1 in Annex II, Q6/items 1-6 in Annex IV, and Q5/item 1-2 in Annex VI). Since the questions were slightly different in the three questionnaires, responses with more than one item to be explored were aggregated to have a general perspective and allow comparison of results for the various trainings (see Graph 13).



Graph 13. Overall perception of learning regarding Open Science according to participants to ORION trainings.

Results show that, **overall, participants have a positive perception of having learnt about OS** (see Graph 14), ranging from 88.9% to 97.4% of participants who agree or strongly agree with the idea of having learnt useful knowledge in the ORION trainings. Participants to the MOOC were asked if they had learnt valuable knowledge about several specific aspects of OS. Training participants acknowledge to have learnt valuable knowledge about all of the OS aspects included in the MOOC, with **Open Access as the best rated one**.

Regarding participants to the TtT course, most of them agree or strongly agree with having learnt valuable knowledge about both **OS theory** (88.9%) as well as **formats and learning methods to train others on OS** (88.9%) to train others on OS.



Graph 14. Perception of learning according to the statements of those attending the ORION trainings.

Qualitative data gathered from interviews to ORION training participants also show that they have the perception of having learnt about different aspects of OS, including its challenges, specific knowledge on Open Access and Open Data and, in the case of the TtT course, about methods and tools to run their own Open Science training in a way that it is meaningful for their future audiences.

> *"… To me really this was something new. You can imagine, as a beginner, you're starting at all the information**. I learnt something about the idea which is behind Open Science** and I understand it's quite problematic. There's been a lot of challenges around the topic."* (Workshop Participant/Interviewed 4)

> *"… I think if you've come to this course you'd probably have come away with a very good overview **so I don't know what else you'd want to discuss really** (…) You were presenting lots of different platforms to promote data repositories and things like that. And I already was aware of this (…) it didn't feel like a waste of time. **I had questions about them that were sort of answered.**"* (Workshop Participant/Interviewed 5)

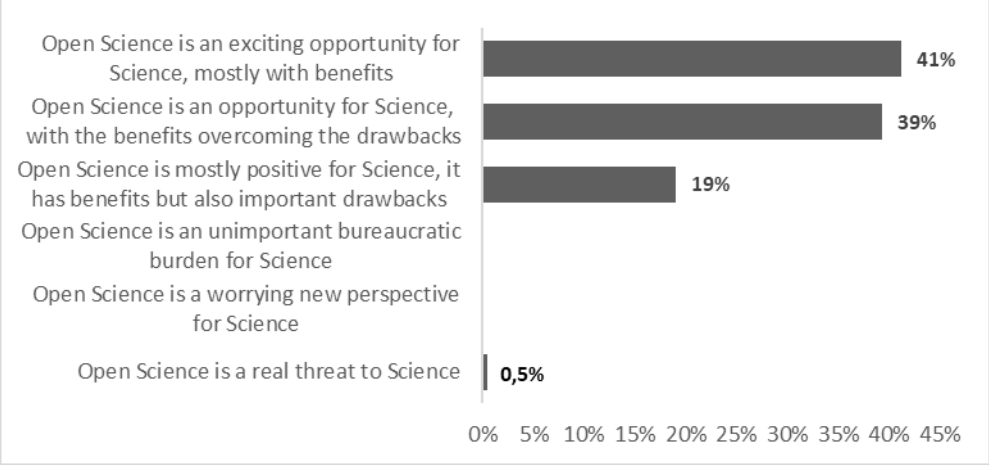
> *"… **I learnt a lot**. Some things I already knew because I have a lot of experience in doing online sessions, so about interaction and short sessions (…) but I also learnt about some tools I didn't know (…) I learnt about teaching in general, online teaching, interactive teaching, **but I also learnt about specifically about [sic] teaching Open Science in ways of making it personal to you**, that I thought was very important, and in ways of let making it somehow playful."* (TtT Participant/Interviewed 6)

3.4. How did participants change their views on Open Science after the ORION training actions? Impact in terms of change of views

- Overall, ORION training participants have a very positive perception of Open Science prior to attending the trainings
- After attending the ORION trainings, most participants do not change their initial views, and there are more positive changes than negative ones
- Overall, ORION training participants think that science should be very open to all stakeholders, but especially to those directly involved in scientific research: scientists from the same area/discipline, scientists from other disciplines as well as funders and policy makers
- After attending the ORION trainings participants do not significantly change their views regarding openness to different stakeholders

Overall, ORION training participants have a very positive perception of Open Science prior to attending the trainings

Results show that, **prior to the ORION trainings, OS is perceived as an opportunity among participants** (see Graph 15). In order of frequency, OS is perceived as an exciting opportunity mostly with benefits for 41.2% of participants, as an opportunity with the benefits overcoming the drawbacks (39.4%), and as mostly positive for science, with benefits but also important drawbacks (19.0%). No participants see OS as an unimportant bureaucratic burden or a worrying new perspective for Science. Only one participant expressed a negative view, considering it a real threat to science. This implies that the ORION trainings have reached, as expected, only those participants who are already interested in the topic and have a positive view regarding it. Despite the limitation of this fact, we consider of crucial importance that those participants with an initial positive view do engage in OS trainings, acknowledging that an initial interest in OS is not enough to be able to implement it professionally.



Graph 15. Participants' views on Open Science prior to the ORION trainings (global perspective) (n=221).

After attending the ORION trainings, most participants do not change their initial views, and there are more positive changes than negative ones

The impact of the ORION trainings in the views of OS of its participants is one of the main outcomes expected by the ORION project.

According to the answers to specific questions on their own perception of change (see Table 9), more than half of participants to all trainings consider they have changed some of their previous ideas about OS, since in all cases there are more than 50% respondents who agree or strongly agree with the statements. The change is higher in the case of the MOOC (85.4% of participants) than for the workshops (57.9%). For the TtT course the question explicitly asked if the change was towards a more positive view regarding Open Science and its practice, resulting in 66.7% of positive answers.

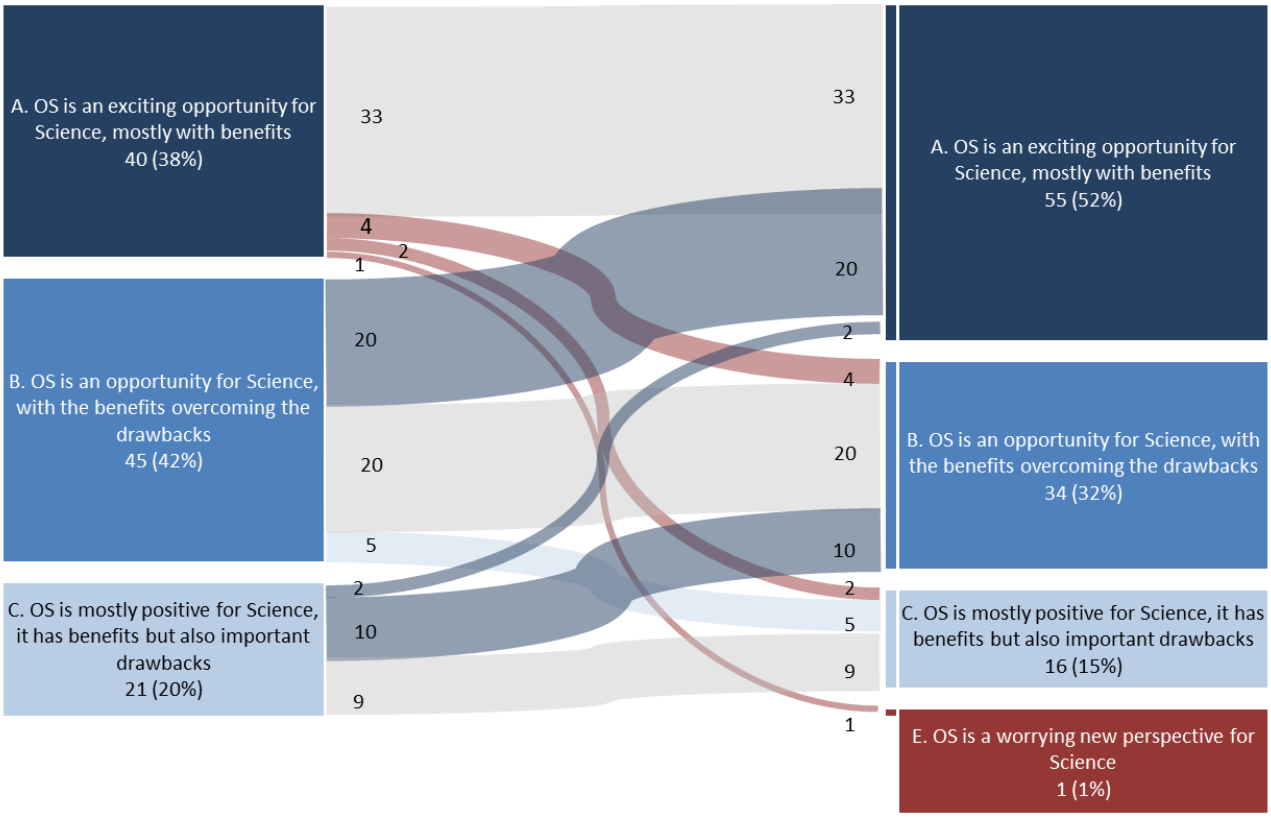
	workshops (n=38)	**MOOC (n=48)**	**TtT course (n=9)**
	After participating in this event, I have changed some of my previous ideas about Open Science (Annex II / Q4-item4)	After participating in this MOOC, I have changed some of my previous ideas about Open Science and its practice (Annex IV / Q6-item6)	After participating in this course, my view regarding Open Science and its practice is more positive (Annex VI / Q5-item7)
Strongly agree	**21.1%**	**43.8%**	**44.4%**
Agree	**36.8%**	**41.7%**	**22.2%**
Neutral	36.8%	12.5%	22.2%
Disagree	5.3%	2.1%	11.1%
Strongly disagree	0.0%	0.0%	0.0%

Table 9. Results according to participants' perception of change.

In this sense, it is worth highlighting what one of the ORION trainers mentioned regarding the opinions on Open Science (and shifts on it) of workshops attendees:

> "… ***people who come to them [the workshops] are already interest in Open Science*** *(…) I don't think there is an opposition to Open Science overall, but there are specific elements of Open science which certain individuals will be opposed to and* ***I don't know if they changed their mind but at least they're aware that there are other opinions out there*** *and that other people may see things differently*." (Trainer/Interviewed 1)

Participants were asked, both in the pre and in the post-questionnaires, about their view on Open Science[2], having to choose between different options ranging from the most positive one ("Open Science is an exciting opportunity for Science, mostly with benefits") to the most negative one ("Open Science is a real threat to Science"). When comparing the answers before and after the trainings (see Graph 16) and how they have evolved (matching each participant pre and post view), we find that most participants (62, i.e., 58.5%) do not change their initial view about OS (as indicated by the fluxes shown in light grey), and there are more positive changes (blue fluxes, corresponding to 32 respondents, i.e., 30.2%) than negative changes (red fluxes, corresponding to 12 respondents, i.e., 11.3%). Interestingly, the most negative view after the training was shown by a participant who initially had the most positive view, something that should be interpreted with caution.



Graph 16. Comparison of participants' views on Open Science before and after ORION trainings (global perspective) (n=106).

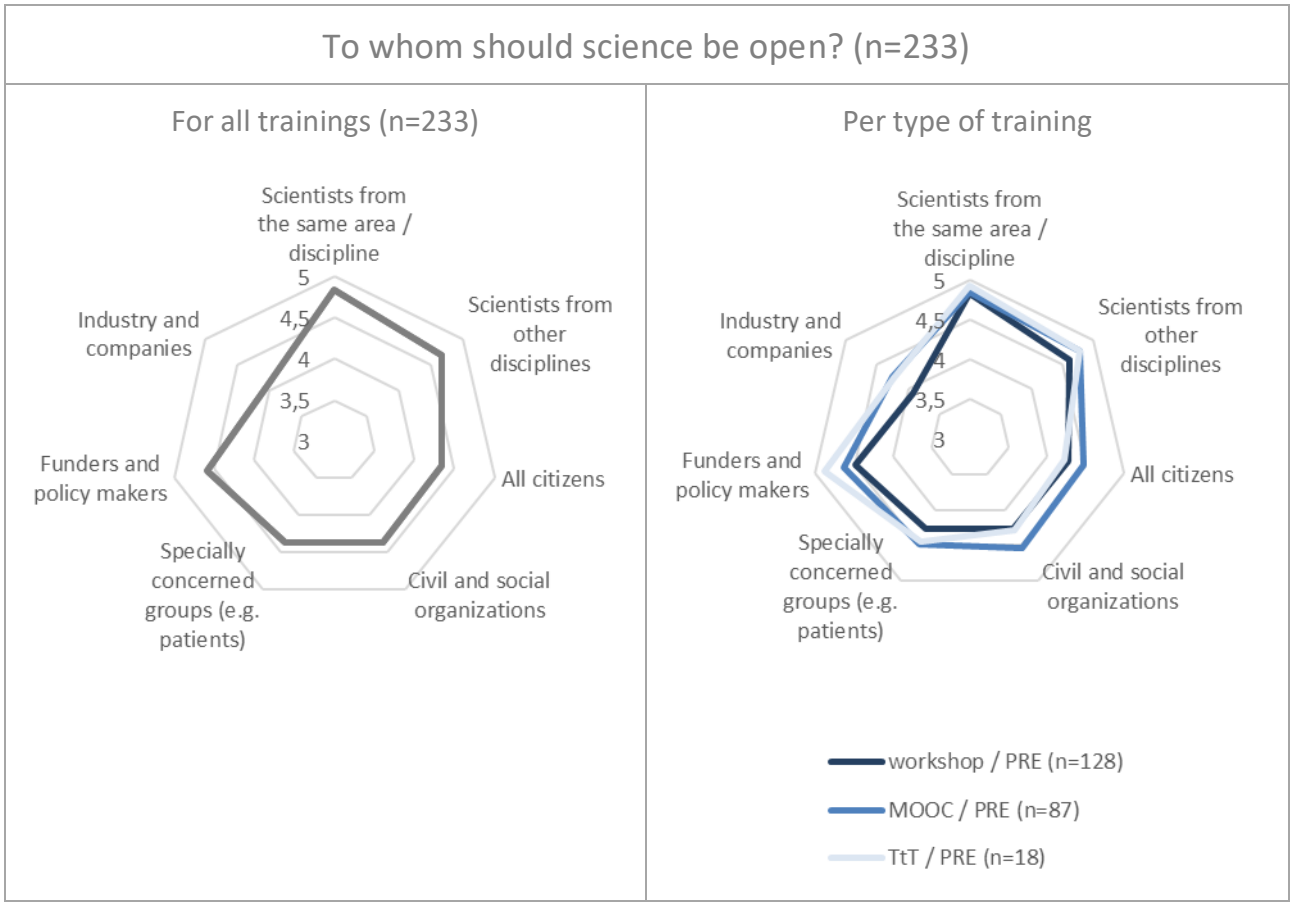
Overall, ORION training participants think that science should be very open to all stakeholders, but especially to those directly involved in scientific research: scientists from the same area/discipline, scientists from other disciplines as well as funders and policy makers

The idea behind the OS concept is that all aspects of scientific research should involve, at different levels, all the different relevant stakeholders. As such, one can have a positive

[2] Participants to the TtT course were only asked this in the questionnaire prior to the training.

general view regarding OS, but this is because they only have some particular stakeholders in mind. For instance, one can be very open to sharing data among scientists, but reluctant to do so with the general public. For this reason, training participants were asked, both before and after their participation in the ORION trainings[3], the following question: "*In your opinion, to whom should science be open?*", in which they had to mark not only to what stakeholders should science be open but in which degree to each of them. As such, answers could range from 1 ("should not be open") to 5 ("should be very open") for each of the following stakeholders: (i) scientists from the same area; (ii) scientists from other disciplines; (iii) all citizens; (iv) civil and social organizations; (v) specially concerned groups, (vi) funders and policy makers; and (vii) industry and companies.

Before attending the ORION trainings, **participants' views on this issue show an initial very open approach, specially towards scientists of the same area/discipline (mean value of 4.8 out of 5) and scientists from other disciplines (mean value of 4.7 out of 5). Openness of Science towards other stakeholders is also high**, with funders and policy makers (mean value of 4.6 out of 5); specially concerned groups as well as civil and social organizations (mean value 4.4 out of 5); and all citizens (mean value of 4.3 out of 5). The lower degree of openness corresponds to industry and companies (mean value 4.1 out of 5), despite still showing a high degree of openness (see Graph 17).

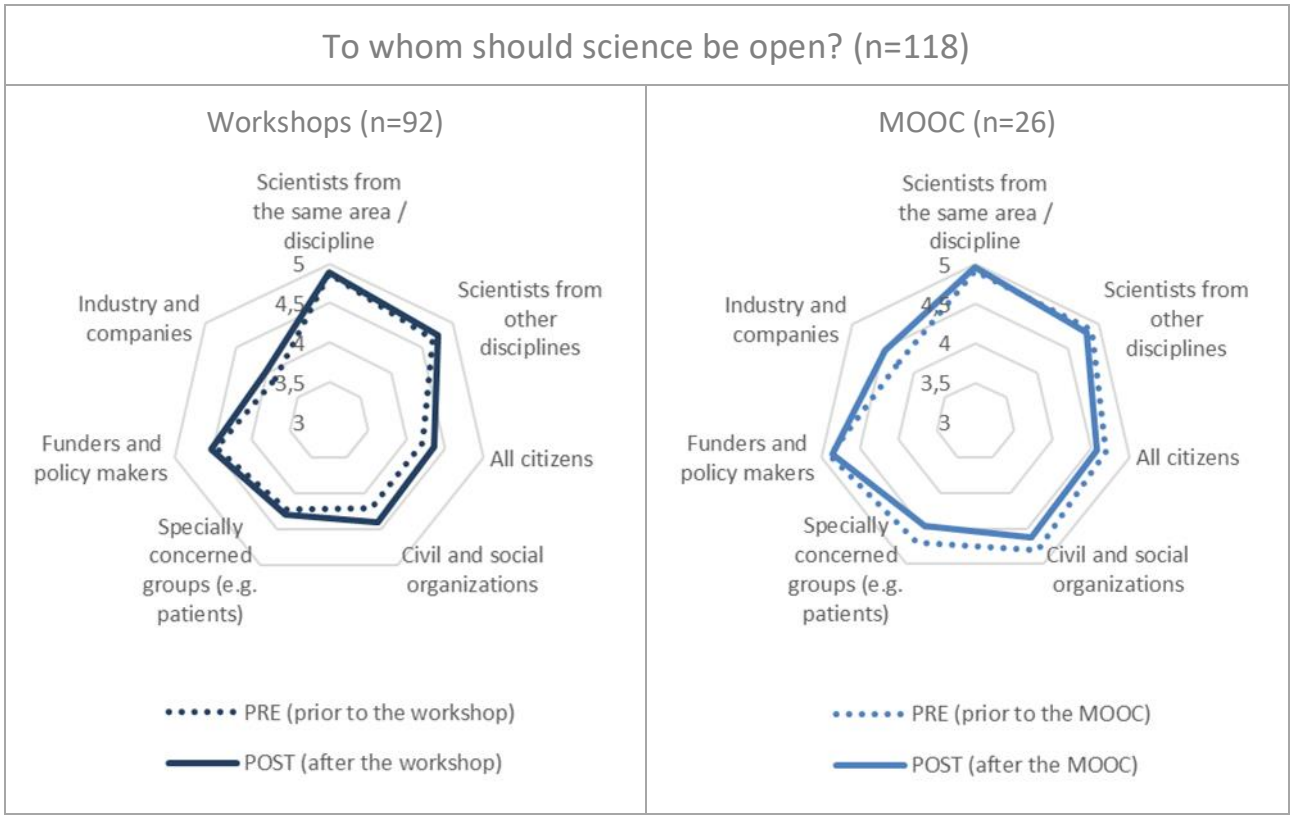


Graph 17. Participants' views on who Science should be open to (prior to the ORION trainings)

[3] Participants to the TtT course were only asked this in the questionnaire prior to the training.

After attending the ORION trainings participants do not significantly change their views regarding openness to different stakeholders

As previously mentioned, the question "*In your opinion, to whom should science be open?"* was asked before and after participants attended the ORION trainings (workshops and MOOC) to explore the possible impact of the training in the participants' views of OS. These views were compared, and the overall results show that **there is no significant change towards a greater openness to stakeholders after participating in the ORION trainings** (see Graph 18). This fact might not be surprising, since overall participants already held a very open view before attending the trainings. Despite this result does not imply that the ORION trainings have not had the desired impact, it raises concerns about the need to pilot it with training participants who have not such a good initial positioning regarding OS. Despite it is not easy to pin-point these participants, and even more difficult to convince them to take the course, the reality is that **more reluctant participants to OS would be necessary in order to assess the actual impact of OS trainings such as those of ORION in the future.**



Graph 18. Comparison of participants' views on who Science should be open to before and after the ORION trainings (n=118)

In addition, the result also shows that perhaps the interesting question in the context of ORION trainings is not to whom science should be open, in general, but to whom do you think you can open your actual science (a more personal and practical question). This

probably would have captured some of the changes at personal level in those attending participants who, as an idea or principle, consider science should be open to everyone but who have not done so yet and/or do not know how to do so beforehand. They need to maintain some questions equal in all ORION evaluation actions made us not to adapt some questions so much to the actual contexts and actions for allowing comparison, thus possibly losing these interesting nuances. However, as we have triangulated data with the interviews, we can see that **according to the trainers there is concrete evidence of positive impact of ORION training participants regarding their change in views about OS**, particularly about the potential to raise awareness towards OS.

> "***I've definitely seen several examples of you know 'aha moments'***, *lightbulb moments when people have had that realization on their own (…) we had a young man, a PhD student who said, 'oh yeah, actually I think I'm gonna [sic] put a preprint, I was worried about my work, getting scoped but that's silly' (...) and he clearly made that jump from 'I must keep everything secret' to 'actually the community can help me and this can be collaborative'."* (Trainer/Interviewed 1)

> "… ***It flips your mind to start seeing with Open Science, to start seeing things in a different way that you didn't see before****. At least to see them, this is the benefit and then it's up to each individual person what they are going to do or find more resources to be active (..)* ***I would say it's the change of the mindset, this is the major benefit****. Seeing and realizing ah, ok, this can be done in a different way (…) to be aware that it can be done in a different way*." (Trainer/Interviewed 2)

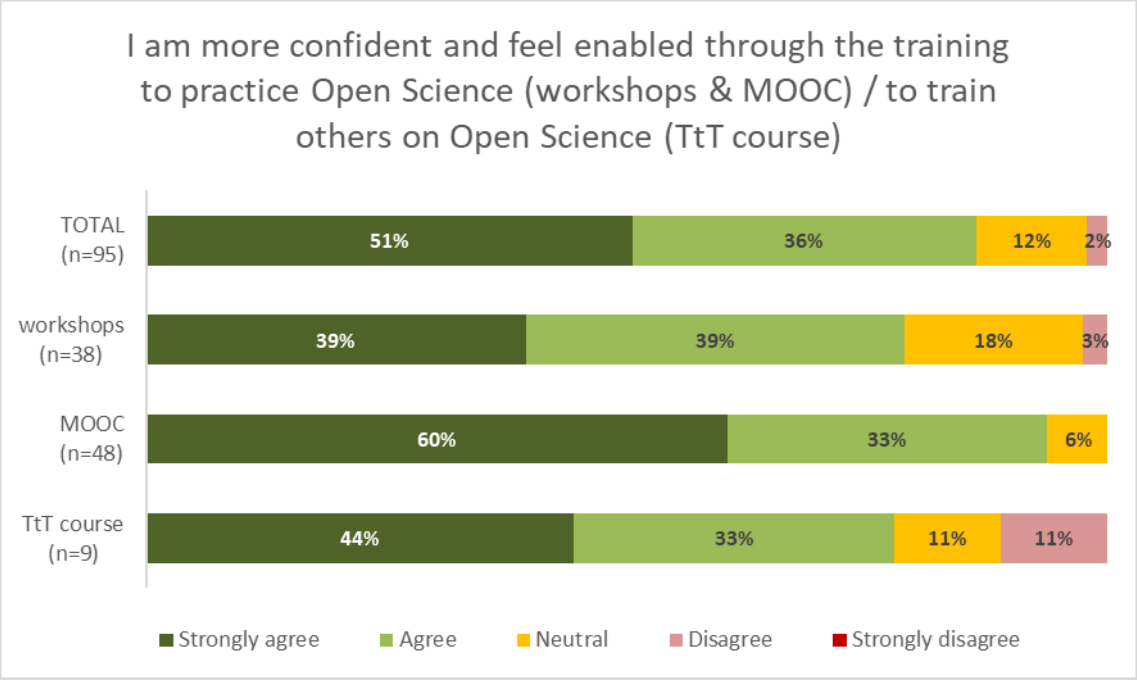
> "***I think though that if you keep, if you start putting these ideas into early career researchers, in about 5-6-7 years you do start to see a shift because they then become postdocs and PIs and so forth*** *(…) it takes time for people to feel comfortable and empowered enough, so I think realistically the training is gonna [sic] be a slow burning thing, but* ***I do believe that it will have an effect over time, and I think the TtT is a really good multiplier*** *(…)* ***I think it's a long term shift****, a long term change, but I think it's really important that we do that, we lay those, we plant those seeds, otherwise nothing is gonna [sic] happen*." (Trainer/Interviewed 1)

3.5. How do ORION training participants plan to act on Open Science? Impact in terms of disposition

- After participating in the ORION training activities, more than 85% of attendees feel more confident and enabled either to practice Open Science or to train others on it.
- Most participants of ORION trainings claim that they will use the information and materials presented in their everyday work/life.

Most participants agree that after the ORION trainings they feel more confident and enabled either to practice Open Science or to train others on it, and claim that they will use the information and materials presented in their everyday work/life

Questionnaires' responses show that, overall, **a majority of ORION training attendees agree or strongly agree (86.3%) with being more confident and feeling enabled through the trainings either to practice Open Science (in the case of the workshops and the MOOC) or to train others on Open Science (in the case of the TtT course).** Only a 11.6% of participants neither agree nor disagree with that statement, and two participants disagree (see Graph 19). Particularly, 60.4% of MOOC participants strongly agree with having more confidence to practice Open Science, compared to a 39.5% of workshops respondents.

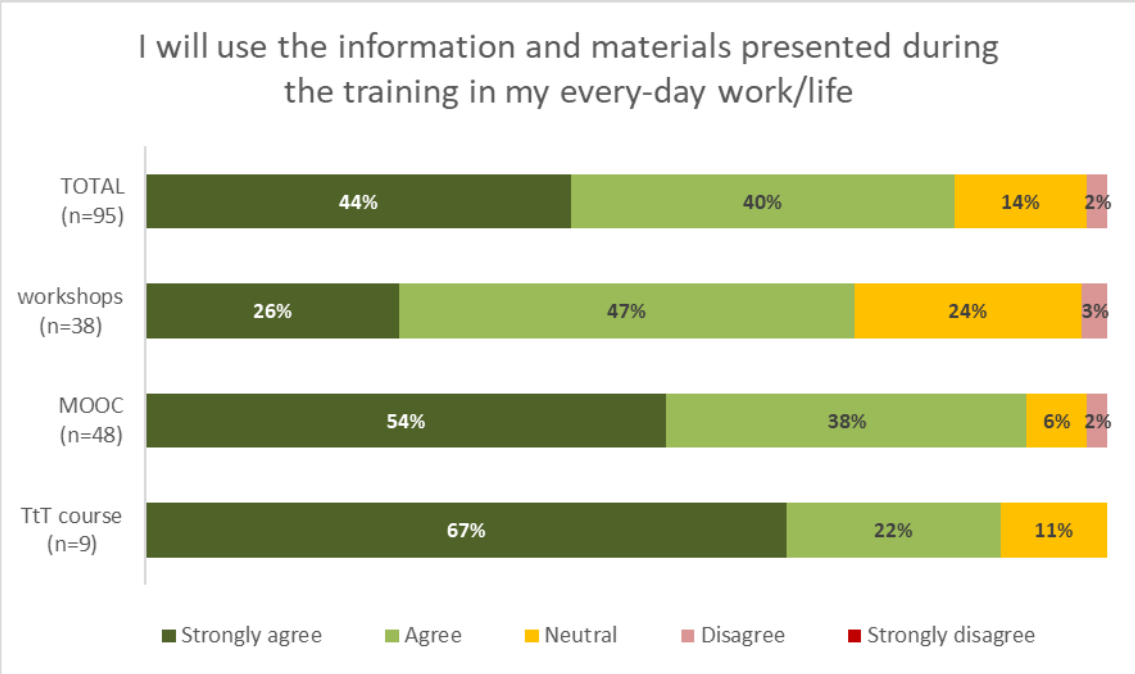


Graph 19. Participants' perception of self-confidence gained through the ORION trainings.

Most ORION training participants believe they will use, in their everyday work life, the information and materials presented during the trainings, since 84.2% of them either agree or strongly agree with that statement (see Graph 20).

When considering the specific answers for each type of trainings, the most favourable responses are found for the online courses, since 91.7% of MOOC attendees and 88.9% of participants to the TtT course think they will use the information and materials given, compared to 73.7% of workshops participants. Only 6.3% of MOOC attendees neither agree nor disagree with the statement (in contrast to the 23.7% of workshops participants).

The lowest proportion of participants who neither agree nor disagree with the statement is found in the case of the MOOC (6.3%), and it increased up to 11.1% for TtT course participants and to 23.7% for workshops participants.



Graph 20. Participants' perception of potential future use of information and materials provided through the ORION trainings.

It is worth mentioning that two of the participants to the TtT course who were interviewed stated that they were planning to give concrete trainings in their current institutions based on the ORION TtT course, that showing the usefulness of the course and the confidence it gave to them.

> *"We will do a course on publishing and one on data, but **we also have the idea to make a few courses about train-the-trainer**. So, that's, when the project is over, the idea is that people will still, that people from the project will have knowledge about training others"* (TtT Participant/Interviewed 6)

> "*…we'll have some very brief, sort of maybe 30 min lunch session on what is Open Science from a manager's perspective at the department, and we'll have some more targeted training on different parts of Open Science for our researchers. So,* ***we have planned to develop those and it's in our action plan****"* (TtT Participant/Interviewed 7)

These statements exemplify the "multiplying effect" pointed out by one of the ORION trainers (who was interviewed after the celebration of the workshops and before the TtT course) and also the need to target different profiles (researchers and managers) to combine bottom-up and top-down approaches for promoting OS and RRI principles.

> "*The role of trainers I think is quite important because it's a direct link between Open Science as a movement and actual implementation for researchers, research managers, in terms of tools and actions (…) which is why* ***we are doing a train-the-trainer next year because you know then you have more trainers to go out and it's a multiplying effect****"* (Trainer/Interviewed 1)

> "*But the problem is of course* ***we're only doing bottom up****. So, we're starting with the people probably with the least amount of power (in terms of researchers) and then asking them to make changes whether as you know, you also need to be getting heads of institutions, directors, PIs to be making these changes really."* (Trainer/Interviewed 1)

3.6. How to get the most from ORION trainings? Reflection perspective.

As we have seen in previous sections, overall, there was a high level of satisfaction with all the trainings, including the format, structure, materials and trainers. In spite of the high satisfaction, some interesting ideas were commented both by trainers and by participants when explicitly asked how they would improve the ORION trainings in the future, which are presented in this section.

Workshops

Attendance:

According to the experience from ORION trainers, the average attendance for a workshop should be around 12-15 people, since it is hard for larger groups to share ideas properly and have space to do activities effectively, while smaller groups do not have enough participants to learn from each other as well:

> "*I think when we started doing it we were sort of aiming for the high 20s in terms of attendance, so 20-30 people, we weren't getting that number and then it became (…) actually for the best, because we did have very high numbers of attendees in Barcelona for the PhD workshop, you had gone on to 25 and it actually didn't work totally well for the format that we'd developed because of the interactive nature (...) if you do that group of say 12 to 15 that works, if you do that group of 23 to 30, becomes completely unmanageable*" (Trainer/Interviewed 1)

Participation of senior researchers who have more decision power as well as people from companies/institutions who have tried to implement OS in their research (failure and success stories) were pointed as desirable by some participants:

> "*it would be great if people with more decision power could be made to participate as well. In addition, perhaps it would be of interest if we'd have gone through an example institute/business which employs open science and see what is done differently. An excursion to such a business/institute?*"

Depth:

Some people would have liked having more in-depth content about certain topics (e.g., pre-prints, opensource software, open access…), although some other participants pointed out that the workshops should be briefer. This highlights the **difficulty to find the right balance between depth and duration** which can be satisfactory for everyone.

Format:

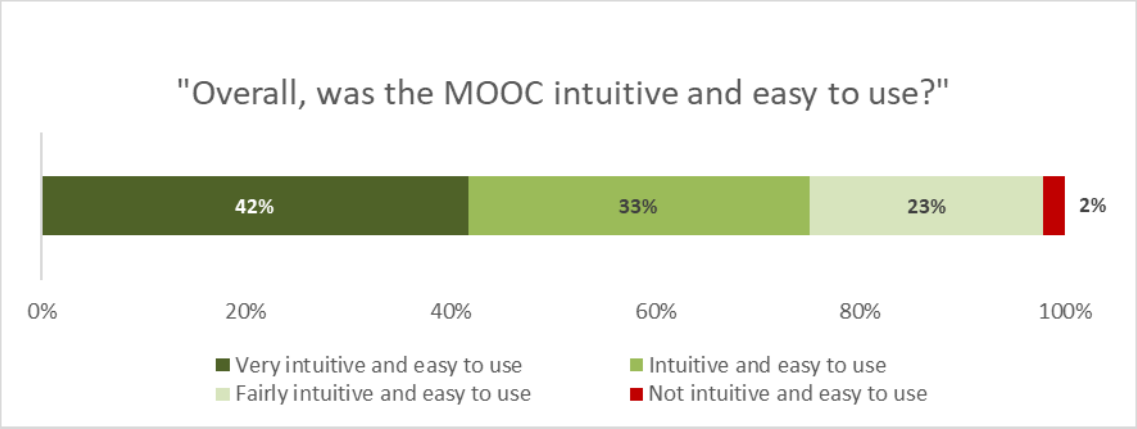
Sending some of the materials to registered participants prior to the event, so that people can look through them beforehand, was also recommended.

MOOC

User friendliness:

While most participants found that the MOOC was overall intuitive and easy to use (see Graph 21) and only 2.1% of them disagreed with the statement, there were some comments concerning potential ways to improve the user friendliness of the course:

> *"some presentations lack full screen view. It was difficult reading in small screens"*
>
> *"It wasn't always easy to see what tasks I had already completed"*
>
> *"Google slides doesn't work good, and the platform Open Learn is not very intuitive. But your contents are great!"*



Graph 21. Participants' views regarding the intuitive and easy-to-use nature of the MOOC (n=48).

Content:

The use of case studies, shorter videos and keeping information updated were some of the suggestions made by participants in terms of content:

> "*It would be very helpful to start with a case of study and develop all its stages as the course goes.*"
>
> "*One or two of the videos were far too long. Any videos beyond 10/15mins are going to lose my attention fast. Embed more of the questions within slides – these seemed to disappear from the later weeks' modules. I really liked your graphics and found them easy to follow.*"
>
> "*To keep the course references up-to-date. Now everything is up-to-date, with newish references. In the future some tools might disappear, and new ones will be introduced.*"

Target audience:

Since researchers and other non-scientists profiles working in research support might have different needs in Open Science trainings, adapting the MOOC to both publics, as suggested by one participant, could help to improve the matching between the training aims, objectives and methods to each type of trainee:

> "*I am not a scientist. I work in research support as a university librarian, so I found it difficult to complete most of the tasks, especially those that required a contribution to the forum.*"
>
> "*Maybe having slightly different versions of the MOOC aimed at academics and those who support academics (e.g., outreach and public engagement professionals).*"

Train-the-Trainer course

Final project

The group activity to prepare a presentation for the Open Science Café at Berlin Science Week was positively assessed by several participants. However, some of them also pointed out an issue with the difficulty to keep teams working together for the whole project ("*unreliable participation from students*"). In this sense, trying to find a way to assure the continuity of all members within the team was one of the main recommendations for this course:

> "*… I think it was great to have a project, that we had a goal for the end of the course, to make this presentation, but my team disappeared, and I ended up to be the only member of my team, because they dropped out of the course (…) a way*

to keep up with who is on what team, maybe every week (…) some regular way that to checking on team" (TtT Participant/Interviewed 6)

Duration

As already mentioned in section 3.2, some of the participants to the TtT course suggested extending it so that it was longer than 2 weeks:

> "*It could have been a bit longer, but really that is because I enjoyed it so much. I did the MOOC in 2019 and it was really, really great too.*"
>
> "*I suggest that it is a little longer to allow more time to work together on the group activity (…) I think also think that a couple of more sessions would had even more depth to this already fantastic course. when I compare to the MOOC there was a lot more course units and learning from the MOOC and I guess then I was expecting a few more Units. But saying this I was really happy with the course!*"

4. Summary and conclusions

The results of this final evaluation report refer to the evaluation of the ORION training activities organised within the WP4 of the ORION project. This includes:

- Training scientists and funding bodies in Open Science concepts and methods through face-to-face workshops and a Massive Open Online Course (MOOC) for the Life Sciences (Task 4.2).
    - Number of participants: 140 (face-to-face workshops) and 300+ (MOOC)
    - Number of respondents to pre-questionnaires: 129 (workshops) and 87 (MOOC)
    - Number of respondents to post-questionnaire: 99 (workshops) and 55 (MOOC)
    - Number of respondents to post-delayed questionnaires: 38 (workshops) and 48 (MOOC)
- Dissemination of ORION training to larger scientific and science funding communities through educational materials and a Train-the-Trainer program (Task 4.3).
    - Number of participants: 21 (14 completed the course)
    - Number of respondents to pre-questionnaire: 18
    - Number of respondents to post-questionnaire: 9

In the following, we will add the concluding remarks of this final evaluation report organised around the questions:

- Is ORION training adequate?
- Does ORION training have the expected impact?

In the next section we will also include main recommendations based on this evaluation, looking at the data from the standpoint of what can be learnt from the ORION training efforts for future training in OS.

Is ORION training adequate?

1. The satisfaction of participants towards ORION training actions are very high. **For all trainings, 9 out of 10 participants express that the training met their expectations, and they would recommend it to others**.

2. There are no significant differences between the evaluation results of the face-to-face and online trainings. As such, **the online formats prove to be adequate and are a desirable format for OS training**.

3. **High quality of content, interactive character of the trainings, innovative engagement methods, professional and knowledgeable trainers, and the friendly atmosphere** of the face-to-face events **were highlighted as the characteristics most valued by attendees of the ORION trainings**.

Does ORION training have the expected impact?

4. **The view on Open Science of those participating in the ORION trainings are already very positive before their participation in the ORION trainings.** 8 out of 10 of ORION training participants view Open Science either as an exciting opportunity for science, mostly with benefits or as an opportunity with benefits overcoming its drawbacks. This result signals that, as usual with volunteer training, ORION training is mostly "**preaching to the converted**".

5. **Most attendees of ORION trainings are researchers with early-stage professional experience in their Research or Funding Organisation**. Particularly, **PhD students were the main public attending the ORION face-to-face workshops and the MOOC** (those trainings which reached a larger audience, more than 400 people). As recognised by the ORION trainers, this implies that most of the trained people, despite introducing OS in their present research actions, will not have the power or resources to promote, in the near future, Open Science on an institutional level. However, they might promote changes as they advance in their future career and can undertake Open Science actions at more personal or local level at present. On the other hand, **management and administrative staff followed by senior researchers were the main profiles attending the Train-the-Trainer course** (which was completed by 14 participants), and these actors might have a larger influence and contribute to a higher degree to multiplying the effect of ORION trainings.

6. **The impact of ORION trainings in preparing participants to implement Open Science is very high in terms of knowledge acquisition**. 9 out of 10 participants state that after their training they have learnt valuable knowledge on Open Science. Particularly, some training participants mentioned having learnt about different aspects of Open Science, including its challenges, specific knowledge on Open Access and Open Data and, in the case of the Train-the-Trainer course, about methods and tools to run their own Open Science training in a way that is meaningful for their future audiences.

7. **Regarding impact on the vision of to which stakeholders science should be open to, ORION training participants show both initially and after the trainings the same openness pattern, which is similar to that already identified by the ORION benchmark effort** (See Deliverable D2.5 Analysis and Benchmarking: Self-Assessment). This pattern emphasises the openness to the scientific system (scientists in the same or different fields), and (to a lesser extent) to funding

organisations, special interest groups and the global citizenship, and recognises the need to openness to the industrial world.

8. **The impact of ORION training in preparing participants to take action is high**. 8 out 10 participants of ORION trainings feel more confident and enabled to do Open Science. A similar slightly lesser percentage state they will use information and materials from the ORION trainings in their future work life. It is noteworthy that some participants of the Train-the-Trainer course claimed they were planning to give specific trainings in their current institutions based on this ORION course, something which shows both **usefulness and the potential multiplying effect of ORION trainings.**

5. Main recommendations

From the conclusions of the previous section and the knowledge gathered through the ORION actions and professional exchanges, a series of recommendations can be made:

RECOMMENDATION NUMBER 1

Future Open Science trainings should maintain the quality in content, and the well proven formats, interactive teaching methods and professionality of the trainers of ORION trainings.

ORION training activities, both in the face-to-face and online formats, have demonstrated to be of high quality and should be carried out in the future. In the case of introducing changes, face-to-face trainings should maintain the interactive activities, give priority to networking among attendees and ensure a friendly/empathic atmosphere. New versions of the online training activities (MOOC and Train-the-Trainer) in a more self-paced format should maintain their essential characteristics, while adding in clearer guidance. The structure, content, methodology, interactive format and guiding/pedagogical principles behind all ORION trainings can be used by others as an inspiration for high-quality trainings, since the materials and activities created are all under a CC-BY license. Being aware of the rapid changes in the field, particularly regarding technical aspects, there is a need of continuous adaptation and other OS actors may continue to use and update the materials.

RECOMMENDATION NUMBER 2

Open Science trainings in the future needs to cover different levels and stages, from focusing on raising awareness about OS, to teaching general OS competence and covering a diversity of specific in-depth competences on different aspects of OS, in addition to a Train-the-Trainer branch.

Those participating in ORION trainings recognised the potential of a clear and structured training path in OS which allows participants to continue progressing their knowledge and competences in this field. A comprehensive training approach should start with an initial training phase focused on raising awareness and giving an introduction into OS for those that need it. Such a training could be inspired by the activities of the ORION workshops and MOOC and would benefit from the face-to-face nature which helps to identify personal barriers and to establish an emotional connection between participants and the subject. Moreover, this can also help participants to become aware of the benefits and the needs for OS for their career and for the scientific system. For those in need to go deeper as users and those that implement OS, the next steps in the training path should include training in more specific, in-depth skills in the different areas of OS, including Open

Access, Open and Research Data Management and Public Engagement, among others. This sort of general but more in-depth training could either be run face-to-face or through online formats and would require, as a pre-requisite, a basic knowledge of OS. For creating such trainings, the existing materials and training activities of the ORION MOOC would be very useful. Once an initial awareness and general knowledge phases of training is achieved, an array of extended, targeted training possibilities should be offered. This includes not only specific courses on OS but also embedding OS concepts and competences in existing scientific or technological courses. The focus of these training opportunities, either as OS specific courses or, more desirably, as other trainings in which OS is embedded, should be placed on gaining competence in particular areas or aspects of OS, in a way that enables trainees to apply this expert knowledge in their day-to-day practice. This could be organised as courses but also as mentoring or support programmes. In parallel, there needs to be a Train-the-Trainer branch addressing how to support others along their OS training path. The ORION Train-the-Trainer programme can be used as a paradigmatic example of how such a meta-level of training should look like.

RECOMMENDATION NUMBER 3

Variety of attendance could be improved in Open Science trainings by increasing visibility, adding flexibility, and exploring incentive programmes.

ORION training actions, both in face-to-face and online form (MOOC and Train-the-Trainer), have shown to be chosen by participants who are in the early stages of their careers and hold a very positive view of OS. In addition, they have mostly become aware of the trainings through other acquaintances and by personal invitations. Despite the existence of this specific profile of attendees does not underestimate the value of ORION training to these professionals as providers of knowledge and promoters of actions in OS, there is need to engage and address different professionals. In this sense, concrete actions to involve researchers and managers with a more reluctant view of OS and/or in upper stages of their career path (profiles such as consolidator / senior researchers and managers) should be undertaken. We consider that to attract this different people to OS trainings there is need to increasing visibility of the training actions, adding flexibility regarding training format and duration, and exploring the use of specific and innovative incentive measures. Different sorts of incentive formats should be piloted in the future. These should be addressed to the professional profiles less represented in the volunteer ORION trainings, such as consolidated / senior researchers and people poorly connected with existing OS actions.

RECOMMENDATION NUMBER 4

More training on Open Innovation that shows new models on how to involve the industrial and business sector in Open Science is needed.

There seems to be a well-identifiable "openness to stakeholders" pattern among professionals of Research Funding and Performing Organisations (RFPOs), in which first scientific and second social views of openness prevail. Although implementing OS principles towards the economic and business world is a complex and bidirectional process, expectations of increasing the openness of RFPOs towards industries and companies must take into consideration the fact that science openness to these stakeholders is perceived as less positive when compared to openness to other sectors. This is an important challenge, which needs more actions than training these stakeholders. However, training has to take into consideration that openness to this sector is missing both in the views of the training participants and in the content that it is provided. Different models of Open innovation that bring closer the public and private research field with the industrial and business sector should be included in future training programmes on OS.

RECOMMENDATION NUMBER 5

Support researchers and managers along the process towards Open Science, not only during but also after the OS trainings.

To promote actual change in RFPOs professionals' actions on OS, training is possibly a necessary but not sufficient action. A possible way of increasing the actual impact of ORION training would be the post-training guidance and review of Action Plans either as self-, co- or trainer-reviewed. If linked with the networking potential of ORION training, a community of interested professionals could be established that support each other in their OS efforts. To do so, self- and co-assessment guiding instruments in OS should be elaborated and provided to OS training participants along their OS training path.

RECOMMENDATION NUMBER 6

Ensure sustainability of training efforts by ensuring the development of a competent and empowered taskforce of OS trainers

The recommendations expressed before need a competent and empowered taskforce of professionals with enough competence and willpower regarding OS. Despite the Train-the-Trainer efforts can be used to initially train these professionals, we consider that more networking possibilities should be offered to them so that they can form a community of

activating agents in OS and benefit from the experience and work of others like them. As such, the train-the-trainer course could be used also as an initial meeting point for these professionals that could be extended after the course finishes. It could also be linked to some sort of association or networking platform that will help these trained OS activators to keep in touch.

RECOMMENDATION NUMBER 7

Evaluation of Open Science trainings is needed in order to continue assessing their impact and improving their quality.

Assessing the impact of OS training efforts is crucial in order to monitor what actions to focus on in the future. In order to do so, training efforts should include evaluation instruments such as those used in the ORION trainings, which go deeper than asking merely about the level of participants' satisfaction. By integrating training with evaluation, we would enter an evidence-based culture regarding OS actions that will ensure its present and future quality.

Annex I: Workshops questionnaire (pre-post)

Please, write your initials ONLY (Name/Surname)

Please, write YOUR Date of Birth

Q1 What do you understand by the term "Open Science"?

Q2 In your opinion, TO WHOM should science be open? From each item, rank it from 1 to 5 (1=should NOT be open, 5= should be very open)

	1	2	3	4	5
Open to scientists from the same area / discipline					
Open to scientists from other disciplines					
Open to all citizens					
Open to civil and social organizations					
Open to specially concerned groups (e.g. patients)					
Open to funders and policy makers					
Open to industry and companies					

Q3 In your opinion, why should science be open?

	Not a reason for Open Science	A relatively important reason	An important reason	The most important reason for Open Science	I don't' know it / I don't have enough information
Diversity (Incorporation of underrepresented groups in science)					
New and innovative economic possibilities (Crowdfunding, etc.)					
Efficiency (Sharing of data, procedures to optimize data)					
Equity (access for all regardless of economic capacity or institutional affiliation)					
Ethics (OS is aligned with principles for research integrity)					

Fairness (Science is often funded by society, so all results from the research should be available to society)					
Impact (To outperform traditional metrics for scientific impact)					
Rigour (Open Access, Open data and/or open replicability make science easier to review)					

Q4 Imagine in your daily work at your institution you decide to embrace (or you already have embraced) an Open Science perspective. What do you think (or know) are the most important barriers you will be facing?

	Very important barrier	Important barrier	Low barrier	Not a barrier at all	I don't know it / I don't have enough information
Lack of proper infrastructure					
Lack of clear steps to follow					
Authentic public engagement					
Budget and funding constraints					
Time constraints					
Fears and uncertainties for career development					

Q5 Overall, if you had to summarize your view on Open Science, what would you say?

☐ Open Science is an exciting opportunity for Science, mostly with benefits

☐ Open Science is an opportunity for Science, with the benefits overcoming the drawbacks

☐ Open Science is mostly positive for Science, it has benefits but also important drawbacks

☐ Open Science is an unimportant bureaucratic burden for Science

☐ Open Science is a worrying new perspective for Science

☐ Open Science is a real threat to Science

Q6 Your gender

☐ Female

☐ Male

☐ Others

Q7 Your professional experience in your current institution

☐ Less than 1 year

☐ 1 to 5 years

☐ More than 5 years

Q8 Type of institution you work in

☐ University

☐ Public/governmental

☐ Private/non-governmental

☐ Non-profit organisations

Q9 Your position in the institution you work:

☐ Profile A. Principal Investigators (PIs)

☐ Profile B. Senior researchers (staff scientists, etc.)

☐ Profile C. Postdocs

☐ Profile D. PhD students

☐ Profile E. Technicians

☐ Profile F. Staff at Core Facilities

☐ Profile G. Science communication / Outreach officers

☐ Profile H: Management and administrative staff

☐ Profile I: Funding programme manager

Annex II: Workshops questionnaire (post delayed)

Please, write your initials ONLY (Name/Surname)

Please, write YOUR Date of Birth

Q1 How did you become aware of this event?

☐ Via social media (Twitter, Facebook, etc.)
☐ By personal invitation (from my institution)
☐ A colleague / acquaintance informed me
☐ Via the ORION website
☐ From another website.
☐ Through other channels

Q2 WHY have you participated in this event?

Q3 Please, rate each session to the event, regarding how satisfied you are with it.

	Very much satisfied	Notably satisfied	Neutral	Slightly satisfied	Not at all satisfied
Welcome and introduction					
Information and content					
Interactive Activities					
Meet the experts					
Applying and finding an individual Open Science Action-Plan					
Overall learning atmosphere					

Q4 Please, rate the event according to the following statements.

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
I have learned valuable knowledge about Open Science					
The information and materials I gained are relevant and useful for me					

I will use the information and materials presented during the workshop in my every-day work/life					
After participating in this event, I have changed some of my previous ideas about Open Science					
I am more confident and feel enabled through the workshop to practice open science					
The workshop met my expectations					
The overall structure and length of the workshop was appropriate					
I would recommend the workshop to others					

Q5 Do you have any suggestion on how this event could be <u>IMPROVED</u> in the future?

Q6 Do you already participate in any Open Science activity/action? *(Collaborations across institutions and disciplines, dissemination to the public and outreach, dissemination to scientists, ethical aspects of science and research integrity, gender equality, Open Access publication, Open Data, Participation of the public or other stakeholders to your research, collaboration with industry, collaboration with funders, science education, etc.)*

☐ Yes

☐ No

Q7 If you have any comment about your participation in Open Science activities/actions, please add it here: *(not compulsory)*

Q8 Do you receive training from your institution related to Open Science? *(E.g Research and data management, Research integrity, Research publishing and dissemination, Collaborating and networking, Communicating science to the general public, Involving the general public in research, Evaluation of research projects and researchers, Assessment of the impact of initiatives in public, etc.)*

☐ Yes

☐ No

Q9 If you have any comment about the training you receive from your institution, please add it here: *(not compulsory)*

Q10 Do you receive support or incentives from your institution related to Open Science? *(Written guidelines, technical infrastructure, specialist support, financial support and rewards, career perspectives and recognition)*

☐ Yes
☐ No

If you have any comment about the support and incentives you receive from your institution, please add it here: *(not compulsory)*

Annex III: MOOC questionnaire (pre-post)

Q1. What do you understand by the term "Open Science"?

Q2. In your opinion, TO WHOM should science be opened? From each item, rank it from 1 to 5 (1=should NOT be opened, 5= should be very opened)

	1	2	3	4	5
Open to scientists from the same area / discipline					
Open to scientists from other disciplines					
Open to all citizens					
Open to civil and social organizations					
Open to specially concerned groups (e.g. patients)					
Open to funders and policy makers					
Open to industry and companies					

Q3. In your opinion, why should science be open?

	Not a reason for Open Science	A relatively important reason	An important reason	The most important reason for Open Science	I don't' know it / I don't have enough information
Diversity (Incorporation of underrepresented groups in science)					
New and innovative economic possibilities (Crowdfunding, etc.)					
Efficiency (Sharing of data, procedures to optimize science)					
Equity (access for all regardless of economic capacity or institutional affiliation)					
Ethics (OS is aligned with principles for research integrity)					
Fairness (Science is often funded by society, so all results from the research should be available to society)					

Impact (To outperform traditional metrics for scientific impact)					
Rigour (Open Access, Open data and/or open replicability make science easier to review)					

Others

Q4. Imagine in your daily work at your institution you decide to embrace (or you already have embraced) an Open Science perspective. What do you think (or know) are the most important barriers you will be facing?

	Very important barrier	Important barrier	Low barrier	Not a barrier at all	I don't know it / I don't have enough information
Lack of proper infrastructure					
Lack of clear steps to follow					
Authentic public engagement					
Budget and funding constraints					
Time constraints					
Fears and uncertainties for career development					

Other

Q5. Overall, if you had to summarize your view on Open Science, what would you say?

☐ Open Science is an exciting opportunity for Science, mostly with benefits
☐ Open Science is an opportunity for Science, with the benefits overcoming the drawbacks
☐ Open Science is mostly positive for Science, it has benefits but also important drawbacks
☐ Open Science is an unimportant bureaucratic burden for Science
☐ Open Science is a worrying new perspective for Science
☐ Open Science is a real threat to Science

Q6. Your gender

☐ Female
☐ Male
☐ Others

Q7. Your professional experience in your current institution

☐ Less than 1 year
☐ 1 to 5 years
☐ More than 5 years

Q8. Type of institution you work in

☐ University

☐ Public/governmental

☐ Private/non-governmental

☐ Non-profit organisations

Q9. Your position in the institution you work:

☐ Profile A. Principal Investigators (PIs)

☐ Profile B. Senior researchers (staff scientists, etc.)

☐ Profile C. Postdocs

☐ Profile D. PhD students

☐ Profile E. Technicians

☐ Profile F. Staff at Core Facilities

☐ Profile G. Science communication / Outreach officers

☐ Profile H: Management and administrative staff

☐ Profile I: Funding programme manager

Annex IV: MOOC questionnaire (post delayed)

Q1 How did you become aware of the ORION MOOC?

☐ Via social media
☐ By personal invitation (from my institution)
☐ A colleague / acquaintance informed me
☐ Via the ORION website
☐ From another website
☐Through other channels

Q2 What was your motivation for completing the ORION MOOC?

USER FRIENDLINESS

Q3 How was the overall flow of the MOOC, did each module and lesson section lead into each other clearly and did you feel well guided?

Q3.1 Flow

☐ Very good flow
☐ Good flow
☐ Poor flow
☐ Very poor flow
☐ I don't know

Q3.2 Guided

☐ Very well guided
☐ Well guided
☐ Poorly guided
☐ Very poorly guided
☐ Don't Know

Q3.3 Overall was the MOOC intuitive and easy to use?

☐ Very intuitive and easy to use
☐ Intuitive and easy to use
☐ Fairly intuitive and easy to use
☐ Not intuitive and easy to use
☐ Don't know

Q3.4 Do you have a comment or suggestion on the user friendliness? If so please comment here:

TECHNICAL FUNCTION

Q4.1 Did all the media and links function correctly?

☐ Media, links, wikis, forums etc. all functioned

☐ No, there were some technical flaws

Q4.2 Please give details of anything didn't work

VALUE AND RELEVANCE

Q5 Please rate each MOOC module, regarding how satisfied you are with it.

	Very satisfied	Satisfied	Neutral	Slightly satisfied	Not satisfied
Module 1: Publishing & Open Access - Part I					
Module 2: Publishing & Open Access - Part II					
Module 3: Research Data Management					
Module 5: Science Communication & Public Engagement					
Module 6: Reflection & Action					

Q6 Please rate the MOOC according to the following statements

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
I have learned valuable knowledge about Academic Publishing and peer review procedures					
I have learned valuable knowledge about Open Access (Preprints and Repositories and OA practices)					
I have learned valuable knowledge about Research Data Management					
I have learned valuable knowledge about FAIR and Open Data					
I have learned valuable knowledge about science communication and Public Engagement					

I have learned valuable knowledge about Citizen Science					
After participating in this MOOC, I have changed some of my previous ideas about Open Science and its practice					
I think the information and materials included in the MOOC are relevant and useful					
I think the course multimedia interactive activities were useful to understand the content and to follow the course					
I will use the information and materials presented during the MOOC in my every-day work/life					
I am more confident and feel enabled through the MOOC to practice Open Science					
The MOOC met my expectations					
The overall structure and length of the MOOC was appropriate					
I would recommend the MOOC to others					

Q7 Did you feel that there was content you wanted to learn about that was missing from any modules?

☐ Yes

☐ No

Q8 Please state which content you felt was missing below:

Q9 Was there any module or learning materials you particularly liked?

☐ Yes

☐ No

Q10 Could you please state what these were? e.g. flipcards, or RDM module

Q11 Do you have any suggestion on how this MOOC could be improved in the future?

OPEN SCIENCE EXPERIENCE

Q12 Do you already participate in any Open Science activity/action?

☐ Yes

☐ No

Q13 If you have any comments about your participation in Open Science activities/actions, please add them here:

Q14 Have you ever received (or are you currently receiving) Open Science training? (E.g. Research and data management, research integrity, research publishing and dissemination, collaborating and networking, communicating science to the general public, Involving the general public in research, RRI evaluation of research projects and researchers, assessment of the impact of initiatives in public, etc.)

☐ Yes

☐ No

Q15 If so, please tell us the institution or organisation which provided it:

Q16 If you have any comments about your participation in Open Science training, please add them here:

Q17 Have you received support or incentives from an institution related to Open Science?

☐ Yes

☐ No

Q18 If yes, please tell us the institution or organisation which provided it:

Q19 If you have any comments about your participation in Open Science training, please add them here:

Thank you for your time and thoughts!

Annex V: Train-the-Trainer course questionnaire (pre)

Please, write your initials ONLY (Name/Surname)

Please, write YOUR Date of Birth

Q1 How did you become aware of this Training Course?

☐ Via social media (Twitter, Facebook, etc.)
☐ By personal invitation (from my institution)
☐ A colleague / acquaintance informed me
☐ Via the ORION website
☐ From another website.
☐Through other channels

Q2 Why do you think there is a need to train people like you on how to train others to implement Open Science?

Q3 What do you expect from this program? What do you think this training course can be useful for?

Q4 What do you understand by the term "Open Science"?

Q5 In your opinion, science should be open TO WHOM? For each item, rank it from 1 to 5 (1=should NOT be open, 5= should be very open)

	1	2	3	4	5
Open to scientists from the same area / discipline					
Open to scientists from other disciplines					
Open to all citizens					
Open to civil and social organizations					
Open to specially concerned groups (e.g. patients)					
Open to funders and policy makers					
Open to industry and companies					

Q6 In your opinion, WHY should science be open?

	Not a reason for Open Science	A relatively important reason	An important reason	The most important reason for Open Science	I don't' know it / I don't have enough information
Diversity (Incorporation of underrepresented groups in science)					
New and innovative economic possibilities (crowdfunding, etc.)					
Efficiency (Sharing of data, procedures to optimize science)					
Equity (access for all regardless of economic capacity or institutional affiliation)					
Ethics (OS is aligned with principles for research integrity)					
Fairness (Science is often funded by society, so all results from the research should be available to society)					
Impact (To outperform traditional metrics for scientific impact)					
Rigour (Open Access, Open data and/or open replicability make science easier to review)					

OTHERS

Q7 Imagine in your daily work at your institution you decide to embrace (or you already have embraced) an Open Science perspective. What do you think (or know) are the most important barriers you will be facing?

	Very important barrier	Important barrier	Low barrier	Not a barrier at all	I don't know it / I don't have enough information
Lack of proper infrastructure					
Lack of clear steps to follow					
Authentic public engagement					
Budget and funding constraints					
Time constraints					
Fears and uncertainties for career development					

Q8 Overall, if you had to summarize your view on Open Science, what would you say?

☐Open Science is an exciting opportunity for Science, mostly with benefits
☐Open Science is an opportunity for Science, with the benefits overcoming the drawbacks
☐Open Science is mostly positive for Science, it has benefits but also important drawbacks
☐Open Science is an unimportant bureaucratic burden for Science
☐Open Science is a worrying new perspective for Science
☐Open Science is a real threat to Science

Q9 Your gender

☐Female
☐Male
☐Others

Q10 Your professional experience in your current institution

☐ Less than 1 year
☐ 1 to 5 years
☐ More than 5 years

Q11 Type of institution you work in

☐ University
☐ Public/governmental
☐ Private/non-governmental
☐ Non-profit organisations

Q12 Your position in the institution you work:

☐Profile A. Principal Investigators (PIs)
☐Profile B. Senior researchers (staff scientists, etc.)
☐Profile C. Postdocs
☐Profile D. PhD students
☐Profile E. Technicians
☐Profile F. Staff at Core Facilities
☐Profile G. Science communication / Outreach officers
☐Profile H: Management and administrative staff
☐Profile I: Funding programme manager

Annex VI: Train-the-Trainer course questionnaire (post)

Please, write your initials ONLY (Name/Surname)

Please, write YOUR Date of Birth

Please, indicate your position in the institution you work

- ☐Profile A. Principal Investigators (PIs)
- ☐Profile B. Senior researchers (staff scientists, etc.)
- ☐Profile C. Postdocs
- ☐Profile D. PhD students
- ☐Profile E. Technicians
- ☐Profile F. Staff at Core Facilities
- ☐Profile G. Science communication / Outreach officers
- ☐Profile H. Management and administrative staff
- ☐Profile I. Funding programme manager
- ☐OTHER_____

Q1 To which extent did the training course fulfil your initial expectations? Please, rate from 1 (very low) to 10 (very high).

1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 – 10

Q2 Which aspects of the course would you highlight as more positive? Please, describe them.

Q3 Which aspects of the course would you point as less positive? Please, describe them.

Q4 Please rate each part of the training course, regarding how satisfied you are with it.

	Very much satisfied	Notably satisfied	Neutral	Slightly satisfied	Not at all satisfied
Webinar 1 Activity 1: Card Game					
Webinar 1 Activity 2: Motivations and Challenges					
MOOC Module 1 (Theory)					
Content (e.g. videos, factsheets, articles)					
Individual Activities: Creating a Participant Profile, Getting Into Character, Challenges to Learning					
Group Activity: Wikipedia Content Digest					
External Activity: Unconscious Bias					
MOOC Module 2 (Methods)					
Content (e.g. videos, factsheets, articles)					
Individual Activities: Scenario Questions, Adapting to E-Learning					
Webinar 2: Pitch Activity					
Webinar 2: Troubleshooting					
Open Science Café at Berlin Science Week: Microtraining Activity					
Support Resources e.g. forum, drop-in sessions, webinars Q&As					

Q5 Please rate the training course according to how much you agree with the following statements.

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
I have learnt valuable knowledge about theory (adult learning theory, identifying audiences, defining learning objectives, selecting content) to train others on Open Science					
I have learnt valuable knowledge about formats and training methods to train others on Open Science					
I found the webinars useful for seeing online activities (e.g. mentimeter) in action and meeting fellow participants					
I think the information and materials provided in the course are relevant and useful for learning to be an OS trainer					

I will use the information and materials presented during the course in my every-day work/life					
Participating in the training program helped me to develop skills that can be useful in training others on Open Science					
After participating in this course, my view regarding Open Science and its practice is more positive					
I am more confident and feel enabled through the course to train others on Open Science					

Q6 Please rate the training course according to the following statements.

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
The overall structure of the course was appropriate.					
The length of the course was appropriate.					
The overall flow of the course was good.					
The guidance was good, the different parts of the course (webinars, modules, etc.) leading into each other clearly.					
Overall, the course was intuitive and easy to follow.					

Q7 Please rate how much you agree with the following statement:

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Overall, I would recommend the course to others					

Q8 Which part of the course or learning materials (activities, working documents, webinars, videos, factsheets...) did you particularly like?

Q9 Do you have any suggestions on how this course could be IMPROVED in the future? (Both in its content and format)

Q10 Please add any other comments you might wish.

Annex VII: Interview trainer

First block: Monitoring of action

- **Accessibility:** How were the countries and institutions where the trainings took place targeted? How were the training dates decided?

- **Scope and variety of participants:** What profile of people attended the trainings? Were all trainings targeted to researchers or were there trainings for funders or other actors?

- **Variety of participants / Sustainability:** Overall, how many people attended the trainings? Did the number of attendees meet your expectations?

- **Sustainability:** Which dissemination channels were used to publicize these events?

Second block: Design of face-to-face workshops

- **Starting point:** Tell me about your experience in organizing these trainings: Which trainings did you participate in and in which capacity? How was your participation organized?

  What expectations [objectives] did you have in relation to the organization of these workshops? Have these expectations been met?

  Did you have any fears or challenges that you expected to encounter?
  Possible sub questions depending on the respondent's answer: Have these materialized? If so, how have you coped with these?

- **Empowerment:** What do you think is the role of trainers like yourself in the organization of face-to-face trainings? What do you think a trainer need in terms of skills, to carry out a workshop like yours?

- **Benefits/potential:** What do you think are the main benefits related to the development of these trainings?

- **Drawbacks /difficulties**: What do you think are the main drawbacks related to the implementation of these trainings? Is there any aspect of the workshops that you think should be improved?

Third block: Impact of training on participants

- **Impact (Reaction):** Overall, did you notice any differences in participants' knowledge about Open Science before and after the workshop?
- **Impact (Reaction):** Overall, did you notice any differences in participants' opinions about Open Science before and after the workshop?

- **Impact (Action):** Do you think participants found the materials and information presented useful for their daily work life? If so, why?

- **Impact (Action):** Are you aware of any attendees that have tried Open Science activities on their everyday life, after participating in the workshop? If so, how?

- **(Burdens for Open Science):** What do you think are the major burdens researchers encounter in their everyday life, when trying to implement Open Science? Do you think participating in the workshops helps researchers overcome any potential burdens to implementing OS? If so, how?

Fourth block: Impact of training at project institution

- **Impact**: In your opinion, how necessary is to organize this face to face workshops in research institutions?

- **Impact:** In which ways can we make sure that these workshops are being organized in research institutions? Who are the main actors that we need to keep in mind in order to organize these trainings?

Impact: In what ways do you think these workshops will contribute to the implementation of OS in ORION institutions? How do you think they will contribute to the research community (overall)? To other communities?

Annex VIII: Interview training (workshop) participant

First block: Impact of training

- **Starting point:** Why did you attend the workshop? What attracted you to this particular event?
  Possible sub questions depending on the respondent's answer: Which were your expectations regarding this training?

- **Impact (Reaction):** What did you liked the most? What did you like the least about the workshop?
  Possible sub questions depending on the respondent's answer: Is there anything that you would change about the workshop?

- **Impact (Knowledge):** Do you think you have learned relevant information about Open Science, during this workshop?
  Possible sub questions depending on the respondent's answer: In your opinion, are the information and materials received during the workshop going to be useful in your everyday work life?

- **Impact (Disposition):** Are you planning to start acting in any particular aspect of OS in your daily life? Or have you?
  Possible sub questions depending on the respondent's answer: Which aspect? In which ways? Could you describe which factors would make you want to participate in similar events in the future?

Second block: Knowledge and opinions about Open Science

- **Knowledge** When had you heard about Open Science for the first time? In which context?
  Possible sub questions depending on the respondent's answer: Had you ever participated in any Open Science related activity before?

- **Knowledge:** Do you think researchers like yourself receive enough information about OS?

- **Barriers:** What are the main barriers you face (or you think you will face) as a researcher trying to implement Open Science in your everyday work life at the MDC?

- **Benefits/Potential:** And on the opposite side of the coin, what do you think are the potential benefits that Open Science can bring you?

- **Empowerment:** What do you think is the role of scientists like yourself in Open Science?

Third block: Open Science at their institution

- **Starting point (Actions/documentation):** What do you think is the starting point of your institution in Open Science?

Possible sub questions depending on the respondent's answer: Are there any actions organized (like this workshop)? What about the outreach? Are there any publications being promoted? Any documentation? Any plans promoted?

- **Starting point (perception)**
  OS could be perceived in different ways (excitement, indifference, worriedness, etc.) If you had to predict what would be the main view hold by researchers in your institution about Open Science, what would you say?
  Possible sub questions depending on the respondent's answer: Why do you think so? Do you have any evidence on this?

- **Institution culture:** Having taken all of this into account, do you think Open Science fits into the culture of your institution?
  Possible sub questions depending on the respondent's answer: Do you think these trainings fits the type of culture of your institution? What would be necessary for Open Science to become more part of the culture of your institution?

- **Next steps:** Are you aware of any future actions planned in your institution to promote OS?
  Possible sub questions depending on the respondent's answer: Is OS a desirable future for your institution?

Annex IX: Interview training (TtT course) participant

- **Starting point:** Why did you attend the online TtT course? What attracted you to this particular event? Was there anything in particular that you expected to learn?
  Possible sub questions depending on the respondent's answer: Had you previously attended toe ORION MOOC for Open Science in the Life Sciences?

- **Impact (Reaction):** What did you liked the most about the TtT course? What would you improve?

- **Impact (Knowledge):** Do you think you have learned relevant information about how to train others on Open Science, during this course?
  Possible sub questions depending on the respondent's answer: In your opinion, are the information and materials received during the online TtT course going to be useful in your everyday work life?

- **Impact (Disposition):** Are you planning to give any training on Open Science in your current institution? Or have you?
  Possible sub questions depending on the respondent's answer: Which aspect? In which ways? Is there any specific action you have in mind? Anything you learnt in the course that you will for sure apply?
  Could you describe/mention which factors would make you want to participate in similar events in the future?

Annex X: Consent form for trainers

CONSENT FORM to conduct interview on opinions about Open Science and experiences in the ORION Open Science training
Open Responsible research and Innovation to further Outstanding Knowledge (ORION)

You are being contacted as trainer on the ***ORION Open Science trainings***, within the ORION European research project about Open Science. This research project is being coordinated by Dr. Michela Bertero from the Centre for Genomic Regulation and funded by the European Commission. One of the main tasks to carry out in this project is to analyse the impact of the ORION Trainings and Open Experiments.
This interview will be an informal conversation about your opinion about Open Science and your experience participating in one of the ORION Open Science trainings. As such, it is not necessary that you prepare the interview beforehand, as we will be asking about your personal opinion about the mentioned topics. For the project research purposes, the conversation will be recorded and transcribed, always assuring confidentiality during all the process.
The information gathered will be used to analyse the design and impact the ORION Open Science trainings, as one of the activities of the project.
We want to highlight that all results from this process will be open to the public but totally anonymous (never giving personal or institutional names in public documents).

Please, check that you agree with the following statements:
1. I confirm that I have read and understand this consent form for a personal interview in the context of the ORION project
2. I agree for the data obtained in the above-mentioned interview to be used confidentially to analyse the impact of the ORION project.

_____ _____

Name of Member of the ORION project Name of the interviewee

Annex XI: Consent form for trainer participants

CONSENT FORM to conduct interview on opinions about Open Science and experiences in the ORION Open Science training
Open Responsible research and Innovation to further Outstanding Knowledge (ORION)

You are being contacted as participant on the ***ORION Open Science trainings***, within the ORION European research project about Open Science. This research project is being coordinated by Dr. Michela Bertero from the Centre for Genomic Regulation and funded by the European Commission. One of the main tasks to carry out in this project is to analyse the impact of the ORION Trainings and Open Experiments.
This interview will be an informal conversation about your opinion about Open Science and your experience participating in one of the ORION Open Science trainings. As such, it is not necessary that you prepare the interview beforehand, as we will be asking about your personal opinion about the mentioned topics. For the project research purposes, the conversation will be recorded and transcribed, always assuring confidentiality during all the process.
The information gathered will be used to analyse the impact the ORION Open Science trainings, as one of the activities of the project.
We want to highlight that all results from this process will be open to the public but totally anonymous (never giving personal or institutional names in public documents).

Please, check that you agree with the following statements:
1. I confirm that I have read and understand this consent form for a personal interview in the context of the ORION project
2. I agree for the data obtained in the above-mentioned interview to be used confidentially to analyse the impact of the ORION project.

_____	_____
Name of Member of the ORION project	Name of the interviewee

Annex XII: Consent form for questionnaire respondents

SURVEY/QUESTIONNAIRE
CONSENT FORM

I understand that I am being asked to participate in a survey/questionnaire activity that forms part of the Open Responsible research and Innovation to further Outstanding Knowledge (ORION) project.

The information gathered will be used to analyse the impact the ORION training activities (under Work Package 4).

We want to highlight that all results from this process will be open to the public but totally anonymous (never giving personal or institutional names in public documents).

Please, check that you agree with the following statements:

I confirm that I have read and understand this consent form to participate in a questionnaire/survey in the context of the ORION project.

2. I agree for the data obtained in the above-mentioned questionnaire to be used confidentially to analyse the impact of the ORION project.

Signed ……. Dated.....