SOPs4RI

D4.6: Fourth version of SOPs and guidelines

Authors: Noémie Aubert Bonn, Joeri Tijdink, Krishma Labib, Panagiotis Kavouras, Daniel Pizzolato, Abigeil Reid, Teodora Konach

Reviewer: Nick Allum, Mads S. Sørensen, Niels Mejlgaard
Editor: Joeri Tijdink

Project title: Standard Operating Procedures for Research Integrity
Project acronym: SOPs4RI
Grant Agreement no.: 824481
Lead contractor for this deliverable: Amsterdam University Medical Center

The project leading to this application has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 824481.

Project full title

“Standard Operating Procedures for Research Integrity”

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Grant Agreement no.

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Editors:	Joeri Tijdink
Version:	2.0
Dissemination level[1]:	PU
Authors:	Noémie Aubert Bonn, Joeri Tijdink, Krishma Labib, Panagiotis Kavouras, Daniel Pizzolato, Abigail Reid, Teodora Konach
Reviewer:	Nick Allum, Mads P. Sørensen, Niels Mejlgaard
Due date of deliverable:	October 31st, 2021
Actual submission date:	October 30th, 2021
Start date of project:	January 1st, 2019
Duration:	48 months
Organisation name of lead contractor for this deliverable:	AmsterdamUMC, location VUmc

[1]This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 824481

PU – Public; PP – Restricted to other programme participants (including the Commission Services); RE – Restricted to a group specified by the consortium (including the Commission Services); CO – Confidential, only for members of the consortium (including the Commission Services).

Document metadata

Version	*Date*	*Modification reason*	*Modified by*
0.1	07-9-2021	First draft	Noémie Aubert Bonn, Joeri Tijdink
0.2	7-10-2021	Second draft	Noémie Aubert Bonn, Joeri Tijdink, Krishma Labib, Daniel Pizzolato, Panagiotis Kavouras, Teodora Konach
0.3	27-10-2021	Third draft	Noémie Aubert Bonn, Joeri Tijdink, Krishma Labib, Panagiotis Kavouras, Daniel Pizzolato, Abigail Reid, Teodora Konach
0.4			
1.0			

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1. Introduction

1.1. Abbreviations

ECoC – European code of conduct

FG – Focus group

QRP – Questionable research practice

RFO – Research funding organisation

RE – Research ethics

RI – Research integrity

RIPP – Research integrity promotion plan

RM – Research misconduct

RPO – Research performing organisation

SOP – Standard operating procedure

SoRs – Set of recommendations

GRWG – Guideline revision Working Group

1.2. Terminology

Code: a document guiding the members of an organisation on ethical standards and how to achieve them. Ethics/integrity codes are formal documents sending a message about moral standards guiding professional behaviour by providing principles, values, standards, or rules of behaviour.

Guideline: a statement of principles or issues to consider when performing a task, aimed to guide courses of action. Guidelines give direction and help users make decisions. They are often created based on the consensus of experts after detailed evaluation and assessment of available evidence. They may include checklists.

Standard Operating Procedure (SOP): a detailed, written instruction, aimed to achieve uniform action step-by-step. SOPs prescribe specific actions; they make it easier for users to

make decisions. They may come in the shape of a 'decision-tree'/flow-diagram, similar to what is referred to as a practical decision making in clinical contexts.

Toolbox: a structured collection of easy-to-use tools (SOPs and guidelines) that RPOs and RFOs can use when developing their own Research Integrity Promotion Plans.

Research Integrity Promotion Plan (RIPP): a document describing how a specific institution will ensure, foster and promote responsible research practices, avoid detrimental practices, and handle misconduct. RPOs and RFOs should form their own RIPPs and consider disciplinary, organisational and national differences.

Set of Recommendations (SoRs): list of recommendations for a subtopic that has been extracted from the documents that were provided by WP3. The teams will make the set per subtopic by discussing the documents and formulate practical and concrete recommendations.

Inspirations: main input of the Co-creation Workshops. It is created per subtopic and represents the Set of Recommendations in a visual manner. Inspirations are necessary for the methodology of the co-creation workshops.

Skeleton Guidelines: main output of the co-creation workshop. Skeleton guidelines are preliminary guidelines for each of the six topics/21 sub-topics addressed in the co-creation workshops. There are two versions of each skeleton guideline. Version 1 is a first rough version of the guideline based on the discussion in the first set of co-creation workshops. Version 2 is a more complete version refined with the feedback gathered during the second set of workshops. These guidelines aim to be as concrete and as practical as possible but will be further harmonized and refined with future steps of the SOPs4RI project, particularly in WP6.

Guideline Revision Working Group: Group put together to undertake revisions of the Skeleton Guidelines V2. The revision process and specific group composition is described in section 3.2.

1.3. About SOPs4RI

The project Standard Operating Procedures for Research Integrity (SOPs4RI) aims to contribute to the promotion of good research practices and a strong research integrity culture aligned with the principles and norms of the European Code of Conduct for Research Integrity. The overall objective is to create a toolbox to support and guide research performing organisations (RPOs) and research funding organisations (RFOs) in fostering

research integrity and consequently preventing, detecting and handling research misconduct. The project focuses on providing Standard Operating Procedures (SOPs) and guidelines that enable RPOs and RFOs to create and implement Research Integrity Promotion Plans (RIPPs). SOPs4RI will thus stimulate European organisations involved in performing and funding research to foster responsible conduct of research by organizational measures and policies. SOPs4RI takes a mixed-method, co-creative approach to the identification, development and empirical validation of SOPs and guidelines.

The expected end-users of the tools provided by SOPs4RI are decision makers within RPOs and RFOs, e.g. university senior management (vice chancellors, deans, heads of administration), university academic councils, boards and directors of funding agencies, and their extended administrations. The identification and development of SOPs and guidelines will take national, epistemic, and organisational differences into account, and the final toolbox will enable RFOs and RPOs to create Research Integrity Promotion Plans in accordance with the needs of their organisation.

1.4. About WP4

Work Package 4 (WP4) serves as the backbone of SOPs4RI. WP4 creates, improves, sharpens and finalizes the content of the toolbox with SOPs and guidelines designed to support RPOs and RFOs.

WP4 builds on the empirical work of WP3. It used the inputs from the literature review, expert interviews and Delphi procedure to identify the needs of RPOs and RFOs in terms of topics to be covered in the toolbox. The first version of the toolbox with the SOPs and guidelines, version 1.0, was used in the focus group interviews (WP5). With the feedback from the focus groups (researchers, research integrity officers, policy makers, funding agency officers, etc.) the second version of the toolbox (version 2.0) was created. Using the sets of recommendation, co-creation workshops with stakeholders, and development of a repository of relevant resources, this current version (version 3.0) proposes preliminary guidelines for RPOs and RFOs.

Selected portions of Version 3.0 of the toolbox with SOPs and guidelines were then tested in an international survey (WP6) among researchers. The survey checked and evaluated the content of the toolbox and created further knowledge on national and organisational differences in research integrity procedures and practices. The survey helps to identify barriers to implementation of the toolbox and enables us to make a cost-benefit analysis (CBA) to assess likely costs and benefits related to specific SOPs and guidelines. In the next

steps of the project, version 4.0 of the toolbox will be piloted in a sample of RPOs and RFOs in WP7.

At the end of the project, the final output of WP4 will be a ready-to-use toolbox with SOPs and guidelines for RPOs and RFOs (version 5.0).

The following components are part of WP4:

- Creating the first, second, third, fourth and fifth version of the SOPs and guidelines to be included in the toolbox.
- Conducting and reporting the co-creation workshops.
- Continuous communication and consultation with WP1 (coordination) and partners in SOPs4RI.

1.5. About this deliverable

Deliverable 4.6 provides the fourth version of the toolbox with SOPs and guidelines. It highlights several activities that have taken place in WP4 to contribute to the formation of the next version of the toolbox. These activities include:

- The revision and finalisation of co-created guidelines for RFOs and RPOs
- The continued progress in populating the toolbox with high-quality tools
- The preliminary findings from a broad scale survey with researchers to inform the co-created guidelines for RFOs and RPOs

2. Fourth version of the toolbox with SOPs and guidelines

2.1. Introduction of WP4

WP4 creates the new versions of the SOPs and guidelines after every empirical step (reviews, Delphi, interviews, focus groups, survey and pilot testing). Furthermore, it creates content for the SOPs and guidelines by conducting the co-creation workshops and it is interacting with the other WPs throughout the project.

WP4 will frequently seek advice from the Executive Board and the Advisory Board to steer the process of forming and testing the SOPs and guidelines.

WP4 bridges the empirical phases of the project and structures the content and form of the SOPs and guidelines that is going to be created. The aim is to identify existing, draft new,

test, improve, and finalize the SOPs and guidelines that together will form the toolbox for Research Integrity Promotion Plans for RPOs and RFOs.

2.2. Work package 4 objectives

The main aim:

To identify existing, draft new, test, improve, and finalize the SOPs and guidelines for the toolbox with input from the literature review, interviews, Delphi procedure (WP3), focus groups (WP5), survey (WP6) and pilot testing (WP7).

To achieve this, the following objectives have been formulated:

1. To develop a toolbox with research integrity SOPs and guidelines for RPOs and RFOs, which reflect the principles and norms of the European Code of Conduct for Research Integrity (ALLEA 2017).
2. To streamline the process of all the steps in the project (in close collaboration with WP1) within the 4 years of the project with the ultimate goal to deliver the toolbox.
3. To work with SOPs and guideline experts to construct specific SOPs and guidelines.
4. To ensure that the principles and norms of the European Code of Conduct for Research Integrity (ALLEA 2017) are translated into the drafts and final version of the toolbox.
5. To organise co-creation workshops with diverse stakeholders and incorporate their thoughts and ideas in the toolbox.
6. To help WP6 to validate and implement a procedure for a CBA (Cost Benefit Analysis) of the implementation of SOPs and guidelines.
7. To create the first, second, third, fourth and fifth version of the toolbox.

The objectives of D4.6 are to develop the fourth version of the toolbox. This version of the toolbox integrates the knowledge gathered from intensive guideline revision processes, the implementation of the quality assessment system for inclusion of research integrity tools in the final toolbox, and the integration of survey results in informing the co-created SOPs4RI guidelines. More specifically, this deliverable refines the set of guidelines that were presented in D4.5 and D4.4 and explains how the toolbox continues to be populated before the launch of the pilot study (WP7) in November 2021.

2.3. Descriptions of the topics for RPOs and RFOs

As previously described in D4.2, the Delphi study, interviews and the scoping review guided the establishment of the prioritized list of the topics for RPOs and RFOs. In the two tables below the prioritized list of topics can be found. In total, 9 topics were developed for RPOs

and 11 for RFOs (see Table 1 and Table 2 below). Each topic also contains subtopics. This selection was done based on the consensus results and arguments from the Delphi and through discussion with the AB and Work Package leaders. In this selection process, we took feasibility and practical issues into account. Hence, some topics and subtopics may need a new SOP or guideline, while others already have many good examples.

2.3.1. Descriptions of the 9 topics for RPOs (from D4.2)

Rank	Topic	Subtopics
1	Research Integrity Training	a. pre-doctorate b. post-doctorate c. training of RI personnel & teachers d. RI counselling and advice
2	Supervision and mentoring	a. PhD guidelines b. supervision requirements & guidelines c. building and leading an effective team
3	Dealing with breaches of research integrity	a. RI bodies in the organization b. protection of whistleblowers c. protection of those accused of misconduct d. procedures for investigating allegations e. sanctions f. other actions (including mobility issues)
4	Research ethics structures	a. set-up and tasks of ethics committees b. ethics review procedures
5	Data practices and management	a. guidance and support b. secure data storage infrastructure c. FAIR principles
6	Declaration of interests	a. in peer review b. in the conduct of research c. in appointments and promotions d. in research evaluations e. in consultancy
7	Research environment	a. fair procedures for appointments, promotions and numeration b. adequate education and skills training c. culture building d. managing competition & publication pressure e. conflict management

		f. diversity issues g. supporting a responsible research process (transparency, quality assurance, requirements)
8	Publication and communication	a. publication statement b. authorship c. open science d. use of reporting guidelines e. peer review f. predatory publishing g. communicating with the public
9	Research collaboration	a. among RPOs inside/outside the EU b. with countries with different R&D infrastructures c. between public and private RPOs

Table 1: Ranked list of topics for RPOs after Taskforce Meeting in Vienna 13 Dec 2019. After this meeting, we have made small iterations on the names of the topics with the aim to increase usefulness and improve clarity.

2.3.2. Descriptions of the 6 topics for the RFOs

Rank	Topic	Subtopic
1	Compliance with RI standards by applicants	a. research ethics requirements b. ethics reporting requirements c. RI plan d. plagiarism
2	Funders' expectations of RPOs	a. Codes of Conduct b. assessment of researchers c. education and training for RI d. processes for investigating allegations of research misconduct e. expectations on collaborative research f. research that is co-financed by multiple funders g. RI bodies in the organization
3	Criteria and processes for assessing grant applications	a. methodological requirements b. diversity issues
4	Declaration of interests	a. among review committee members b. among reviewers c. among staff members d. What counts as an unjustifiable interference? e. preventing unjustifiable interference by the funder

		f. preventing unjustifiable interference by political or other external influences g. preventing unjustifiable interference by commercial influences
5	Monitoring funded grants	a. financial monitoring b. monitoring of execution of research grant c. monitoring of compliance with RI requirements d. publication requirements e. expectations on authorship f. open science (open access, open data, transparency)
6	Dealing with internal breaches of research integrity	a. procedures for breaches by funded researchers b. by review committee members c. by reviewers d. by staff members e. protection of whistleblowers and the accused f. sanctions/other actions g. communication with the public in case of breaches

Table 2: List of topics and subtopics for RFOs

2.4. Evolution of the 9 topics for RPOs. Graphical illustrations of how the topics for the RPOs relate to each other

In earlier deliverables from WP4 (D4.1-D4.3), we already highlighted the evolution of the topics for the RPOs. This work resulted in a 2-pager where we describe the 9 topics in more detail. You can find this 2-pager on the SOPs4RI website (www.sops4RI.eu). Below we give you the overview of the 9 topics and how they relate to each other.

	Topic	Examples
Prioritizing people and enhancing capabilities	**Research environment**	Responsible procedures for assessing researchers; Managing competition and publication pressure
	Supervision and mentoring	Guidelines for PhD supervision; Setting up mentoring schemes

	Research integrity training	Research integrity training for junior and senior researchers; research integrity counselling
Building research integrity into organizational structure	**Research ethics structures**	Setting up ethics committees; Ethics review procedures
	Dealing with breaches of research integrity	Protection of whistle-blowers and researchers accused of misconduct; Procedures for investigating allegations
	Data practices and management	Guidance, training and infrastructure for data management; Implementing the FAIR principles
Ensuring clarity and transparency	**Research collaboration**	Guidance for collaboration with institutions in countries with different R&D systems; University-Industry collaboration
	Declaration of interests	Declaration of interests in research conduct, peer review, research evaluation, appointments, promotions and consultancy
	Publication and communication	Guidelines for authorship; Procedures for open science and communication with the public

Table 3. Overview of 9 RI-topics for RPOs that correspond with the EcoC and shows us how they relate to each other

2.5. Evolution of the initial 11 RFO-topics towards 6 main topics for RFO.

Initially, the RFO-topics contained 11 topics, which were later merged into 6 RFO topics. In the evolution of the topics for RFOs, we took the results of the Delphi study as a starting point. These 11 topics were later refined and explored through the focus group study and the other empirical elements in the project. To further develop this list of topics, we set up a taskforce. In the taskforce, we described the 11 topics in more detail and examined how they relate to each other. In the empirical studies in the project (cf. Delhi study, focus group study, and co-creation workshops), different stakeholders had expressed concern that a list with 11 topics would make the responsibility for RFOs unnecessary complex.

With this in mind, the taskforce started a merging process, to see if the list could be reduced. The result is a list of 6 topics (see figure 1). The rationale for the merging and reduction process is, first, that several topics already are well covered by the responsibilities of RPOs

and also giving the RFOs the responsibility for these topics would make things too complex and cause too much administrative burden. Thus, the taskforce decided that these responsibilities should be part of the overall expectations to RPOs, which RFOs could have (such as dealing with breaches of RI, collaboration, implementing RI policy and Intellectual property issues; see Figure 1). Second, there was a significant overlap of the 11 topics and some of them could be merged. This also helped to make it clear what the RFOs core responsibilities are. One example was that conflicts of interest and independence have similar goals, namely making research as independent as possible. Therefore, it was specified that when research is influenced by external factors, there must be policies in place on how to deal with these influences. Third, we also wanted to include the most important elements in the toolbox for RFOs. To this aim, we used the ranking exercises from the empirical work to make an evidence based decision on which topics are essential in the RFO toolbox. In Figure 1, we show how we grouped the 11 topics under 6 overarching themes.

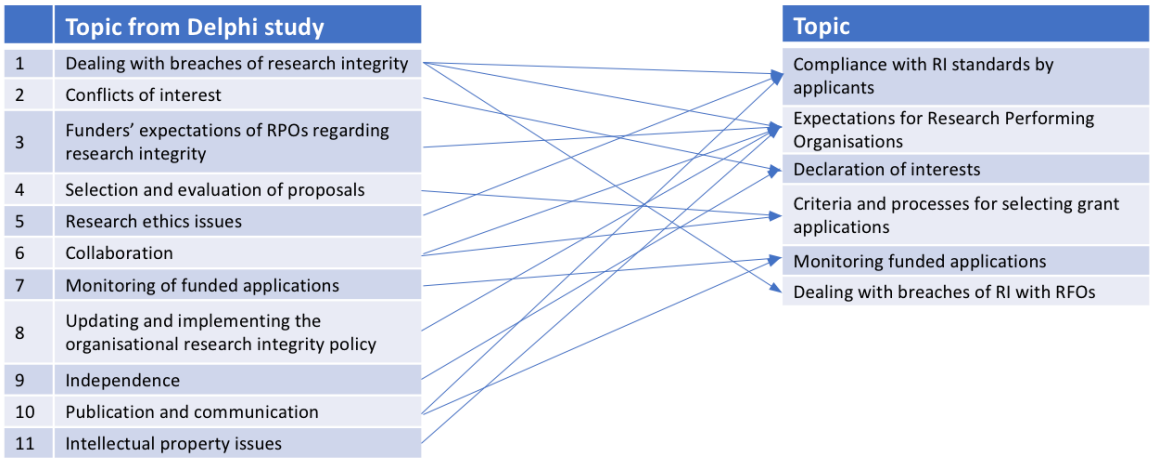


Figure 1. Overview how the 11 topics are distributed among the 6 final topics.

How the 6 final topics relate to each other is sketched in Figure 2. What you can see there is that there are 3 overarching RFO duties. Duty 1 is communicating their expectations related to RI towards RPOs and applicants; duty 2 is being transparent about how they evaluate applications on RI criteria and assure that potential competing interests are reported; and duty 3 is to have an internal structure organised in an RFO that can safeguard RI in relation to staff members, committees and reviewers. These three duties are further delineated in two main categories of (1) external expectations and (2) internal procedures in the online toolbox (see Figure 3). The work on the RFO-topics has resulted in a 2-pager where we describe the final set of topics in more detail. This 2-pager is placed on our website (www.sops4ri.eu).

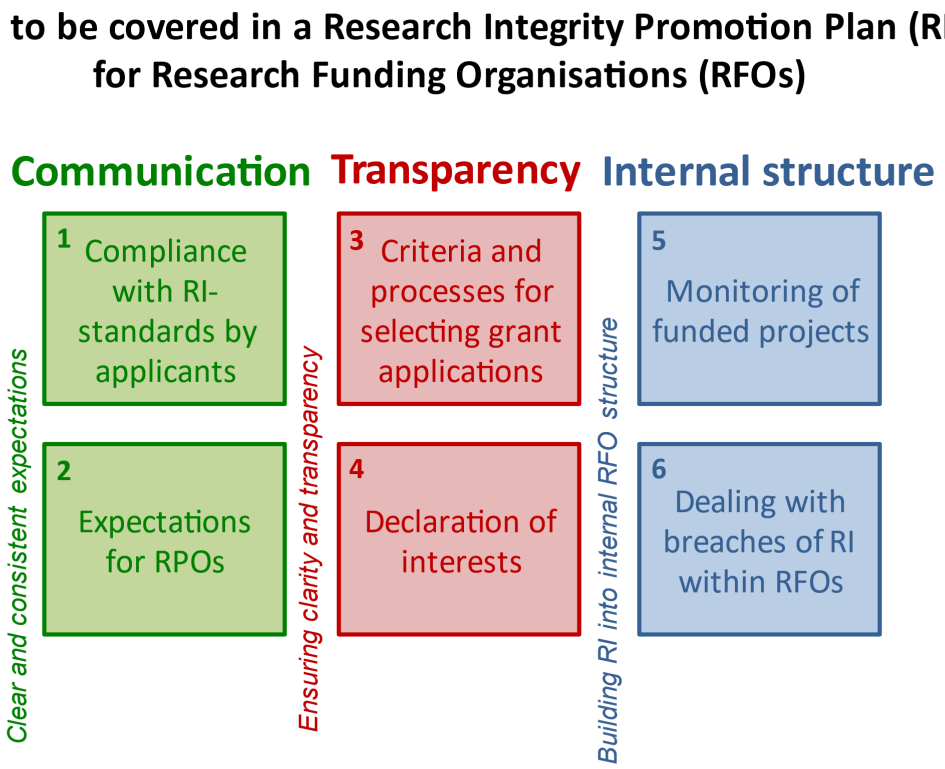


Figure 2. Schematic overview of the 6 RFO topics

Figure 3. Overview of the main division of RFO topics in the online toolbox.

2.6. Specific activities discussed in the fourth version of the toolbox

2.6.1. Introduction

The fourth version of the toolbox builds on the first three versions of the toolbox. In the *first* version of the toolbox the results from WP3 (literature review, expert interviews and a Delphi study) were integrated to develop the first version of the toolbox. Specifically, 9 topics were found to be important for RPOs to include in their RIPPs, and 11 topics were found to be important for RPOs. The *second* version of the toolbox presented concrete

recommendations and accounts for disciplinary differences, building on the work of the focus groups (D5.2) and the work in WP4 for this deliverable. In the *third* version of the toolbox, we complement previous findings by adding insights from the developed Sets of Recommendations (SoRs), from the co-creation workshops results organised to create guidelines on topics that are underdeveloped in the literature, and from our plan for selecting the tools for research integrity that will be included as examples in the SOPs4RI toolbox (i.e., the quality assessment process). In the fourth version of the toolbox, we 1) explain how the co-created guidelines are being revised and finalised by internal working groups, 2) we describe the results from the application of the quality assessment process on all the existing documents in our repository that helped us in populating the toolbox with existing guidelines, and 3) we present preliminary findings from the survey which help us inform and broaden our co-created guidelines.

2.6.2. Specific activities

The specific activities in WP4 for this deliverable are:

1. **Revision and finalisation of the SOPs4RI guidelines that we created in co-creation workshops**

In past deliverables, we explained how we co-created draft guidelines for six topics that were found to be underdeveloped in the literature and to lack good quality resources such as guidelines, SOPs, and best practices, etc. (See D4.4 and D4.5 for more information). In this deliverable, we explain the process elaborated and implemented to revise and finalise these draft guidelines into usable, user-friendly, and high-quality guidelines to be added to the SOPs4RI toolbox.

2. **Populating the toolbox with assessed high quality resources from the SOPs4RI-repository**

The final toolbox will include a selection of high-quality tools on research integrity such as research integrity documents, policy, guiding resources, and codes of conduct. To decide which integrity tools are included in the final toolbox, we assess the quality from a comprehensive selection of research integrity tools retrieved in earlier steps of the research project. In this deliverable, we detail the methodology for assessing resources to include in the final toolbox and report on the progress made in our selection procedure that was performed by several working groups from the whole consortium.

3. **Preliminary results from the survey with researchers**

The SOPs4RI project also aims to capture the perspectives and experiences of researchers on research integrity and research procedures. Using a broad-scale European-wide survey (WP6), we were able to obtain information on the measures that are currently in place in research performing organisations, the perceived needs and gaps in research integrity and good research practice, and the researchers' personal values, beliefs, and attitudes towards research integrity and research integrity promoting proposals. In addition to the general knowledge that the survey creates around research integrity, the survey also provides insights to help inform and revise the co-created SOPs4RI guidelines. In this deliverable, we will glance through a subset of survey elements that serve in informing and revising these specific SOPs4RI guidelines. We have based these elements on the discussions that were held during the co-creation workshops. In co-creation workshops, experts in the field of RI discussed whether certain topics and themes should be included in the guidelines. The survey tested whether some of these suggestions were perceived to be actually happening and perceived as important by the participants of the survey.

2.6.3. Methodological steps

Each specific activity presented in the current deliverable followed a number of methodological steps. Further details on the methodology of each activity are provided within the sections dedicated to specific activities.

1. **Revising and finalising co-created SOPs4RI guidelines**
    a. Design a guideline revision process and devise guideline revision working groups
    b. Undertake the revision process by following the steps of 1. Prioritization according to necessity, feasibility, and relevance; 2. Reorganisation; 3. Optimization; 4. Formatting; 5. External advice; 6. Visual layout; and 7. Closure
2. **Populating the toolbox with high quality resources**
    a. Retrieve document and resources which are relevant to include in the toolbox
    b. Design a resource quality assessment method and process and devise assessor teams
    c. Assess the resource to ensure quality
    d. Select high quality resource for inclusion in the toolbox
    e. Upload the tools in the online toolbox
3. **Preliminary results from the survey with researchers to inform the co-created SOPs4RI guidelines**

a. Discuss and exchange with WP6 to ensure some elements are included in the survey inform the SOPs4RI guidelines
b. Analyse the survey data
c. Implement the insights form the survey in the SOPs4RI guidelines

In the following sections, we go through each specific activity in greater details.

3. Revising and finalising the co-created SOPs4RI guidelines

3.1. Background

The SOPs4RI project aims to help equip research performing and research funding organisations (RPOs and RFOs, respectively) so that they can better foster research integrity and good research practices. In early steps of the project, we identified topics and sub-topics that are essential to consider when making efforts towards research integrity and good research practices (see Deliverables D4.1 to D4.5). At the culmination of the project, the SOPs4RI toolbox will ensure that RPOs and RFOs have access to high-quality guidance on each of the identified topic and sub-topic so that they can build high quality research integrity promotion plans and standard operating procedures in their own setting.

In searching for high quality guidance documents on each of the topics and sub-topics identified, we realised that some of the sub-topics which are important for the promotion of research integrity are underdeveloped and that the guidance needed to help RPOs and RFOs build research integrity promotion plans in these areas is lacking. As a result, an important task of the SOPs4RI project consisted of creating high-quality guidelines in these underdeveloped topics and sub-topics.

Based on an extensive analysis in earlier steps (See D4.4), we selected 6 underdeveloped topics (21 sub-topics, see Table 4) in which to build guidelines for RPOs and RFOs. The complete details on the guideline development, methodology, and results are available in *Deliverable D4.4: Report on the co-creation workshops*. For the sake of simplicity, we provide a concise summary of the process and the resulting '*Skeleton Guidelines'* which are now being revised and finalised as described in section 3.2.

3.1. Summary of the process used to develop the SOPs4RI guidelines

The complete details on the guideline development, methodology, and results are available in *Deliverable D4.4: Report on the co-creation workshops*.

We conducted 24 CCWs with diverse stakeholders during which we covered 6 different topics (the so-called underdeveloped topics), each separated in several subtopics (see Table 4). The stakeholders included research consultants, editors, junior researcher, senior researcher, policy maker, funder, and research administrator. Each workshop covered one topic, with each topic being discussed in 4 workshops in total. Of these 4 workshops per topic, two were held in October 2020, while the other two were held in November or December 2020. All workshops were conducted on the collaborative whiteboard software program MIRO, as well as Zoom.

The first sets of workshops were focused on content creation. During content creation, we asked participants to create ideas for skeleton guidelines on each of the subtopics included in the topic of the workshop. Additionally, we explored which guideline formats stakeholders prefer by asking them to compare the formats of three existing guidelines on RI. We analysed the ideas generated in the first set of workshops (i.e., inductive analysis of transcripts), we drafted a first version of the skeleton guidelines (i.e., Skeleton guidelines V1) which we used as input for the second set of workshops.

The second set of workshops focused on content refinement. During content refinement, we asked participants to comment on and refine the draft skeleton guidelines, as well as to discuss potential implementation issues of the guidelines. We used the ideas discussed in the second set of workshops (i.e., deductive and inductive analysis of transcripts), to further refine and finalize the skeleton guidelines. We sent the resulting guidelines to the participants for user feedback and adapted the guidelines where needed to obtain our final skeleton guidelines. We will hereafter refer to this final version of the co-created guidelines as the *Skeleton guidelines V2*.

Table 4. Distribution of the co-creation workshop groups and topics

	Topic	Subtopics	1st set of workshops	2nd set of workshops
RPOs	1. Research environment	1. Community building for a positive research culture 2. Managing competition & publication pressure 3. Adequate education & skills training 4. Diversity issues	2 groups	2 groups
	2. Responsible supervision	5. PhD guidelines 6. Supervisor requirements & guidelines 7. Building and leading an effective team	2 groups	2 groups
	3. Education and training in research integrity	8. At the pre-doctorate level 9. At the post-doctorate level 10. For support staff 11. Counseling & advice	2 groups	2 groups
RFOs	4. Selection and evaluation of proposals	12. Research integrity plan 13. Methodological requirements 14. Diversity issues	2 groups	2 groups
	5. Monitoring of funded applications	15. The execution of the research grant 16. Compliance with RI requirements 17. Financial	2 groups	2 groups
	6. Independence	18. What counts as an unjustifiable interference? 19. Interference by the funder 20. Interference by political/other influences 21. Interference by commercial influences	2 groups	2 groups

3.1. Rationale for adding revision working group to the guideline revision process

Although the *Skeleton Guidelines V2* are well-structured, evidence based guidelines, they still have some problems that need to be addressed before we can add them to the toolbox. For example:

- The guidelines are very long and detailed. This is one of their strength, but it also weakens the user-friendliness of the guidelines. As a result, we need to shorten and streamline the guidelines to make sure that they are simple, clear, and easy to use.

This objective will require a *prioritization* of the guideline elements to ensure that the users of the guideline know which recommendations have highest priority.

- There is some overlap between the guidelines. While this is not a problem since the guidelines are intended for individual use (i.e., each subtopic as a standalone guideline), it is essential to ensure that *overlapping recommendations are described in similar ways* to avoid any possible confusion.
- Since the guidelines are the result of separate research workshops, there are a few instances in which *differing or conflicting information* is presented in different guidelines (e.g., integrity trainers should be selected among the professors at a university vs. integrity trainers should be appointed professionals). The results from the survey will help resolve most of these differences, but it is still important to ensure that the information is coherent between all guidelines so that the guidelines can be used together without generating conflict.
- In addition, the terms and concepts used in the guideline are often inspired by the terms participants used orally in the workshop. It will be important to ensure that the terminology used in the guidelines is flawless and that the formulation of the sentences is unambiguous. To do so, an *optimization* of the guideline will need to take place to ensure that the guidelines are understandable, implementable, methodologically sound, and comprehensive.
- Furthermore, the guidelines do not address institutional differences, disciplinary differences that we have gained from WP5 or country differences yet. This is still something that needs to be addressed in a final version of the guidelines.
- Finally, *the format* of the guidance will ultimately need to be *visually attractive for the users*. A discuss on how we can make the guidelines visually attractive, user-adapted, and toolbox-friendly in line with the co-creation workshop participants' feedback is necessary to help us move forward towards fully useable guidelines.

3.2. Procedure for revising the SOPs4RI guidelines

3.2.1. Revision working groups and timeline

We built six Guideline Revision Working Groups (GRWG), each assigned to a specific RPO or RFO topic in which we are building guidelines. Each group is composed of a GRWG leader and two GRWG partners (see Table 5). A GRWG core team also helps to coordinate the revision process. Consequently, those involved in the revision process include:

- **GRWG leaders** who organise and moderate the revision meetings and ensure that all feedback and results are taken into account in the guidelines.

- **GRWG Partners** who participate in two-to-three rounds of revisions and provide final comments before the guidelines are final.
- **GRWG core team** who developed and coordinates the revision process and serves as the point of contact for questions and queries from the GRWG leaders and partners.
- Additional comments provided by **Co-Creation workshop** participants, **WP7 content experts** and, where relevant, **External Advisory Board**, all of whom will provide feedback on different versions of the revised guidelines.

Table 5. GRWG organisation.

Group	Topic	GRWG Leaders and partners
1	RPO: Research environment	GRWG leader: NAB GRWG Partners: GG + NC
2	RPO: Responsible supervision	GRWG leader: JT GRWG partners: PK + RS
3	RPO: Education and training in Research Integrity	GRWG leader: KL GRWG partners: GW + TK
4	RFO: Selection and evaluation of proposals	GRWG leader: KD GRWG Partners: AM + MPS
5	RFO: Monitoring of funded applications	GRWG leader: DP GRWG partners: NF + BT
6	RFO: Independence	GRWG leader: AKB GRWG partners: MH + SH

Each GRWG was assigned to a specific topic and was asked to revise three to four guidelines within this topic. A precise revision manual was elaborated to facilitate the revision process (see Appendix II). A timeline was also sketched to ensure that the revision process would be completed in a timely manner that enables the guidelines to be used in the pilot testing of the toolbox (WP7). The detailed timeline is available in Appendix I, and the Gantt chart for the revision process is displayed in Table 6.

Table 6. Gantt chart for the guideline revision process activities.

	2021							2022							
	Month number							Month number							
ACTIVITIES	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8
GRWG Kick-off meeting	•														
First guideline revision meetings		■	■												
Second guideline revision meetings		■	■												
Follow up meeting with all partners				•											
GUIDELINE V3					•										
Implementation of survey feedback (RPO topics)					■										
Collection of feedback from CCW participants					■										
GUIDELINE V4						•									
Collection of feedback from WP7 content experts							■	■	■	■	■	■	■	■	
Collection of feedback from External advisory board							■	■	■	■	■	■	■	■	
Final feedback from GRWG Partners							■	■	■	■	■	■	■	■	
Implementation of all feedback by GRWG leaders										■	■	■	■	■	
FINAL GUIDELINE															•
GRWG Leaders' meeting		•	•	•	(•)	•									•

Note: Dots in parentheses are only applicable to GRWG working on RPO topics

3.2.2. Guideline revision process

The guideline revision process is delineated in seven steps. Each GRWG had the freedom to decide exactly how they would follow each step and could decide to go back and forth between the steps where convenient. The seven guideline revision steps were as follows:

1. Prioritization according to necessity, feasibility, and relevance
2. Reorganization
3. Optimization
4. Formatting
5. External advice
6. Visual layout
7. Closure

A detailed timeline of the revision activities is available in Appendix I. The complete revision manual in which the steps are detailed and explained for Revision working groups (GRWG) is available in Appendix I.

3.2.2.1. Step 1. Prioritization according to necessity, feasibility, and relevance

The first revision step consisted of a prioritization step. This process is inspired by UpPriority[2] tool which we adapted and simplified to fit our purpose. In this step, partners scored each key recommendation on three different criteria, namely necessity, feasibility, and relevance (further details about these criteria are available in Box 1).

The priority scores were used as used as a basis to guide the discussion for the revision meeting and as a way to inform where GRWG should focus for the next steps of the revision process.

NECESSITY	**Necessity of the recommendation in enabling RPOs/RFOs to implement Research Integrity Promotion Plans** Does the recommendation set a necessary starting point for other recommendations to take place? Is it imperative in setting Research Integrity Promotion Plans?
FEASIBILITY	**Feasibility of implementing the recommendation in RPOs/RFOs settings** Is it realistic to expect RPOs/RFOs with varying degrees of resources to follow the recommendation?
RELEVANCE	**Relevance of the key recommendation towards the sub-topic of the guideline** Is the key recommendation is relevant to the sub-topic targeted by the guideline? Would the key recommendation be better suited in another guideline within the main topic or in other topics?

Box 1. Elements used in the prioritization process

3.2.2.2. Step 2. Reorganisation

In step 2, GRWGs are asked to reorganize the recommendations based on the priority scoring and on the order that seems more appropriate for the guidelines targeted. In this step, GRWGs reorganise the guidelines' key recommendations based on the prioritization

[2] Sanabria, A. J., Pardo-Hernandez, H., Ballesteros, M., Canelo-Aybar, C., McFarlane, E., Niño de Guzman, E., Penman, K., Posso, M., Roqué I Figuls, M., Selva, A., Vernooij, R., Alonso-Coello, P., Martínez García, L., & G-I-N Updating Guidelines Working Group and Collaborators (2020). The UpPriority tool was developed to guide the prioritization of clinical guideline questions for updating. *Journal of clinical epidemiology, 126*, 80–92. https://doi.org/10.1016/j.jclinepi.2020.06.018

scores to ensure that each guideline starts with high necessity key recommendations and that each *nested recommendation* (i.e., the detailed recommendations placed under a key recommendations) are placed in a key recommendation that captures their content appropriately.

3.2.2.3. Step 3. Optimization

The optimization step ensures that the recommendations uphold the quality criteria of understandability, implementability, methodological soundness, and comprehensiveness (see Box 2 for a description of each quality criterion). These are the criteria that we use when assessing external guidelines for inclusion in the toolbox (see section 4). We thus did our best to ensure that these criteria were upheld and fostered within the SOPs4RI co-created guidelines. To do this, GRWG complete a series of checks and improvements to make sure that the recommendations foster each quality criteria. Further details on how to uphold these quality criteria are explained in Appendix II.

UNDERSTANDABILITY: The content of the guideline is very easy to understand. The guideline presents extremely coherent information, presents the information in very clear and understandable language and uses the appropriate terminology.

IMPLEMENTABILITY: The guideline contains clear guidance for implementation and/or concrete examples that provide sufficient details to understand how the guideline can be implemented.

METHODOLOGICAL SOUNDNESS: The process used to develop the guideline is reported, robust and methodologically sound

COMPREHENSIVENESS: The guideline covers the sub-topic fully, considers different settings and provides a complete image of the issues related to the sub-topic.

Box 2. Quality criterion used to optimize the guidelines

3.2.2.4. Step 4. Formatting

In the formatting step, GRWG leaders fit the guidelines in the format template that was agreed among GRWGs during the Kick-Off meeting for the revision of the guidelines. At this point, the revised and formatted guidelines are called *Guidelines V3*.

3.2.2.5. Step 5. External advice

In the fifth step, advise from outside the GRWGs is captured to further improve the guidelines.

Survey results. Guidelines in the RPO topics are updated in light of relevant results from the survey (WP6; See section 5.1). These help inform the guidelines about country differences, receptivity, willingness, and implementation issues.

External advisory boards advice. Where deemed relevant, external experts can also be invited to comment on the guidelines. These external experts, later referred to as 'External advisory boards', can help inform the GRWGs by their expertise in the topic, by their personal implication in similar guidelines, or by providing their feedback as respondents for whom the guidelines are built (e.g., supervisors and supervisees for guidelines on mentoring and supervision; minority representatives for guidelines on diversity and inclusion, etc.).

Co-creation participants feedback. After obtaining advice from the survey results and the external advisory boards, the guidelines are sent back to the original co-creation workshop participants.

Once survey results, external advisory boards advice, and co-creation participants' feedback is implemented on the guidelines, the resulting guidelines will be called Guidelines V4. The Guidelines V4 will be added to the toolbox as preliminary tools to be used by pilot partners.

Pilot institution feedback: Where pilot institutions (WP7) decide to use the SOPs4RI guidelines in their institutions, they may provide further feedback on the guidelines. This feedback will inform us on specific issues with the guideline, on the usefulness and user-friendliness of the guidelines, and on the preferences regarding the format and presentation. GRWG leaders will implement this feedback to create the *Final Guidelines* at the end of the summer 2022.

3.2.2.6. Step 6. Visual layout

A professional visual design will take place as a collaboration between WP2 and WP4 in late 2021–early 2022 to ensure that the guidelines are visually appealing and that they offer a professional interface to their users.

3.2.2.7. Step 7. Closure

In the last step, final edits are implemented on the guidelines, including some re-wording and final touch ups to ensure that the guidelines are harmonized and coherent with one another, and that the terms used are adequate, precise, and consistent. The resulting Final Guidelines will be uploaded to the final SOPs4RI toolbox.

3.3. Preliminary overview of the changes resulting from the revision process

Although the final guidelines will only be available mid-2022 since we will use the pilot testing phase from WP7 to further develop and improve and test them in a real life setting, important changes have already been made in the progress from our Skeleton Guidelines V2 to our Guidelines V3. These current guidelines — which still need to be harmonized, language-checked, refined, and finalised — are available in Appendix IV to Appendix XVII. Here, we cover some of the commonalities and changes implemented more generally in the revision process.

3.3.1. From prescriptive guidelines to advisory documents

A common discussion among all GRWG was whether the guidelines should be prescriptive or not. Several GRWG partners worried that the guidelines were too demanding and therefore unrealistic to implement in institutions with few procedures in place. Unrealistic guidelines then pose a risk of being abandoned early or even ignored all together.

A few ideas to address this issue were mentioned, and discussion between GRWG leaders led to a general agreement to add a paragraph at the beginning of each guideline to emphasise the advisory and non-prescriptive nature of the guidelines. Despite the advisory nature of the guideline, a decent amount of details was kept deliberately to provide more concrete inspiration on practices that can help to fulfil the recommendations put forth in the guidelines, and best-practice examples were detailed where possible to provide applied recommendations.

3.3.2. General simplification

GRWGs also agreed that the guidelines should provide a balance between high-level of details and a user friendly approach. This point was even more relevant for guidelines addressing RFOs, where GRWG partners worried that overly detailed guidelines may reduce adherence by imposing practices that may conflict or not fully correspond to equivalent practice already in place in the organisations. In this regard, all GRWGs agreed on a general simplification of the guidelines, either by removing overly descriptive recommendations, by merging recommendations with one another, or by moving recommendations to best practice examples.

3.3.3. Avoiding redundancy by inter-linking between guidelines

Another point of concern was the redundancy that occurred between the topics covered by the guidelines. For instance, guidelines on research environment may need to discuss

supervision and research integrity training, while guidelines on research integrity training and supervision may need to discuss support which is one of the key aspects of research environments. In such instances, the GRWG leaders agreed to connect guidelines with one another rather than to repeat or rephrase the recommendations and risk conflicting interpretations.

3.3.4. Improved concreteness and implementability

As part of the optimisation process members of the GRWGs also aimed to improve the 'implementability' of the guidelines by adapting the way in which they are formulated and by ensuring that every recommendation was realistic and actionable enough. This led to several changes in the guidelines. First, GRWG members made efforts to remove unrealistic recommendation or, to tone down recommendation that were not necessarily realistic in all settings by either moving those recommendations to best practice examples or by adding phrases such as 'where possible…' or 'it may be helpful to…' to make very clear that these recommendations are optional and dependent on context.

3.3.5. Better adaptation to the audience

The GRWGs also took into consideration the audience of the guidelines and made efforts to best adapt the guidelines to the intended audiences. For example, several recommendations in the RPO guidelines were intended at academic research institutions rather than at industry or technical research institutes. The GRWGs tried to broaden the recommendations to make them applicable to different types of research institutions or, where a broadening was not possible, they rephrased academic-specific recommendations to inform users that these may only be relevant in academic settings. Along the same lines, some GRWGs added notes in the preamble to highlight the fact that the guidelines may need to be considered differently in different institutions and settings. Finally, GRWGs in the RFO topics adapted the guidelines further to address RFO users more efficiently. In fact, an expert with experience of research policies was intentionally included in each RFO GRWG and their perspectives were instrumental in simplifying and optimizing the guidelines.

3.4. Next steps

The revision of the guidelines is a work in process, with the objectives of obtaining the Version 4 of the guidelines available for pilot institutions in November 2021 and Final Guidelines in the summer of 2022. The detailed timeline in Appendix I and the Gantt chart in Table 6 show the steps that remain to be accomplished in the coming months. In short, before obtaining Version 4 of the guidelines in November, the leaders from the GRWG still need to:

- Harmonize remaining elements between the guidelines,
- Adapt the guidelines to relevant survey results (RPO GRWG)
- Share the guidelines with the original co-creation participants for feedback

Once these three steps are completed, the Guidelines V4 will be shared with pilot institutions.

The final version of the guidelines is then planned to be released in the summer of 2022, after a few additional revision steps including:

- Collection and implementation of feedback from pilot institutions who used SOPs4RI guidelines
- Collection and implementation of feedback from External advisory boards where GRWGs find it relevant
- Collection and implementation of feedback from GRWG Partners

4. Populating the toolbox with high quality resources

4.1. Introduction to the Quality Assessment process

The online toolbox that is the core output of the SOPs4RI project will be populated with high-quality relevant resources that can help research performing (RPOs) and research funding organisations (RFOs) develop Research Integrity Promotion Plans (RIPP) and Standard Operating Procedures (SOPs) for research integrity.

In Deliverable D4.5 we detailed the quality assessment system that we created to ensure that the tools included in the toolbox are of high quality (see section 5 in D4.5). The process is summarized in the guidance for assessors that was distributed to those assessing the resources in Appendix III. In short, we built a system that would allow us to score resources on four key quality criteria: Understandability, Implementability, Methodological Soundness, and Comprehensiveness. These four criteria are also used in our guideline revision process and their meaning is explained in section 3.2.2, Box 2. In addition to these four quality criteria, guideline assessors were asked to select the most fitting classification out of seven different classification pairs (e.g., general vs. specific, visual vs. textual, mandatory vs. optional). The classification options selected will be used as tags in the online toolbox and will help users find and select guidelines that fit their needs.

Having now used this quality assessment process in practice, we have started populating the toolbox with both RPO and RFO high-quality resources. In this section, we refined the quality

assessment process based on feedback from the first round of assessment, and we show the resulting progress in populating the toolbox.

4.2. Refining the quality assessment based on assessors' feedback

The quality assessment process was built, revised and consolidated in earlier steps of the project (see D4.5). After the first round of resource quality assessment, feedback was obtained from the assessors. Based on their feedback, we decided on a few adjustments to strengthen the quality assessment process.

Diversify expertise among assessors. First, we realised that the we cannot exclude that different assessors or users in different contexts may perceive the quality of documents differently. This is especially true of parameters such as implementability , which are highly context-dependent, and assessors with different expertise may score them differently. To address this issue, we decided that the teams of assessors should be decided strategically to capture different perspectives from different assessors. Consequently, we chose to assign one assessor with a research-oriented expertise and one assessor with a practice-oriented expertise to assess each resource. Each assessor scores the resource independently and an average of the two assessors' scores is computed for each assessment parameter.

Remove ambiguity on the implementability criteria. Second, and along the same line, the first round of assessments made us realise that the way in which the criterion of *Implementability* was interpreted was problematic to some assessors. Some assessors scored a resource high on implementability if it was easy to put in practice without too much pre-existing resources, while others scored a resource high on implementability if the recommendations were concrete enough to allow users to understand how they can put these recommendations in practice. In consulting with the assessors, we concluded that most interpreted the implementability criterion with the latter interpretation. We thus reformulated the criterion to ensure that it was interpreted as a concreteness issue rather than a capacity issue. The second round of assessment proved this decision useful since no further issues were raised on the assessment criteria.

Re-think the cut-off inclusion score. Finally, we also realised that out initial plan of only including resources with overall score average of 4 or higher was unrealistic since most resources ranked very low on *Methodological Soundness* (i.e., most resources do not describe how they were created). Together with some of the assessors from the first round of assessments, we agreed that we would then include resources that obtain an overall score of 4 on the three other quality criteria, but that we would ignore the *Methodological Soundness* in deciding whether to include the resource in the toolbox or not.

4.3. Progress and tools included in the toolbox

The toolbox underwent three important content updates and will continue to grow substantially in the coming months (November 2021 to March 2022).

4.3.1. First round of inclusion of documents for the RPO toolbox in 2020

The first round of selection is extensively described in D4.2 and D4.3. The selection of documents was based on the results of WP3 in which two literature reviews served as a basis for the selection of documents. An initial assessment of these documents was completed and is detailed in D4.3.

4.3.2. Second round of inclusion of documents for the RFO toolbox

In the beginning of the summer of 2021, four assessor teams assessed the quality from 36 RFO resources of potential interest for the toolbox. Twenty resources were kept for inclusion in the toolbox and are described in Appendix XIX. They can also be found on our website. See the link here: https://sops4ri.eu/tools-for-rfos/

4.3.1. Third round of inclusion of documents for the RPO toolbox

In the end of the summer of 2021, five assessor teams assessed the quality from 85 RPO resources of potential interest for the toolbox. 40 resources were kept for inclusion in the toolbox and are described in Appendix XIX.

4.4. Next steps

Using the same process, we will continue to assess resources and populate the toolbox until November 2021, when the tool box will start being used in the Pilot study (WP7). At that point, we will have reviewed all resources captured in earlier steps of the project.

The quality assessment process will not stop then however. SOPs4RI partners will continue to be able to recommend resources that may be useful for the toolbox and these additional resources will be assessed periodically and – when positively assessed – added to the toolbox every so often by a team of assessors from WP4.

5. Preliminary results from the survey with researchers to inform the SOPs4RI co-created guidelines

5.1. Introduction to the SOPs4RI survey

The SOPs4RI project aims to build a toolbox that helps support research funding and research performing organisations in facilitating good research practices without causing unnecessary burden or alienation of researchers themselves. In fulfilling this objective, it is important to ensure that the steps taken to promote RI will be both: beneficial to, and perceived as beneficial by the researcher.

For this reason, a broad-scale survey was developed to capture the perspectives of researchers on research integrity and research procedures from different countries in order to extract country specific differences and get more insight in potential implementation mechanisms.

The survey probes researchers to obtain information on the measures that are currently in place in research performing organisations, the perceived needs and gaps in research integrity and good research practice, and the researchers' personal values, beliefs, and attitudes towards research integrity and research integrity promoting proposals. In this regard, the survey will help identify obstacles, areas of need with regards to research integrity and research integrity policies, and differences between countries, disciplines, and seniority.

The elements included in the survey were carefully elaborated to provide a broad range of knowledge about different aspects of research integrity. In addition to the general knowledge that the survey creates around research integrity, the survey also provides insights to help inform the co-created SOPs4RI guidelines (see Section 3.2.2. Guideline revision process, Step 5). For this purpose specifically, the survey included a range of recommendations that created doubts whether they should be included in the final guidelines. The survey was a perfect instrument to question our doubts and get insights. In the present deliverable, we focus on the subset of the survey elements that serve in informing and revising the SOPs4RI guidelines. The full protocol for the survey study is detailed in the Deliverable *D6.1: Protocol for the Survey Study*, and the full results of the survey will be discussed in the upcoming deliverable D6.2.

5.2. Survey elements added to contribute to the SOPs4RI guidelines

In collaboration with WP6, several elements have been specifically introduced in the survey to address points that raised uncertainty during the guideline development process in the co-creation workshops. Eight of these elements aim to capture details on how a policy should be implemented, while other elements (n=21) aim to capture the perceived legitimacy of highly innovative or potentially controversial recommendations as well as current implementation of these recommendations in different countries.

5.2.1. Elements used to capture details on the implementation of research integrity policies

A) **General guideline implementation**

(A-1) Motivations for research integrity. First, we had a general and recurrent discussion on the benefits that would most motivate researchers to follow research integrity procedures. The survey addressed this question by asking respondents what to select two elements that would most motivate them to follow research integrity procedures and two elements that would least motivate them. The possible choices included:

- More reliable scientific knowledge;
- Increased funding opportunities;
- Facilitated collaboration with other researchers;
- Being able to publish in higher status outlets;
- Better reputation in their field; increased chance of promotion;
- Higher salary;
- More trust in their research by the general public;
- More trust in their research by their colleagues;
- Visual symbol on their published work of research integrity attainment.

B) Elements under the topic of *Research Integrity Education and Training*

In the topic of *Research Integrity Education and Training*, we added several survey elements to obtain information on the implementation of recommendations and training programs:

(B-1) Motivation towards research integrity training. We introduced survey elements that questioned respondents on the features that motivate them to attend research integrity training courses. The choices provided included several facts about the training and the effects that following the training has on participants' career and research (See Box 3). The

selection of choices was motivated by elements that were mentioned in the co-creation workshops as being important for research integrity training.

How important would the following features be in encouraging you participate in a research integrity training course?

- Intellectually stimulating
- Applicable across multiple fields
- Takes a short amount of time
- Available online in your own time
- Of practical use to me in my research
- Would help me supervising staff/students
- Enjoyable
- Delivered face to face with the trainer
- Would help me making grant applications
- Would help me in applying for promotion

Box 3. Elements added to understand what motivates researcher to attend research integrity training

(B-2) Attractiveness of research integrity training. In addition, we probed whether the terminology used may influence enthusiasm to participate in research integrity training. To do so, we randomly asked each participant to state their interest (from *very positive* to *very negative*) after being presented with a variation of the four sentences available in Box 4.

Suppose your organisation sends you an email ***inviting you*** to attend a research ***integrity masterclass*** on some aspect of research integrity that interests you. How would you feel about attending it?

Suppose your organisation sends you an email ***inviting you*** to attend a ***research integrity training*** on some aspect of research integrity that interests you. How would you feel about attending it?

Suppose your organisation sends you an email ***requiring you*** to attend a ***research integrity masterclass*** on some aspect of research integrity that interests you. How would you feel about attending it?

Suppose your organisation sends you an email ***requiring you*** to attend a ***research integrity training*** on some aspect of research integrity that interests you. How would you feel about attending it?

Box 4. Variations of terminology to assess the interest that they generate for researchers.

This last question may also be used as a composite to assess whether the willingness to participate to research integrity training differs between seniority level, a point that was assumed numerous times in the co-creation workshops.

(B-3) Qualified research integrity trainers. We also introduced elements to better understand the features that are considered to yield high quality research integrity training. For example, we added a question to capture the characteristics that researchers consider important in a research integrity trainer. Respondents thus needed to say how important (i.e., from 'Not important at all' to 'Extremely important') they believed the following characteristics were to promote supervision of the highest quality:

- Specialist knowledge of research integrity;
- Member of my own department;
- In-depth knowledge of my own field;
- Being an active researcher;
- Respected in their field;
- External to my organisation.

C) **Elements under the topic of *Supervision, Mentoring, and Leadership***

We also added four survey elements that probed different aspects relevant to the topic of *Supervision, Mentoring and Leadership*.

Positivity and confidence towards supervisory responsibilities. After asking respondents whether they currently had supervisory responsibilities for research staff and research students, we then asked them (C-1) how positive they felt about having supervisory responsibilities (i.e., from 'Very positive' to 'Very negative'), as well as (C-2) how confident they were that they were meeting the needs of their supervisee (i.e., from 'Very confident' to 'Not at all confident').

(C-3) High quality supervision. We asked survey respondent to rate the relevance (i.e., from 'Not important at all' to 'Extremely important') of different features in promoting supervision and mentoring of the highest quality. These included

- Tangible rewards for good supervision;
- Support structures in place for the well-being, care and mental health issues of supervisee;
- Procedure in place to change supervisor if necessary;
- Evaluation structures for supervision in place.

(C-4) Characteristics of a good supervisor. We also asked survey respondents to assess the importance (i.e., from 'Not important at all' to 'Extremely important') of different characteristics in supervisors. These included:

- Ability of supervisors to act as exemplars;
- Knowledge of institutional support structures;
- Supervisors' familiarity with PhD or relevant procedures;

- Ability of supervisors to engage supervisees in decision-making process;
- Ability of supervisors to provide personal guidance;
- Ability of supervisors to communicate effectively with supervisees from different cultures;
- Ability of supervisors to provide balance between providing support and facilitating independence.

D) Elements under the topic of *Research Environment*

Although we addressed the topic of *Research Environment* more extensively though items meant to capture the legitimacy of potentially controversial innovative recommendations (section 5.2.2 below). Nevertheless, we added one element to capture distinctions and preferences with regards to researcher assessments.

(D-1) Responsible research assessments. We added a simple question to capture the different elements that researchers deem important to look at when assessing their performance as researchers (See Box 5).

In the course of our research, experts have derived an expanded list of potential criteria on which researchers could be evaluated which goes beyond the quality of their research alone. When a researcher's performance is being evaluated by an employer or potential employer, how important do you think it is to include each of the following activities in making an assessment of their performance?

- Societal impact of their research
- Teaching
- Peer review
- Editorship of journals and other publications
- Supervisory responsibilities
- Outreach and communication of research to public audiences
- Leadership
- Publication metrics (e.g. Journal Impact Factor)
- Collegiality
- Participation in, or delivery of, research integrity training

Box 5. Question to probe elements that are deemed important to include in research assessments

5.2.2. Elements used to capture the current implementation and the legitimacy of innovative or potentially controversial recommendations

The co-creative process used to create guidelines is a highly creative process meant to enable creative and innovative ideas to be heard. The creativity and the freedom which are embedded in the co-creation process are great assets to enable discussion and reflection

among co-creation workshop participants and to help uncover ideas and initiatives which are not yet implemented in practice.

Yet, before adding such innovative practices into research integrity guidelines, it was important to capture how these initiatives may be received by the scientific community. We used the survey as a way to probe the legitimacy of such highly innovative and potentially controversial recommendations.

To do so, we randomly assigned one of 21 innovative integrity recommendations (See Table 7 for the full list of elements used in the survey) to each survey respondents and asked them whether this procedure already happened in their organisation (yes, no, I don't know) and whether they believed this procedure was a good idea (7-point scale from extremely good idea to extremely bad idea).

Table 7. Innovative Standard Operating Procedures used in the survey to probe ongoing practice and receptivity

Topic		Innovative Standard Operating Procedure
Research integrity training and supervision	1	Mandatory research integrity training should be integrated in the curriculum for Bachelor, Master, and PhD students.
	2	All researchers should be required to complete research integrity training every 2-3 years to update their knowledge.
	3	All researchers starting a new position should be required to complete research integrity training.
	4	Established researchers should be required to follow training to build new skills and to update their methods.
Mentoring, supervision, and leadership	5	Supervisors and supervisees should be required to sign agreements laying out the expectations and obligations of supervision at the outset.
	6	An independent body should be in place for supervisees and supervisors to turn to in the event of problems.
	7	Mandatory training on supervision should be provided to all supervisors.
	8	Good researchers who are not suitable research leaders should be allowed to progress in their career without the need to take on research leader tasks.
	9	Team leaders (e.g. principal investigators) should be periodically assessed by asking colleagues about their leadership skills.
	10	Organisations should set a maximum number of students a researcher can supervise at once.

Research environment	11	Organisations should not assess researchers using metrics that emphasise quantity or journal-level impact, such as publication counts, H-index, and Journal Impact Factor.
	12	Organisations should ensure that assessment procedures include evaluation from direct colleagues and supervisees as well as from those in a senior position to the member of staff being assessed.
	13	Organisations should provide researchers with an independent research integrity counselling service that can provide advice on research integrity dilemmas or queries.
	14	Organisations should appoint research integrity 'champions' (colleagues who can provide informal advice about day-to-day research integrity questions) within every department or unit of their institution.
	15	Organisations should actively facilitate peer support groups for researchers at different stages of their career.
	16	Researchers should have access to mental health professionals as part of their conditions of employment.
	17	Where an organisation provides a research counselling service, research counsellors should be able to guarantee confidentiality and secrecy to researchers, even in cases in which misconduct is being discussed.
	18	Training should be provided for non-research skills such as conflict management, listening, and other "soft" skills.
	19	Organisations should adopt policies on diversity and inclusion for executive boards and university management.
	20	Organisations should adopt policies on diversity and inclusion for scientific seminars and speaker panels.
	21	Organisations should monitor and publicly report their commitment, achievements and setbacks in ensuring diversity and inclusion.

5.1. Preliminary survey results relevant for the SOPs4RI guidelines

Results from the survey will be detailed in the deliverable D6.2. Although the result analysis is not yet completed, we believed that it would be relevant to already explore some of the preliminary results about the elements of the survey that served to inform the SOPs4RI co-

created guidelines. Since the final data still needs to be curated and cleaned before we undertake a full statistical analysis, we will only explore trends and provide an idea of the possible findings without going in depth in the specific statistical results obtained. Consequently, readers of the current deliverable should remain aware that the results presented here are incomplete, preliminary, and that the trends presented may change slightly once the final, curated data is analysed.

5.1.1. Respondents

The survey obtained between 50 000 and 60 000 respondents (predominantly researchers holding a PhD as an inclusion criterion) from all European Union member states as well as Iceland, Norway, Switzerland, Australia, Canada, United Kingdom, and the United States of America. We randomly presented two of the 21 innovative integrity recommendations to each respondent of the survey, meaning that each SOP was presented to between 4000 and 5000 participants.

5.1.2. Elements used to capture details on the implementation of research integrity policies

A) General guideline implementation

The factor that most motivated respondents to follow integrity procedures (**A-1)** was the production of more reliable scientific knowledge (i.e., over three quarter of respondents mentioned that the ability to produce more reliable scientific knowledge was 'Very motivating' or 'extremely motivating'). The two least motivating factors were (i) the possibility of a higher salary and (ii) a higher chance of promotion, with only slightly over 40% of respondents saying that this was 'Very motivating' or 'Extremely motivating' and over 15% saying that this was 'Not at all motivating'.

This finding indicates that respondents appeared to be more motivated by the added value that directly impacted the quality of their research rather than by advancements in their career. This finding can be used in the guideline to provide insights for institutions on how they can best motivate researchers to embrace research integrity procedures.

B) Elements under the topic of *Research Integrity Education and Training*

(B-1) Motivation towards research integrity training. The most important element that would motivate respondents to undertake research integrity training was the practical utility of the training for the researcher's work, with over three quarter of respondents stating that this is 'Very important' or 'Extremely important' to them. Having training that is (i) intellectually stimulating and (ii) helpful in knowing how to supervise staff/students were also perceived as important, both having over 60% of respondents stating that these were 'Very important' or 'Extremely important'. Most other training features were found to be

very or extremely important by around half of the respondents except for face-to-face training, which was found to be 'Very' or 'Extremely important' by only a quarter of the respondents and which was found 'Not at all important' by another quarter.

These findings provide insights on the type of features that would increase the motivation of researchers to attend research integrity training. We will use these findings to add details in the SOPs4RI co-created guidelines as a way to help research institutions know how they can create attractive training that fits with researchers' expectations.

(B-2) Attractiveness of research integrity training. The differences were not so striking when comparing the four different ways of introducing research integrity training to researchers (i.e., using the term 'integrity masterclass' vs. 'research integrity training' and 'inviting researchers to attend' vs. 'requiring researchers to attend'). Nonetheless, there was a gradual trend in which slightly more respondents were 'very positive' or 'slightly positive' for the term 'masterclass' or for 'invited' training than for the term 'research integrity training' and for 'required' training. Although not so striking, this finding is interesting for increasing the acceptability of research integrity training and can be explained in the guidelines to help institutions shape their approach to research integrity training to promote acceptability.

(B-3) Qualified research integrity trainers. Respondents found most important to have research integrity trainers who have specialist knowledge of research integrity (nearly 80% of respondents stated that this was 'Very important' or 'Extremely important') and who were active researchers (almost 70% of respondents stated that this was 'Very important' or 'Extremely important'). Ensuring that trainers for research integrity were respected in their field was also seen as an important point, with around 60% of respondents stating that this was 'Very important' or 'Extremely important'. On the other hand, having research integrity trainers who are member of the respondent's own department was perceived as an important characteristic of research integrity trainers by much fewer respondents, with over 70% of respondents stating that this was 'Not at all important' and less then a tenth stating that it was 'very' or 'extremely important'. Having research integrity trainers who are external to the respondent's organisation seemed to depend on individual preferences a bit more as it was perceived by more than a third of respondents as something that is 'Not at all important' while it was perceived by less than a third of respondents as something 'Very' or 'extremely important'.

These findings indicate that research integrity trainers should be active, respected researchers who have specialised knowledge of research integrity. In this regard, the SOPs4RI co-created guidelines should emphasise the need for these characteristics when explaining the importance of selecting appropriate research integrity trainers and training them to become specialists in research integrity. On the other hand, the area where research integrity trainers come from may not bear such an important impact on the

perceived qualification of the trainer, and it may be better if we leave this at the discretion of research institutions rather than to formally recommend it in the SOPs4RI co-created guidelines.

C) Elements under the topic of *Supervision, Mentoring, and Leadership*

A bit more than 60% of respondents stated that they currently undertake supervisory responsibilities.

(C-1) Positivity towards supervisory responsibilities. Of those, almost half were 'Very positive' about having supervisory responsibilities, and over 90% said they were either 'Positive' or 'Very positive'. Less than 1% were either 'Negative' or 'Very negative' about having supervisory responsibilities.

(C-2) Confidence towards supervisory abilities. Despite their positivity towards having supervisory responsibility, those in supervisory were not always as confident of their abilities to meet the needs of their supervisees. In fact, only a bit more than a third stated being "Very confident' of their ability to meet the needs of their supervisees, while almost 60% stated being 'Somewhat confident' and almost 5% stated being either 'Not very confident' or 'Not at all confident'.

Together, these findings indicate that supervisory responsibilities are seen as something highly positive for researchers, but that the confidence that researchers have in their own supervisory ability could be improved. This finding is unlikely to change the content of the SOPs4RI co-created guidelines, but it can help us introduce the need explicitly in the preamble and the justification paragraphs embedded in the guidelines to help research institutions understand the relevance of helping researchers build the skills and the confidence they need to be excellent supervisors.

(C-3) High quality supervision. Three of the four support structures proposed to encourage high-quality supervision, were found to be either 'Very' or 'Extremely important' by around 60% of the respondents, and found to be 'Not at all important' by only less than 3% of respondents. These were (i) the importance of having support structures in place for the well-being, care and mental health issues of supervisee, (ii) the importance of having procedure in place to change supervisor if necessary, and (iii) the importance of having evaluation structures for supervision in place in the institution. On the other hand, the need to provide tangible rewards for good supervision was perceived as 'very' or 'extremely important' by fewer respondents (around 40%) and perceived as 'Not at all important' by over 10% of respondents.

These findings indicate that elaborate support structures are needed to support researchers in providing high-quality supervision. It also indicates that most seem in favour of an evaluation system to ensure that good supervision is upheld, and that tangible rewards, although seen as important by some researchers, are not important for all. These findings do

not dramatically disturb the way in which this topic was approached in the SOPs4RI co-created guidelines and will probably not impose much formal revisions to the guidelines.

(C-4) Characteristics of a good supervisor. All characteristics of supervisors presented to survey respondents were considered 'Extremely important' or 'Very important' in providing high-quality supervision by more than 60% of respondents, many by over 80% of respondents. The characteristic that obtained the lowest proportion of respondents in the 'Very important' and 'Extremely important' range was the need of supervisors in knowing institutional support structure. Nevertheless, this characteristic still obtained over 60% of respondents stating that it was 'Very' or 'extremely' important and less than 1% stating that it was 'Not at all important'. All other characteristics obtained over three quarter of respondents finding the characteristic as either 'Very important' or 'Extremely important' in providing supervision of the highest quality. Among those, the importance of the supervisors to be able to create a balance between providing support and facilitating independence was ranked highest, with nearly 90% of respondents seeing this characteristic as 'Very important' or 'Extremely important' in providing high-quality supervision.

These findings indicate the importance of certain characteristics and abilities needed by supervisors to provide high-quality supervision. The findings can be helpful in creating courses for research supervisors, and can help us provide examples of these characteristics in the SOPs4RI guidelines to inspire the types of training and courses that should be offered to help support better supervisors in research institutions.

D) Elements under the topic of *Research Environment*

(D-1) Responsible research assessments. Respondents had broadly differing views on the elements that were important to include in research assessments. The elements that the highest number of respondents considered 'Very important' or 'Extremely important' to include in research assessments were (i) *Collegiality* and (ii) *Supervisory responsibilities,* with over 60% of respondents considering these elements 'Very important' or 'Extremely important' and nearly nine in ten considering them 'Very', 'Extremely', or 'Fairly important'. *Peer-Review* was also considered as an important element, with slightly less than 60% considering it 'Very' and 'Extremely important' in research assessments but nearly nine in ten considering it 'Very', 'Extremely', or 'Fairly important'. Other elements raised lower agreements between participants. In particular, only slightly more than a third of respondents considered evaluating researchers on (i) *the societal impact of their research*, on (ii) *their participation in, or delivery of, research integrity training*, and on (iii) *publication metrics (e.g. Journal Impact Factor)*, as 'Very' or 'Extremely important', while around one in ten considered these elements to be 'Not at all important'.

These findings are good indicators of the elements that researchers believe should be considered in research assessments. In particular, the findings showcase the broad diversity of answers which means that disagreements and diverse opinions exist when it comes to

research assessments. These findings may help inform the SOPs4RI guidelines by emphasising the importance of certain elements that were perceived of high importance such a collegiality, supervisory responsibilities, and peer-review. Nonetheless, the broad diversity of answers also means that implementing any changes to research assessments risks being received both positively and negatively by researchers. To account for this finding in the SOPs4RI co-created guidelines, we could add a note to warn institutions about the diverse views on research assessments and could ensure that the guidelines document the empirical reasoning behind the elements recommended for inclusion in research assessments. Adding these additional details may help institutions prepare for the distinct receptivity from researchers and may help equip them with arguments to raise awareness and justify their decisions.

5.1.1. Elements used to capture the current implementation and the legitimacy of innovative or potentially controversial recommendations

5.1.1.1. Current implementation

The survey was used to probe whether innovative integrity recommendations proposed in the co-creation workshops were currently implemented in research institutions. As mentioned above, each survey respondent was presented with a randomly selected innovative integrity recommendations, and then asked whether this recommendation was currently implemented in their institution (yes, no, I don't know). Since research institutions differ in their policies and procedures, both positive and negative answer are possible for a single question and for a single country. Consequently, we look at the percentage of positive and negative answers and the countries where they came from to build a better understand of the innovative recommendations that are most and least implemented in research institutions. It is important to remember that these are researcher's perspectives of implementation rather than a measure of actual implementation of these innovative recommendations. As a result, it may be possible that some the respondents are unaware of the current implementation of some of these recommendations in their institutions or alternatively, that they mistakenly think their institution implements a point when it does not.

All 21 innovative recommendation presented to participants had fewer than 40% of respondents stating that they were implemented in their institution, sometimes having as little as one tenth of participants stating that the recommendation was currently implemented. Many respondents answered that they did not know whether the recommendation was currently implemented in their institution (i.e., on average a bit less than a third of respondents), but overall, the low range of positive answers suggests that the innovative recommendations presented are not often implemented in the respondents'

research institutions or at least that researchers are not often aware if such recommendations are implemented in their institutions.

Only four of the presented innovative recommendation obtained a higher percentage of respondents stating that the recommendations were currently implemented in their institutions than those declaring that they were not. These were three recommendations on diversity and inclusion policies (19, 20, and 21) and recommendation 8 stating that researchers who are not suitable to supervise should be allowed to advance in their career without needing to undertake supervisory tasks. All four recommendations obtained over one third of respondents stating that these were implemented in their institution and less than a third stating that they were not, meaning that these four recommendations may have better implementation or higher awareness than the other innovative recommendations presented. In all other recommendations, there were more respondents stating that the innovative recommendations were not in place in their institution than respondents stating that they were.

From the results, it was also evident that research integrity champions (recommendation 14) and continuous research integrity training (recommendation 2) were rarely implemented, each having only around one tenth of respondents stating that these were currently implemented in their setting and at least 60% of respondents stated that they weren't.

5.1.1.2. Enthusiasm about the innovative recommendations presented

The second point we tried to capture when presenting respondents with innovative integrity recommendations was their enthusiasm towards the recommendation presented. In the survey, we asked respondents whether they thought the innovative recommendation presented was a good idea or not (7-point scale from 'extremely good idea' to 'extremely bad idea').

When looking at the responses all together, it was clear that innovative recommendations yielded an overall very positive response from respondents, with over three quarter of all responses considering the presented recommendations as good ideas (responses from "extremely good idea" to "good idea"), and less than a tenth considering them bad ideas.

Several recommendations yielded overwhelmingly positive responses from respondents. Table 8 showcases a selection of recommendations that were seen as a good idea by at least 80% of respondents.

Table 8. Recommendations considered by at least 80% of respondents as a good idea ('extremely good idea' to 'good idea')

1	Mandatory research integrity training should be integrated in the curriculum for Bachelor, Master, and PhD students.
3	All researchers starting a new position should be required to complete research integrity training.

4	Established researchers should be required to follow training to build new skills and to update their methods.
6	An independent body should be in place for supervisees and supervisors to turn to in the event of problems.
7	Mandatory training on supervision should be provided to all supervisors.
10	Organisations should set a maximum number of students a researcher can supervise at once.
13	Organisations should provide researchers with an independent research integrity counselling service that can provide advice on research integrity dilemmas or queries.
15	Organisations should actively facilitate peer support groups for researchers at different stages of their career.
18	Training should be provided for non-research skills such as conflict management, listening, and other "soft" skills.

The innovative recommendation that was least considered a good idea was the recommendation 11 stating that "Organisations should not assess researchers using metrics that emphasise quantity or journal-level impact, such as publication counts, H-index, and Journal Impact Factor", with just above half of respondents stating that thisrecommendations was a 'good idea' and one fifth of respondents stating that it was a 'bad idea' (responses from "bad idea" to "extremely bad idea"). The recommendation 2 "All researchers should be required to complete research integrity training every 2-3 years to update their knowledge" also yielded lower positivity with about three fifth of respondents thinking it was a good idea while a little over ten percent believed it was a bad idea. Together with these two recommendations, the last recommendation for which less than 70% of respondents believed was a good idea was recommendations 14 "Organisations should appoint research integrity 'champions' (colleagues who can provide informal advice about day-to-day research integrity questions) within every department or unit of their institution".

5.1.1.3. Pairing current implementation and enthusiasm together for each topic

Pairing together the current implementation of the innovative integrity recommendations presented and the perspectives of respondents, we can find a few recommendations which are high priorities for research integrity and are likely to be welcomed by the scientific community, while we can also find some areas for which resistance may occur.

For the topic of *Research Integrity Training and Supervision*, over 80% of respondents believed that SOPs 1, 3, and 4 were good ideas and these were stated as being implemented by less than a third of respondents. It thus seems that efforts and resources should be put in place to ensure that research integrity is integrated in the curriculum (recommendation 1), that it is provided to all researchers starting a new research position (recommendation 3), and that established researchers are required to update their research skills and methods (recommendation 4), meaning that these three recommendations should be place in particularly prominent positions in the SOPs4RI co-created guidelines. Contrarily, recommendation 2 which discussed the need for continued and repeated training in research integrity every 2-3 years was received with less enthusiasm (i.e., only about three fifth seeing it as a good idea), even if it was said to be implemented by only one tenth of the participants. This last finding is challenging to interpret without additional information but it could help inform the SOPs4RI co-created guidelines on *Research Integrity Training and Supervision,* for example by suggesting that it may be useful for research institutions to investigate in-house to understand why researchers are less in favour of repeated and continuous RI training so they can address this resistance.

For the topic of *Mentoring, Supervision, and Leadership*, respondents particularly thought the recommendation 6 about providing a supporting body for supervisors to turn to in case of problem, recommendation 7 about providing mandatory training to all supervisors, and recommendation 10 about setting a maximum number of students per supervisor were good ideas (all over 80% of respondents seeing them as good ideas). Since none of these recommendations were said to be implemented by more than a third of respondents, they should be good target of procedures that may have a positive impact on mentoring and supervision while being likely to be welcomed by researchers. This finding indicates that these recommendations could be highlighted in the guidelines on *Mentoring, Supervision, and Leadership* as particularly relevant target for action. The other recommendations about signed supervisor–supervisee agreements (recommendation 5), about allowing researchers unsuitable to supervision to progress in their career without supervising students (recommendation 8), and about periodical assessments of team leaders were more often seen as potentially bad ideas and may therefore benefit from being investigated further before implementation in practice, and from being addressed with caution in the guidelines on *Mentoring, Supervision, and Leadership.*

Finally, for the topic of *Research Environment*s, a few different trends can be projected. First, recommendation 13 which proposes that “Organisations should provide researchers with an independent research integrity counselling service that can provide advice on research integrity dilemmas or queries” appears to be a research environment priority since over 85% of respondents believed it was a good idea but less than 20% of respondents said that this was in place in their institutions. Along the same line, recommendation 15 about the need for institutions to facilitate peer support groups and recommendation 18 about the need to

provide researchers with soft skills training were both seen by over 80% of respondents as good ideas but were said to be implemented by only about a third of respondents. On the other hand, a fifth of respondents believed that avoiding to assess researchers on impact metrics that emphasise quantity or journal impact (recommendation 11) was a bad idea — the higher percentage of respondents believing any SOP was a bad idea — with only a bit more than half believing that it was a good idea. Knowing that this recommendation is currently one of the recommendations proposed by the Declaration on Research Assessments (DORA) which over two thousand organisations signed and by other international guidelines that are upheld by funders and research institutions, the survey findings suggest that the implementation of such recommendations and guidelines may require important efforts raise awareness and acceptance before the recommendation is fully accepted by the scientific community. This finding informs us for example to complement the SOPs4RI co-created guideline on *Research Environment: Managing Competition and Publication Pressure* with ways in which institutions can raise awareness and mobilise researchers, not only with innovative ways to assess researchers.

5.2. Next steps

5.2.1. Revising the guidelines in light of the survey results

We already noted some ideas on how the guidelines can be revised in light of the most obvious findings (section 5.1.1.3), but the more detailed survey results will be used to revise the 11 SOPs4RI co-created guidelines for RPOs (See Appendix IV to Appendix XVII) further in the coming months (November 2021 – February 2022). For instance, recommendations that obtained very low acceptability scores will be either removed, moved to best-practice examples, or explained with greater details to provide better understanding and implementation guidance for users of the SOPs4RI guidelines. Recommendations that a high percentage of respondents perceived as a good idea but for which fewer respondents stated current implementation can also be prioritised, moved up, or emphasised to promote their adoption.

The terminology used in the guidelines and the details and examples provided will also be adapted to address findings from the other guideline-relevant elements embedded in the survey (i.e., section 5.2.1). These adaptations will target more refined details such as the way in which the recommendations are presented and the way they are worded.

5.2.2. Extended survey with RFO

It may be noticed that only RPO elements have been addressed in the survey, leaving our guidelines for RFO without survey input. In fact, given the fact that the broad-scale survey

exclusively targeted researchers, it was decided that the survey should prioritize elements which are directly relevant to researchers and which appeal to researchers' daily research experience. Since researchers rarely have direct interaction and hands-on knowledge of RFO topics, we decided to build a second, parallel study in which selected RFO guideline elements will later be introduced. More details about this second study and about its opportunity for improving the RFO guidelines will be described in later stages of the project and will be a collective effort that will be highlighted in the deliverables of WP7.

6. Summarizing reflections

In this deliverable, we looked at three different steps that helped us achieve the fourth version of the toolbox.

First, we explained how we revised and brought the SOPs4RI co-created guidelines closer to completion by revising them and using input from empirical steps. In earlier steps of the project, we co-created guidelines with a diversity of research stakeholders to provide guidance on research integrity in topics where little guidance currently exists. These topics were determined through extensive empirical work in earlier steps of the project and included topics relevant for research integrity in research performing organizations as well as in research funding organizations. Despite the extensive empirical work that went into the selection of topics and the co-creation process, the guidelines are still in the process of revision, finetuning and finalization before they could be used in practice. In this deliverable, we detailed the processes used to revise the guidelines and to bring them a step closer to a final, usable product. Although the ultimate version of the guidelines will only come later in the project, we now have refined guidelines which are more concise, more coherent, and more adapted to fit the needs of their intended user and will soon be ready to be used in the pilot testing of the SOPs4RI project (WP7).

Second, we explained how we employed the quality assessment process that was designed in earlier steps of the project to assess and select high-quality resources to the online toolbox. In this regard, we explain the adaptations that were made to the quality assessment process after obtaining feedback from assessors, and we detail the progress made on the resources included in the toolbox. The newly populated toolbox for both RPOs and RFOs now contains a rich diversity of resources that will provide pilot institutions a wide range of choices and inspiration in developing Research Integrity Promotion Plans (RIPP).

Finally, we explained how we added elements to the survey to inform and revise the SOPs4RI co-created guidelines further. In particular, we explained that we added elements to better capture details on the implementation of research integrity policies as well as elements to capture the current implementation and the legitimacy of innovative or potentially controversial SOPs. Having access to some preliminary findings from the survey, we thus reported on the latter set of elements and explained how we can adapt, detail, or revise the guidelines to incorporate the findings from the survey.

The three activities detailed in this deliverable showcase the advancement of the project and the toolbox and indicate that the knowledge produced in the project so far has allowed us to come closer to achieving our objective of collecting and building useable tools to help research performing and research funding organizations build research integrity promotion plans for their institutions. In the coming months, these important activities will continue. On the one hand, the SOPs4RI co-created guidelines be refined further after obtaining the feedback from external experts, pilot institutions, and complementary survey results. On the other hand, the toolbox will continue to grow and enrich itself with new tools and new features through additional rounds of quality assessment and feedback from pilot institutions.

7. Next steps in WP4

7.1. Piloting of the toolbox and guidelines

In the autumn of 2021, the toolbox will be used by RFO and RPO pilot institutions who are developing and implementing SOPs for research integrity in their organisations. The pilot study is coordinated by WP7 and further details on the methodology is available in D7.1. The institutions participating in the pilot may be seen in Table 9.

Table 9. List of institutions participating in the Pilot study of WP7.

RFOs	Public	Austrian Science Fund (FWF)
		Research Council Norway (RCN)
		Croatian Science Fund
	Private	La Caixa Foundation

		Novo Nordisk Foundation
RPOs		Ghent University
		Jagiellonian University
		University Pompeu Fabra
		Janssen Pharmaceutica N.V. (member of the European Quality in Preclinical Data project (EQIPD))
		Barcelona Biomedical Research Park
		University of Split

The pilot study will enable us to better understand how we can increase the user-friendliness of the toolbox, how we can optimize its presentation, and how we can ensure that it contains sufficient relevant information to help different types if organisations in different settings.

In addition, the pilot study will help us test the relevance and usefulness of the guidelines we co-created in the project. In accessing the toolbox, pilot institutions will be able to access and use the guidelines we co-created on topics that were scarcely addressed in research integrity. Where participating organisations choose to use the SOPs4RI guidelines, they will have the opportunity to provide feedback and to help us improve the guidelines once again before they become final. The feedback from these pilots will provide rich insights that can help us ensure the guidelines are understandable, comprehensive, and implementable in a broad variety of settings in the future.

7.2. Dissemination

The Toolbox is the main output of the project and the consortium considers it as the "legacy" of SOPs4RI. By this it is meant that the toolbox is bound to be the most impactful output of SOPs4RI. For the toolbox to be as influential as possible, the consortium, with the lead of NTUA (WP2 leader) and AU (coordinator), is going to use the following "pathways" to impact: (a) boost its visibility through the dissemination and communication channels of SOPs4RI and (b) draft plans for its sustainability after the end of the project. With regard to the dissemination and communication strategy to be followed until the end of the project, SOPs4RI is going to increase its presence on the Social Media, where it has already established a non-trivial presence (e.g. 1500 followers on Twitter) and by implementing additional dissemination and communication activities via: (a) the release of the results of

the WP6 online survey and the WP7 piloting activities, (b) the presence of the consortium members at important events, like the 7th World Conference on Research Integrity and the ENRIO Congress on Research Integrity practice, (c) the release of the videos that have been created with the cooperation of SOPs4RI and SAGE, (d) its active presence at the "Community" and "Resources" sections of The Embassy of Good Science, and (e) the release of a significant number of peer-reviewed publications (already planned or to be planned by collectively created and agreed publication plans for each WP). With regard to the sustainability of the toolbox (online presence, curation, enrichment with new guidelines and SOPs) the consortium has already started discussing plans to render this challenging target feasible, with the opportunity of the 3rd General Assembly that took place in September 2021.

Appendices

Appendix I – **Guideline revision process timeline**

Appendix II – **Guideline Revision Manual**

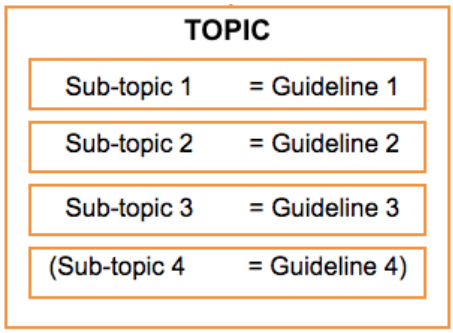
About this document

In the following document, we provide details on a process that can be used to revise the SOPs4RI skeleton guidelines V2 so that they can be used in practice.

Definitions and Details about the Guidelines

Terminology used in this document:

- **Guideline**: By guideline, we refer to the set of recommendation covering a specific sub-topic. Consequently, each Guideline Revision Working Group (GRWG) group is assigned one topic which contains between three and four guidelines (i.e., sub-topics). See figure below.



- **Key recommendation**: By key recommendations, we intend a recommendation that is written in bold and attributed to a number in the skeleton guidelines V2.

- **Nested recommendation**: We call nested recommendation any recommendation that comes under key recommendations. These are generally attributed a letter (a, b, c, etc. Or i, ii, iii, etc.) and aim to provide details about the key recommendation.

- **Best-practice example**: By best-practice example, we refer to the specific examples provided in a box at the end of each guideline. These examples provide more concrete ways in which the recommendations can be achieved. They will be kept where available in the revised guidelines, but will be moved to the key-recommendation they relate to.

- **Explanations**: When we send you the current version of the skeleton guidelines (Skeleton Guideline V2), you will notice that each key recommendation in the guidelines is followed by an *'Explanation'* section outlining the discussions in the co-creation work that led to the recommendation. The *'Explanations'* were added to enable you to understand the context of the co-creation workshop during which the guidelines were created. These explanations will not appear in the final guidelines, but they may help you enrich the short descriptions that

will be added to each key recommendation or to rephrase elements while keeping the co-creation workshop in mind.

- **Guideline development process:** Each final guideline will contain a short section entitled 'Guideline development process'. This section will provide an overview of the methods that were used to develop the guideline and will list the name of the contributor (GRWG partners, GRWG leaders, willing co-creation workshops participants, etc.)

- **Topic**: By topic, we intend the main six topics targeted in building the Co-creation guidelines, namely Research environment; Responsible supervision; Education and training in Research Integrity; Selection and evaluation of proposals; Monitoring of funded applications; Independence.

- **Sub-topic**: By sub-topic, we refer to the three or four smaller topics that were included in each topic. For example, the topic of Research Environments contains four sub-topics, namely Community building for a positive research culture; Managing competition & publication pressure; Adequate education & skills training; Diversity issues.

Audience of the guidelines:

Remember, the audience for the guidelines are Research Performing Organisations (RPOs) and Research Funding Organisations (RFOs). In this regard, recommendations should address RPOs and RFOs directly rather than researchers and research students.

Format of the guidelines:

As discussed in the Kick-Off meeting of 30th June 2021, the guidelines will all be laid out in a similar format which implies different layers of recommendations (key recommendations and nested recommendations) as well as good practice examples. The proposed 'Guideline Format Template' is available in the SharePoint. Further information on the formatting can be seen in the Kick-Off presentation from Krishma 'Presentation - Format' or in the recording of the Kick-Off (1h after the beginning of the recording).

Overlap and cross-references:

It is important to remember that each Sub-Topic is a guideline on its own. In this regard, a certain level of overlap is possible. Where relevant however, guidelines should cross-reference one another instead of repeating one another.

Glossary of terms:

In order to ensure compatibility and harmonisation between the guidelines, a joint 'Glossary of terms' was created and can be updated simultaneously by all partners and leaders. Where terms or concepts are already defined on the Embassy of Good Science website (https://embassy.science/), a link to the relevant page should be used as a definition. Where important and potentially unclear terms do not have any entry on the Embassy of Good Science website, they should be defined in the

'Glossary of terms'. All Guideline Revision Working Group Partners are encouraged to edit and add to the 'Glossary of terms'.

Guideline Revision Working Group Roles

It may also be good to have a quick reminder of the roles described in this document. We will address the following Guideline Revision Working Group roles throughout the document:

Guideline Revision Working Group leaders: We assigned one leader per topic to manage and chair the revision process. Of course, Guideline Revision Working Group leaders are welcome to take part in the revisions and to provide their inputs as well.

Guideline Revision Working Group partners: Two GRWG partners were selected for each topic. They will participate in the Guideline revision process, especially in the first three steps of the revision process.

Guideline Revision Core Team: By 'Guideline Revision Core Team, we refer to the core team in charge of the Guideline Revision Working Group. The Guideline Revision Core Team is composed of Krishma Labib, Joeri Tijdink, Noémie Aubert Bonn, Guy Widdershoven, and Miranda Langendam. Noémie, Krishma, and Joeri should be the ones to contact in case of questions and concerns.

More details on the Workplan, group composition, and timeline are available in the Guideline Revision Working Group Workplan

Guideline Revision Process

The guideline revision process contains the following steps:

1. Prioritization according to necessity, feasibility, and relevance[3]
2. Reorganization
3. Optimization
4. Formatting
5. External advice
6. Visual layout
7. Closure

Step 1. Prioritization according to necessity, feasibility, and relevance

GRWG leaders will share the guidelines with GRWG partners ahead of the meeting. Each Partner should perform the prioritization exercise before the first guideline revision meeting. In this exercise, you will score each key recommendation on three different criteria. Scores should not be used in

[3] This prioritization process is inspired by UpPriority tool which we adapted and simplified to fit our purpose (doi:https://doi.org/10.1016/j.jclinepi.2020.06.018).

isolation however, and the scoring exercise should be used as a basis to guide the discussion for the revision meeting.

Note: While the Prioritization Sheet only contains the key recommendation for each guideline, it may be useful to have a look at the full guidelines (i.e., key and nested recommendations) when doing this exercise in case the key recommendation does not capture the full intention of nested recommendations. The full guidelines are available in the SharePoint folder for your GRWG topic as a Word Document entitled 'Skeleton Guideline V2 – Topic X'.

Process

- Key recommendation should be scored on three priority items: Necessity, Feasibility, and Relevance. The boxes below detail each of these items and explain the scoring options.
- The scores for each item should be entered directly in the Excel document entitled "Prioritization sheet - Topic X" that you can find in the SharePoint folder for your GRWG topic
- During the first guideline revision meeting, GRWG partners will share their ratings with GRWG leaders and discuss the scored given to each key recommendation.
- Leaders should add a justification or summary of the discussion to the key recommendation that were discussed in the column entitled 'Discussion Summary' on the 'Prioritization sheet – Topic X' (i.e., this can be very short if there is agreement, or more extensive if the discussion raised issues.)
- Recommendations that obtain exceptionally low scores overall should be noted by the GRWG leaders for discussion in the GRWG Leaders' meeting. They may be noted for removal at the next steps (i.e., in Step 2)

Priority items

PRIORITY ITEM 01 – NECESSITY

Necessity of the recommendation in enabling RPOs/RFOs to implement Research Integrity Promotion Plans

EXPLANATION

Evaluate whether the recommendation sets a necessary starting point for other recommendations to take place. For example, high necessity recommendations will need to be in place in the organisation to set the scene and enable Research Integrity Promotion Plans (RIPPs) to be established. Low necessity recommendation, on the other hand, are good guidance that would benefit RIPPs but are not essential and often require high necessity recommendations to be in place before they can be implemented.

APPLICABLE SECTIONS

Rate this priority item on all key recommendations.

HOW TO RATE

- Low necessity [1]: The recommendation can strengthen RIPPs in RPO/RFO settings but are not necessary elements enable RPOs and RFOs to improve research integrity in their organisations. Often, low necessity recommendations can only be implemented after the high-necessity recommendations are in place.
- Uncertainty [2]: There is uncertainty about whether this recommendation is necessary for enabling RIPP in RFOs/RPOs.
- High necessity [3]: The recommendation needs to be implemented in RPOs/RFOs as a baseline to enable RIPP to take place.

PRIORITY ITEM 02 – FEASIBILITY

Feasibility of implementing the recommendation in RPOs/RFOs settings

EXPLANATION

Evaluate whether it is realistic to expect RPOs/RFOs with varying degrees of resources to follow the recommendation. High-feasibility recommendations will be realistic to implement also in contexts where few resources are currently attributed to research integrity, while lower-feasibility.

APPLICABLE SECTIONS

Rate this priority item on all key recommendations.

HOW TO RATE

- Low feasibility [1]: The recommendation is highly demanding and will only be possible in institutions with high resource investment for RIPPs.
- Uncertainty [2]: There is uncertainty about the feasibility of this recommendation.
- High resource requirement [3]: The recommendation requires a reasonable investment which is, in theory, possible in most RPO/RFO setting.

PRIORITY ITEM 03 – RELEVANCE

Relevance of the key recommendation towards the sub-topic of the guideline

EXPLANATION

Evaluate whether the key recommendation is relevant to the **sub-topic** targeted by the guideline. Remember each guideline is its own sub-topic. Consequently, you should score the relevance of each key recommendation within the guideline rather than in relation to the whole topic.

APPLICABLE SECTIONS

Rate this priority item on all key recommendations.

HOW TO RATE

- Low relevance [1]: The recommendation is outside the scope of the **sub-topic** targeted by the guideline. For example, this recommendation would fit better in another guideline (i.e., in another sub-topic) or it should be removed from this guideline.
- Uncertainty [2]: There is uncertainty about whether this recommendation is relevant for the **sub-topic** of the guideline. For example, it may be relevant in this guideline if placed as a nested recommendation under another key recommendation, but it might not be entirely relevant as a key recommendation.
- High relevance [3]: The recommendation is highly relevant to the **sub-topic** targeted by the guideline.

Step 2. Reorganization

A. Reorganisation of key recommendations

We encourage you to re-cluster and reorganize the recommendations to improve the guidelines. Below, we provide some procedures that can help give you a framework upon which you can reorganize the guidelines, but you can also feel free to reorganise the guidelines according to other aspects you think would help improve the guidelines.

Based on the scores obtained in the prioritization process, a reorganisation of the guideline can take place. Key recommendations with high **NECESSITY** should be moved up in the guideline so that each guideline will start with high necessity key recommendations. Of course, you may find that another order works best for the sub-topics you are targeting, and you are welcome to decide on another way to order the guideline without considering the necessity principles. For instance, as it was mentioned in the Kick-Off meeting, a topic such as monitoring may work better if ordered by the chronological order in which the recommendations should happen than if ordered by necessity. We leave it to the Guideline Revision Working Group groups to discuss what fits best in their guidelines.

Key recommendation with low **RELEVANCE** should be discussed and either downgraded to nested recommendations, merged to other recommendations, or rephrased to better capture the relevant elements from the nested recommendation they contain. In case both key recommendations and nested recommendations are believed to be of low relevance, the recommendations should be

noted on the Excel Sheet entitled 'Recommendations deemed irrelevant for the guideline'. A justification should be added alongside each item that is placed on the list of 'Recommendations deemed irrelevant for the guideline' to explain why GRWG partners and leaders propose to remove these recommendations from the guidelines.

You may find that a similar structure (order of recommendations, clustering, etc.) can be used for all the guidelines within a certain topic. If so, we encourage you to keep the structure consistent between all the guidelines within your topic.

Note: Please keep in mind that the recommendations are all based on what different stakeholders from various countries and disciplines found important to include during the co-creation workshops. Since they are based on a co-creative endeavour, we should not remove the points raised by our participants unless we have a very strong and convincing argument (and we can present this clearly to the participants to hear their thoughts about it). We therefore encourage you to try as much as possible to reorganize and rephrase the recommendations in a way that is logical and practical, rather than to put them in the list of 'recommendations deemed irrelevant for the guidelines'.

B. Reorganization of nested recommendations

As a second step, GRWG partners and leaders should go through each nested recommendation to determine whether they are relevant to the key recommendation under which they are placed. Where possible, nested recommendations with low relevance towards the key recommendation under which they are placed should be placed under more relevant key recommendation or alternatively made into key recommendation within the guideline. In cases where there are too many nested recommendations for a given key recommendation, the key recommendation can be split in several key recommendations, or the nested recommendations can be merged to be more comprehensive. Where nested recommendations are deemed irrelevant to the guideline as a whole, they should be added to the list of 'Recommendations deemed irrelevant for the guideline' following the guidance detailed in step 2.A.

C. Reorganization of best practice examples

A few recommendations refer to best practice examples. Whenever a recommendation includes a best practice example, the best practice examples should be placed in a box or section called 'Best practice' immediately after the key and nested recommendation where it belongs (as opposed to the current bundle box at the end of the guideline). If the best practice examples are relevant only for a specific nested recommendation, a linking statement such as 'see best practice' should be added to the nested recommendation.

Step 3. Optimization

The optimization step ensures that the recommendations uphold the quality criteria of Understandability, Implementability, Methodological Soundness, and Comprehensiveness. In this step, you will not be asked to score the recommendations on the different quality criteria, but rather to foster each quality criteria by completing a series of checks and improvements. Specific points to check for each quality criterion are detailed below.

Process

For the optimization step, the GRWG leaders should take the initiative to edit the recommendations in the guidelines (using track changes) taking into account earlier discussions with the GRWG members, as well as the four quality criteria (described below). After the meeting, GRWG leaders can then circulate these revisions to the GRWG members for discussion and further revision.

Quality Criteria and how to uphold them

UNDERSTANDABILITY

The content of the guideline is very easy to understand. The guideline presents extremely coherent information, presents the information in very clear and understandable language and uses the appropriate terminology.

To uphold this criterion, **GRWG partners and leaders** will:

1. Compose a preamble for each of the assigned guidelines. The proposed format for these is to compose 1-2 paragraphs for the main topic, followed by 1 paragraph for the sub-topic (i.e., the specific guideline), totalling around 200-300 words maximum. The preamble should showcase the importance of the guideline. It should contain information such as i) Who the guideline is for; ii) Why this guideline is needed; iii) The purpose of the guideline. For inspiration, you may have a look at existing guidelines we presented during the Kick Off meeting from Wellcome and one from NICE. The content of these preambles is discussed further in the Guideline Format Template. Depending on the preference of the group, these preambles can be drafted by the leader and agreed in the meeting or drafted together in a shared document.
2. Ensure that the content is unambiguous and that the **correct terminology** is used. In doing so, the Glossary of terms can be used and updated.
3. Ensure that the **wording of key recommendations** is concise and simple, but also provides sufficient information to be understood on their own. For each key recommendation, also create a short form (max 6 words) to be used on the first page of the guidelines. Some examples are available on the Wellcome guideline. For instance, the recommendation "*Prioritise anti-racism work by dedicating time and resource to it*" is used in the short form "*Prioritise anti-racism*" on pages 4 and 5.
4. Add one or two sentences after each key-recommendation (before introducing nested recommendations) to provide the a few words of context for each key recommendation. The "explanation" that are currently used in the document can be used as inspiration to build introductory statement (see Guideline Format Template for more details).
5. Where relevant, ensure **coherence** between overlapping information within and between guidelines in the topic assigned. Cross-reference between the guidelines can be used to avoid repetitive sections.
6. Where relevant, ensure that there is **no conflicting** recommendation within and between guidelines in the topic assigned.

To uphold this criterion, **GRWG leaders** will also:

1. Ensure coherence and absence of conflicting information between the different topics. They will do this by discussing the edits in the leader's meeting.
2. In this step, it may be useful if leaders make sure technical terms we use internally, such as 'topics' and 'subtopics' are changed to more common terms, such as 'core areas' or 'themes' for 'Topics', and 'topics' for what we currently call 'sub-topics'. This can also be done as a final revision before formatting the guidelines (i.e., Step 4). Agreement on the terms will need to take place between the leaders in the follow-up meeting.

IMPLEMENTABILITY

The guideline contains clear guidance for implementation and/or concrete examples that provide sufficient details to understand how the guideline can be implemented.

GRWG partners and leaders will:

1. Wherever possible, rephrase the recommendations to make them SMART, meaning that they are:
    a. Specific (concrete, using action words)
    b. Measurable (provided with a way to be demonstrated or evaluated)
    c. Achievable (attainable, possible; See point 3 on FEASIBILITY below)
    d. Relevant (reasonable and relevant for the intended user)
    e. Time bound (specific about the timeframe in which they should be implemented)
2. Make sure the recommendations provide **enough concrete details** or best practice examples to be implemented in practice. Details may be added where deemed necessary.
3. Discuss any key recommendations that obtained low **FEASIBILITY** scores in the prioritization (Priority item 03 in Step 1) to see whether they may be improved. Where it is not possible to improve the feasibility of a recommendation, the formulation of the recommendation should make clear that this recommendation is optional, intended for institutions who have the resources necessary (e.g., "Where possible, ensure…", "Consider implementing...", etc.). Low feasibility recommendations may also be tranGRWGormed into best practice examples if they are concrete enough. Alternatively, in cases where they are thought to add no information and to disrupt from the implementability of the guideline as a whole, they can be added to the list of 'Recommendations deemed irrelevant for the guideline' following the guidance detailed in Step 2.A.

To uphold this criterion, **GRWG leaders** will also:

1. Take into account any feedback from the Pilot Institutions who attempt to implement the guidelines (i.e., see Step 5. External advice).

METHODOLOGICAL SOUNDNESS

The process used to develop the guideline is reported, robust and methodologically sound

To uphold this criterion, GRWG partners and leaders will:

1. Agree on a '**Guideline development process**' section (to be drafted by the 'Guideline Revision Core Team') that will appear alongside each of the guidelines. An additional paragraph can then be added by each GRWG leader to contain the names of GRWG leaders, partners, co-creation workshop participants who would like their identity disclosed and any external advisors involved in the revision process specific to the guideline.

COMPREHENSIVENESS

The guideline covers the sub-topic fully, considers different settings and provides a complete image of the issues related to the sub-topic.

Note: We start on the assumption that the guidelines are already largely comprehensive and extensive and that the optimization process should remain a process of revision and finalization rather than one of content creation. Based on our discussion during the Kick-Off meeting, we also agree that it is unrealistic to expect two GRWG partners to know all disciplines and areas. In this regard, ***the following points should be undertaken with the best of your knowledge, we do not expect you to think beyond your expertise****.*

To help uphold the COMPREHENSIVENESS criterion, GRWG partners and leaders will:

1. Remark if they notice that **important area or disciplinary perspective are missing** from a guideline and, if possible, provide links to existing guidance that could fill this gap. Having a look at the tools for that (sub-)topic in the toolbox may be helpful to understand the breadth of the sub-topic that the guidelines cover and to identify missed areas. GRWG leaders will discuss potentially overlooked areas during the leaders' meeting to decide how to proceed further.
2. Look through guidance available on this topic in the toolbox to Try to find the **right balance** between comprehensiveness, implementability, and user-friendliness. Based on the format and examples we presented, GRWG partners and leaders should make decisions to include the right level of details for the guidelines to be useful without becoming overwhelming (e.g., shorten wording, merge nested recommendations, etc.).
3. (*optional*) Where deemed appropriate, **add relevant links** to external guidance, best practice examples, or documents such as those that are already presented in the toolbox. ***Important note****: We mark this step as optional as it can easily become highly time consuming. We thus recommend that partners only add links to sections where they*

immediately identify an important resource rather than to perform this step as an additional task (i.e., as a baseline, consider the guidelines to be comprehensive enough as they currently stand). In addition, with a view to sustainability, we are planning to enable users of the guidelines to be able to continue adding best-practice examples to enrich the guidelines on the Embassy website. This is still an idea in process that will be discussed between the Guideline Revision Core Team and the team of the Embassy at later stages of the guideline development.

Final checks

GRWG Partners and leaders: After the prioritization, reorganisation, and optimization steps have taken place, the guidelines should be r**ead through one last time** to address any additional concerns by GRWG leaders and partners.

GRWG leaders: GRWG leaders will meet to ensure the style and terminology are coherent between the different topics. They will edit the wording and presentation where needed.

Step 4. Formatting

GRWG leaders

The resulting guidelines will then be used by GRWG leaders and fitted in the format templates. Further information on the formatting can be seen in the Kick-Off presentation from Krishma 'Presentation - Format' or in the recording of the Kick-Off (1h after the beginning of the recording).

After this basic formatting, the resulting guidelines are called the **Guidelines V3**.

Step 5. External advice

GRWG leaders from the RPO topics

GRWG leaders from the RPO topics will update the Guidelines V3 with relevant results from the survey results.

GRWG leaders

External advisory board: Where deemed relevant, external experts can be invited to comment on the Guidelines V3, but this is up to each GRWG leader's preferences or agreement between GRWG leaders at a later stage.

Original participant feedback: GRWG leaders will send all guidelines to the original co-creation workshop participants for feedback and implement feedback where appropriate. GRWG leaders should add information to indicate whether participant's feedback was provided, and whether external advisory boards were consulted in the short section describing the 'Guideline development process' (see more details about this in the 'Methodological soundness' point in 'Optimization'). Co-creation workshop participants' feedback will be implemented by GRWG leaders to create the **Guidelines V4**.

The Guidelines V4 will finally be added to the toolbox as preliminary tools to be used by pilot partners. (WP4 and WP2 will take care of this)

Pilot institution feedback: Pilot institutions may then provide further feedback on the guidelines, and GRWG leaders will implement such feedback to create the **'Final Guidelines'** at the end of the summer 2022.

Step 6. Visual layout

Simultaneously with Step 5, a more professional visual design will take place as a collaboration between WP2 and WP4 (i.e., this will therefore not be a responsibility of the GRWG partners and leaders). This step will be managed by the 'Guideline Revision Core Team' and therefore does not require additional involvement from GRWG partners and leaders.

Step 7. Closure

GRWG leaders

GRWG leaders will have a meeting to make final edits on the guidelines, including some re-wording and final touch ups.

GRWG partners

All GRWG partners and leaders will be given a chance to comment on the Final Guidelines before they are closed and finalised. The resulting **Final Guidelines** will remain as important pillars in the SOPs4RI toolbox.

Appendix III – **Guideline Revision Manual Checklist**

Step 1. Prioritization according to necessity, feasibility, and relevance

- ❑ **Using the 'Prioritization Sheet' score each Key Recommendations on:**
  - NECESSITY of the recommendation in enabling RPOs/RFOs to implement Research Integrity Promotion Plans
  - FEASIBILITY of implementing the recommendation in RPOs/RFOs settings
  - RELEVANCE of the key recommendation towards the sub-topic of the guideline
- ❑ **(LEADERS) Add the justifications or summary of the discussion in the 'Discussion Summary' column of the 'Prioritization sheet'**

Step 2. Reorganization

A. Reorganisation of key recommendations

- ❑ **Move up key recommendations of high NECESSITY (or order the guideline according to what you find fits best with the recommendations)**
- ❑ **Reorganize key recommendations of low RELEVANCE**
  - Downgrade to nested recommendations
  - If still irrelevant, note on the list of 'Recommendations deemed irrelevant for the guideline' and justify

B. Reorganization of nested recommendations

- ❑ **Reorganize nested recommendations that are not relevant to the Key recommendation under which they are placed.**
  - Move to better fitted key recommendations
  - If still irrelevant, note on the list of 'Recommendations deemed irrelevant for the guideline' and justify

C. Reorganization of best practice examples

- ❑ **Place best practice examples immediately at the end of the key and nested recommendation they correspond to.**

Step 3. Optimization

UNDERSTANDABILITY

- ❑ **Compose the *Preamble* for each guideline (1/guideline = 3 to 4/group; see Guideline Template)**
- ❑ **Resolve ambiguous phrasing and ensure correct terminology throughout the guidelines**
- ❑ **Refine the wording of key recommendations to a short and clear format (a few keywords)**
- ❑ **Add one to two sentences to introduce each key recommendation (see Guideline Template)**
- ❑ **Ensure coherence between overlapping information between guidelines in this topic**
- ❑ **Ensure that there is no conflicting information between guidelines in this topic**
- ❑ **(LEADERS) Ensure that there is no conflicting recommendation between topics**

IMPLEMENTABILITY

- ❑ **Make sure the recommendations provide enough concrete details/best-practice examples**
- ❑ **Adapt the phrasing of recommendations with low FEASIBILITY to make them less prescriptive, moving them around as best practice examples or, if disruptive, added to the list of irrelevant recommendations that should be removed from the guideline.**
- ❑ **(LEADERS) Take into account feedback from pilot institutions (see Step 5)**

METHODOLOGICAL SOUNDNESS

- ❑ **Agree on the 'Guideline development process' paragraph that will be distributed in the first revision meeting**
- ❑ **Add names of contributors (GRWG leaders, GRWG partners, co-creation participants, etc.)**

COMPREHENSIVENESS

- ❑ **Question whether essential areas or disciplinary perspectives are missing (only if major, we do not expect you to cover all disciplines!)**
- ❑ **Find the right balance to keep guidelines user-friendly while being comprehensive (e.g., shorten wording, merge nested recommendations, etc.)**
- ❑ *(optional) Add relevant links to external guidance and best practice examples*

Final checks

- ❑ **Final read-through**
- ❑ **(LEADERS) Compare topics to ensure coherent terminology, style, and presentation.**

Step 4. Formatting

- ❑ **(LEADERS) Place the revised guidelines in the Guideline Template**

Step 5. External advice

- ❑ **(LEADERS OF RPO TOPICS) Adapt guidelines based on the survey results**
- ❑ *(optional) (LEADERS) Obtain and implement feedback from external experts*
- ❑ **(LEADERS) Obtain and implement feedback from original co-creation participants**
- ❑ **(LEADERS) If applicable, implement feedback from Pilot institutions**

Step 6. Visual layout

(Task of the Guideline Revision Core Team — beyond the remit of GRWG partners and leaders)

Step 7. Closure

- ❑ **(LEADERS) Final edits, re-wording, and touch-ups**
- ❑ **Final edits before the guidelines are finalized**

Appendix IV – **Guidelines for research performing organizations on Community building for a positive research**

Guidelines for research performing organizations on

Community building for a positive research culture

Guidelines for research performing organizations on **community building for a positive research culture**

Research institutions can help foster research integrity and responsible research practices by providing researchers with healthy environments in which to work. In fact, research on research integrity has shown that research environments play a crucial role on researchers' wellbeing, decisions, and practices. Ensuring that researchers work in an environment that is collaborative, positive, inclusive, and enriching is a starting point to enable responsible research practices and research integrity.

This guideline offers recommendations that can help research institutions create an environment in which researchers share a sense of community and a positive research culture. The recommendations target several themes of research environments such as inclusivity, support, performance management, and wellbeing. Each recommendation is followed by more detailed guidance and best practice examples to help research institutions bring the recommendations into practice.

Given the broad diversity that exists among research institutions, it is possible that some recommendations are not applicable in all research settings. Nevertheless, the recommendations can help provide inspiration for areas and practices that can help support community building for a positive research culture.

Guidelines for research performing organizations on **community building for a positive research culture**

Key recommendations:

1. Provide a safe, inclusive, and open environment
2. Provide an institutional framework for research integrity
3. Promote participative leadership
4. Ensure responsible performance management
5. Provide an institutional framework for diversity and inclusion
6. Support the well-being of researchers

1. Provide a safe, inclusive, and open environment

Ensure that researchers can work in a safe, inclusive and open environment where they feel responsible and accountable, can share concerns about dilemmas and can discuss errors made without fearing the consequences ('blame-free reporting').

The working environment of researchers is an important factor in shaping the research culture. Ensuring that those involved in research feel safe, included, and able to be open and honest is an essential starting point for creating a healthy research culture.

A. Create opportunities for community building activities

B. Create fora, open discussions and dialogues for sharing research activities, viewpoints and ideas

2. Implement an institutional framework for research integrity

Implement an institutional framework for research integrity and good research practices by providing training, support mechanisms, documents, and the appropriate infrastructures

Research institutions have an important role to play in building an environment that enables researchers to uphold research integrity and good research practices. In this recommendation, we detail some elements which can serve as a foundation for building a research environment that enables researchers to conduct research with integrity.

A. Provide training for research integrity

- Provide research integrity training for all involved in research within the institutions (see associated guidance on this topic)[1]
- Provide training and other institutional tools for good mentorship and supervision (see associated guidance on this topic)
- Ensure that training is a continuous process that is adapted to the needs of researcher (e.g., different career stages)

B. Provide support mechanisms

- Provide support mechanisms for researchers, for example research integrity services, library services, data management services, statistical support, information services and packages for new employees, diversity and inclusion support, etc.
- Invest in digital infrastructures to ensure that all researchers can access and share information (e.g. data management plans, data limitations, etc.)[2]
- Ensure existing support services are reachable and findable.

C. Appoint support persons

- Appoint support persons for research integrity, such as research integrity officers, library services, diversity and inclusion officers, RI information services, ombudspersons and resource persons for students (e.g., research integrity advice, mental health support).
- Where appropriate, hire legal expert with the required knowledge to address data management and data privacy issues (e.g., GDPR data experts)
- Train and appoint research integrity champions who can support research integrity at the level of researchers (e.g., at the faculty, departmental, or research group level)

- Provide a channel of local confidential advisors (i.e., researchers who can be consulted in confidence when integrity issues arise) to help address doubts and questions as soon as they arise.
- Provide confidential and independent channels for support in case of bullying, harassment, and interpersonal conflict
- Provide a safe place for raising concerns in which power differences are minimized, for example by designating champions from different seniority levels[3]
- Have a clear whistleblowing policy in place, including a procedure to deal with conflict of interests when dealing with integrity issues.
- Ensure that researchers know what they can expect from each support channel, that the contact details of support persons are up-to-date, visible, and accessible, and that researchers, research students, and research staff feel confident approaching advisors (e.g., by providing a safe space and contact channel that can be accessed discretely).
- Ensure that all support persons are knowledgeable about their role, about their legal responsibilities (where applicable), and about the research integrity policies they advise on (consider providing dedicated training and support to the support person). Also make sure they are informed on the researchers' expectations and needs (e.g., timely response and sufficient follow-up)

D. Provide guidelines and documents

- Provide guidelines and documents around research integrity and good research practices such as guidelines for capturing and implementing feedback, guidelines for collaborating with industry, guidelines on data management plans, guidelines on transferring data between institutions and on the portability of research data, policy on open access, policy on promotion and assessment processes, guidelines on bullying and harassment, guidelines on diversity and inclusion including in hiring, promotion, and research activities (see associated guidance on this topic), guidelines on mentoring (see associated guidance on this topic), whistleblowing guidance, etc.
- Ensure guidelines and documents are findable and practical.

E. Frequently seek feedback from researchers to capture which support, infrastructures, and documents are needed

Best practice examples

1. To encourage training, universities can provide eBadge/accreditation for internal ethics training (Epigeum)

2. In Flanders, a research integrity commission external to institutions is available to provide second, disinterested opinions on integrity cases http://vcwi.be

3. In Flanders, specific 'ombudspersons' serve to help PhD students deal with problems, including with interpersonal issues with their supervisors and integrity issues

4. Some universities set mandatory requirements for data management plan at the PhD students level. The university provides the appropriate digital infrastructure. This ensures that students understand the data and its limitations, understand if special approvals are needed, know how to handle the data, etc.

3. Promote participative leadership

Promote participative leadership of research at the institutional level and within research groups

Creating an environment in which those performing the research can openly communicate with those managing the institution can help foster a cooperative research culture in which all members feel respected, considered, and accountable.

A. Enable leaders to positively influence the research environment of their team

B. Encourage regular meetings between leaders, research staff, managers and support staff[1]

C. Encourage cooperation between all levels of the institution, including between research support and university management, between research support and research groups, and between leaders and researchers within the research groups

D. Provide researchers (including early career researchers) incentives and opportunities to be involved in institution management and coordination activities[2]

Best practice example

1. Some research institutions embrace an open door policy between researchers and researchers leaders to welcome researchers to communicate openly with the leadership so their concerns are addressed promptly

2. In some institutions where RI committees have different phases, students and junior researchers can be involved in the research integrity office meetings during organization phases where no confidential information is discussed

4. Ensure responsible performance management

Ensure responsible performance management, assessment and evaluation

Assessments and rewards play an important role in the way researchers define success and perform research. We know that indicators focusing on quantity can incite researchers to disregard quality and integrity. Consequently, responsible research assessments are key to promoting high quality and high integrity research. Additional recommendations for responsible research assessments are available in the associated guidance on Managing Competition and Publication Pressure.

E. Assess research on aspects such as versatility, quality and actual impact of research

F. Assess researchers on non-research related tasks, such as supervision, leadership, and other professional activities (e.g., peer-review)

G. Do not solely assess research on metrics that emphasise quantity or journal-level impact, such as publication counts, H-index, and Journal Impact Factors, and always complement metrics with human input

H. Appreciate all research outputs, including those that are not published in high impact factor journals

I. Broaden perspectives of impact to include different expressions and forms it can take

J. Ensure guidance and incentives for good mentorship

5. Provide an institutional framework for diversity and inclusion

Implement an institutional framework for diversity, equality and inclusion

Part of the richness and the value of research environments comes from the great diversity of individuals that build these environments. To make sure everyone feels included in this environment however, diversity, equality, and inclusion should be at the core of research institutions. Additional recommendations for diversity and inclusion are available in the associated guidance on Diversity and Inclusion.

A. Implement a policy and action plan for diversity, equality and inclusion

B. Foster an environment where diversity, equality, and inclusion are part of the culture[1]

C. Consider all aspects of diversity, including, but not limited to gender, race, disability, career profiles, career breaks, caring obligations, and consider their intersectionality

D. Provide support to help mentors and group leaders uphold an inclusive environment (e.g. foreign students and researchers, language challenges, etc.). More information on mentorship is available in associated guidelines X, Y, and Z.

E. Provide diversity and inclusion training

Best practice example

1. Some universities assign 'diversity officers' who ensure that diversity issues are considered in all aspects of university tasks

6. Support the well-being of researchers

Pay sufficient attention to the well-being of research group members and the people who lead them.

Performing research can be highly stressful and demanding. It is known that researchers and research students have a high risk of burn out and other mental health problems. Research institutions can help create environments where stressors are kept in control and where resources are available to address problems when they occur.

A. Ensure a climate that is conducive to a healthy work-life balance
   - For example, minimize productivity pressures, short-term contracts, competition, and acknowledge their impact on mental health and wellbeing (see associated guidance on this topic (Guideline #2 on competition and pressure))
   - Enable researchers to take unpredicted leave to care for a dependent (e.g., to care for children in sick leave)

B. Increase awareness of mental health issues among researchers to help them detect early signs of burn-out and other issues (i.e., consider including as part of the introduction training)

C. Establish a channel of mental health professional that are accessible, known, and communicated to everyone (i.e., dedicated resources and funding)

D. Make efforts to detect problems in researchers' wellbeing and act upon the findings to improve wellbeing wherever problems are detected[1]

Best practice example

1. Several institutions implement surveys to investigate the well-being of the staff members and research students. A number of these surveys are available in the scientific literature and can help institutions detect issues that would otherwise easily be missed. in the

Guideline development process

These guidelines are based on empirical work done by the SOPs4RI consortium. We identified available recommendations on the topic, as well as gaps and lacunas using two scoping reviews on best practices for research integrity promotion [1] and the implementation factors of these [2]; 23 interviews with research integrity experts [3]; and a Delphi consensus-study with 68 research policy makers and research leaders across Europe [4] To ensure sensitivity to various disciplinary contexts, we also conducted 30 focus groups with researchers and other research stakeholders from different disciplines and countries in Europe [5,6]. Following this, we organized 4 co-creation workshops with various research stakeholders to draft the guidelines, the intentions to produce a wide range of practical ideas for the guidelines taking into account users' needs [7,8]. To revise the guidelines, we worked in a small working group with the aim to prioritize, reorganize and optimize the guideline elements (see the revision protocol at https://osf.io/f9ghj/). Our working groups incorporated the results of a European-wide survey on research integrity, including input from over 50 000 researchers [ref]. Furthermore, the working group also sought expert input on the guidelines from external advisors. The guidelines are now ready to be piloted by a number of organizations taking part in the SOPs4RI pilot. Based on the results of the pilot, we will undergo a final revision of the guidelines, to finalize them.

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Names

SOPs4RI guideline revision working group members

Names

External advisors

names

References

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Appendix V – **Guidelines for research performing organizations on Managing competition and publication pressure**

Guidelines for research performing organizations on

Managing competition and publication pressure

Guidelines for research performing organizations on **managing competition and publication pressure**

Research institutions can help foster research integrity and responsible research practices by providing researchers with healthy environments in which to work. In fact, research on research integrity has shown that research environments play a crucial role on researchers' wellbeing, decisions, and practices. Ensuring that researchers work in an environment that is collaborative, positive, inclusive, and enriching is a starting point to enable responsible research practices and research integrity.

Publication pressure and competition can create an unhealthy research environment in which researchers can feel tempted to deviate from research integrity. This guideline offers recommendations that can help research institutions manage the competition between researchers and the publication pressure they face. The recommendations target several areas such as research freedom, collaboration, careers, assessments, and workloads. Each recommendation is followed by more detailed guidance and best practice examples to help research institutions bring the recommendations into practice.

Given the broad diversity that exists among research institutions, it is possible that some recommendations are not applicable in all research settings. Nevertheless, the recommendations can help provide inspiration for areas and practices that can help manage the competition between researchers and the publication pressure they face.

Guidelines for research performing organizations on **managing competition and publication pressure**

Key recommendations:

1. Protect research freedom
2. Foster coordination and collaboration
3. Engage with external stakeholders
4. Implement a research career structure
5. Adopt responsible assessments
6. Provide balanced workloads

1. Protect research freedom

Where feasible, give researchers the freedom to investigate their own research ideas.

While research institutions have a limited capacity in increasing the freedom granted in research funding calls, they can help researchers keep freedom in how they undertake and perform their research.

A. Allow for creativity in setting up and performing research
B. Allow for more time to work on publications truly reflecting the interests of the researcher
C. Striking the balance between basic research (i.e., blue sky research) and research addressing societal needs
D. Engage with external stakeholders such as policy makers, funders, etc. to promote research freedom more broadly (Also see recommendation 3)

2. Foster coordination and collaboration

Foster a culture of coordination and collaboration

Research is highly competitive. Unfortunately, competition can disrupt the collaborative spirit between researchers. Inciting researchers to collaborate with one another, to cross disciplinary borders, and to join forces when seeking funding may help encourage researchers to foster a culture of collaboration, at least within research institutions.

A. Foster collaboration
   - Avoid competition between research groups in the same organisation (e.g., avoid that different research groups apply for the same funding stream)[1]
   - Incentivize internal collaboration to apply for joint collaborative projects

B. Promote communication between research sectors and disciplines inside and outside the institution

C. Reward, promote and incentivize interdisciplinary research[2, 3]

Best practice examples

1. Implementing strategic selection of funding calls within institutions can help decrease competition in a certain field. For example institutions can incite researchers to join forces so that one strong funding application is sent instead of multiple weaker applications.

2. Recognizing the value of interdisciplinary journals in research assessments may be a starting point to enable interdisciplinary research without disadvantaging researchers.

3. Ensuring that research integrity and good research practice guidance applies to all research fields can also help foster research integrity in interdisciplinary research.

3. Engage with external stakeholders

Support engagement with stakeholders such as policy makers, funders, industry and commerce, and civil society

Competition and publication pressure are multifactorial problems that extend beyond research institutions. For example, policy makers and funders have a key role to play in defining what researchers pursue. To reduce competition and publication pressures, research institutions need to engage with external stakeholders and to facilitate a shared discussion on different aspects of research life, including research assessments, research funding, and research objectives.

4. Implement a research career structure

Create and implement a research career structure

Research careers are often characterized by early career instability and insecurity. If researchers feel insecure in their career, they may feel the need to focus on advancing and securing their career rather than to focus on best practices that foster research integrity but may place them behind in competitive academic careers. Helping researchers feel safe in their career may help them feel able to foster research integrity.

A. Favour more permanent career structures in which researchers' salary are secured rather than temporary self-funded contracts

B. Share the responsibility of securing funding with the researchers

C. Formally inform students and early career researchers about alternative career paths (e.g. dedicated lectures)[1]

D. Inform students early on about the odds of pursuing a career in academia and tackle negative attitudes towards those leaving academia, for example by actively introducing students and early career researchers to careers outside academia.

Best practice examples

1. In Wallonia, universities collaborate with external funders to provide funding programme that enable PhD students and postdocs to start spin-offs.

5. Adopt responsible assessments

Adopt responsible recruitment and assessment practices

Assessments and rewards play an important role in the way researchers define success and perform research. We know that indicators focusing on quantity can incite researchers to disregard quality and integrity. Consequently, responsible research assessments are key to promoting high quality and high integrity research.

A. Base researcher evaluations on inputs from different levels of colleagues by including individuals in supervisor and supervisee positions (i.e., 360° evaluation) as well as internal and external reviewers

B. In evaluations and promotions ask for a selected list of publications and ask the researcher to reflect on their work to move from quantity to quality[1]

C. Consider diverse forms of impact

D. Set and clarify the diversity of criteria used in evaluation

E. Compare internal procedures with those recommended in the Declaration on Research Assessments (DORA), the Hong Kong Principles, the Leiden Manifesto, and other guidance on good research assessment

F. Provide rewards and incentives for open science practices, for instance by recognizing preregistrations, preprints, publication of negative/null results, and open access publications as assets to researchers' portfolio and by investing the resources necessary to allow researchers to afford reasonable Article Processing Charges

G. Provide rewards and incentives for research and other professional contributions, for instance by recognizing teaching, peer review,

editorship, supervision, contribution to support roles, dissemination, outreach, and societal impact.

H. Ensure that recruitment and assessment procedures do not deepen inequalities

- For example, ensure that evaluations do not disadvantage researchers who had parental leave (e.g., do not rely on cumulative number of publications) and set reasonable expectations that take into account different stages of career

Best practice example

1. Narrative CV formats, such as the Résumé for Researchers from the Royal Society in the UK may help provide a structure to capture the qualitative elements of a researcher's achievements.

6. Provide balanced workloads

Ensure a balance in researchers' workload

Researchers are generally expected to balance their time between a wide range of professional activities. Depending on the type of research institution, these may include research-related activities, education-related activities, and service-related activities. Institutions can help ensure that researchers are able to dedicate time to their research.

A. Ensure researchers have dedicated research time

B. Ensure researchers have equal opportunities to publish

C. Ensure researchers can balance teaching and research activities

D. Ensure that researchers who take on additional roles, such as data stewards or confidential advisors are recognized for their commitment and not overburdened.

Guideline development process

These guidelines are based on empirical work done by the SOPs4RI consortium. We identified available recommendations on the topic, as well as gaps and lacunas using two scoping reviews on best practices for research integrity promotion [1] and the implementation factors of these [2]; 23 interviews with research integrity experts [3]; and a Delphi consensus-study with 68 research policy makers and research leaders across Europe [4] To ensure sensitivity to various disciplinary contexts, we also conducted 30 focus groups with researchers and other research stakeholders from different disciplines and countries in Europe [5,6]. Following this, we organized 4 co-creation workshops with various research stakeholders to draft the guidelines, the intentions to produce a wide range of practical ideas for the guidelines taking into account users' needs [7,8]. To revise the guidelines, we worked in a small working group with the aim to prioritize, reorganize and optimize the guideline elements (see the revision protocol at https://osf.io/f9ghj/). Our working groups incorporated the results of a European-wide survey on research integrity, including input from over 50 000 researchers [ref]. Furthermore, the working group also sought expert input on the guidelines from external advisors. The guidelines are now ready to be piloted by a number of organizations taking part in the SOPs4RI pilot. Based on the results of the pilot, we will undergo a final revision of the guidelines, to finalize them.

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Appendix VI – **Guidelines for research performing organizations on Adequate education and skills training**

Guidelines for research performing organizations on

Adequate education and skills training

Guidelines for research performing organizations on **adequate education and skills training**

Research institutions can help foster research integrity and responsible research practices by providing researchers with healthy environments in which to work. In fact, research on research integrity has shown that research environments play a crucial role on researchers' wellbeing, decisions, and practices. Ensuring that researchers work in an environment that is collaborative, positive, inclusive, and enriching is a starting point to enable responsible research practices and research integrity.

This guideline offers recommendations that can help research institutions provide researchers with adequate education and skills building opportunities. Ensuring that researchers are competent and versatile in their work does not only help them perform research of higher quality, but it can also help them feel more comfortable and able to deal with dilemmas and career uncertainty. The recommendations target several skills that are important for researchers, including research integrity, research skills, interpersonal skills and skills sharing. Each recommendation is followed by more detailed guidance and best practice examples to help research institutions bring the recommendations into practice.

Given the broad diversity that exists among research institutions, it is possible that some recommendations are not applicable in all research settings. Nevertheless, the recommendations can help provide inspiration for areas and practices that can help ensure an enriching environment in which researchers have opportunities to learn an build new skills.

Guidelines for research performing organizations on **adequate education and skills training**

Key recommendations:

1. Provide guidance for integrity and good research practices
2. Implement a framework for adequate training
3. Provide exposure to other sectors
4. Foster communication and exchange among researchers

1. Provide guidance for integrity and good research practices

Provide adequate guidance about good research practices and research integrity

Supporting researchers' education and skills training begins with good research practices and research integrity. Providing training, support, and infrastructures to enable all those involved in research to conduct research with integrity is a necessary starting point for performing high quality research.

A. Provide training on research integrity to all involved in research, including researchers at all seniority levels (see associated guidelines on this topic)

B. Provide sufficient training, guidance, support, and infrastructures for good data management, ethical conduct of research, and adequate research methods (see associated guideline addressing this topic)

C. Communicate the responsibility of research leaders and research institutions (e.g. related to grants, conflict management, research practices, etc.)

D. Ensure visibility, awareness, and use of relevant European guidance

E. When possible, coordinate requirements for good research practice across institutions[1]

Best practice examples

1. In Denmark, Responsible Conduct of Research courses are coordinated across institutions to ensure a common agreement on what is good scientific practice

2. Implement a framework for adequate training

Implement a framework for adequate training of researchers

Beyond good research practices and research integrity, ensuring that researchers build the right skills and knowledge to conduct research and navigate a research career is also key to performing high quality research. Research institutions should ensure that they have a framework to provide strong training and education opportunities for everyone involved in research.

A. Dedicate a budget for training, training infrastructures, and training staff

B. Provide training that targets a broad range of skills. These may include:

- Direct research skills, such as
  - Research methods
  - Technical skills
  - Analytical skills
  - Data management practices
- Essential skills that are necessary as part of a research career, such as
  - History of science
  - Peer review training
  - Reproducibility and open science
  - Diversity and inclusion in research environments
  - Representation of gender and diversity in research samples
  - Leadership and mentorship skills for principal investigators (see associated guideline on responsible leadership and mentorship)
- Transferable skills, such as
  - Organization skills
  - Project management
  - Conflict management
  - Negotiation skills
  - Communication skills
- Personal and interpersonal skills, such as
  - Emotional intelligence training and development,
  - Curiosity
  - Empathy
  - Listening skills

C. Provide training and opportunities for skills building to all levels of seniority
   - For example, provide a large course at the beginning of academic career, and smaller, tailored courses throughout research career
   - Give researchers dedicated time for skill development at all seniority level[1]

D. Involve researchers in the training curriculum to ensure that the training offered corresponds to their needs

E. Provide researchers the opportunity to set their own skills development objectives upon which their progress is monitored

F. Establish a clear collaboration between research offices, libraries, and research management to ensure that the training and services provided are aligned

G. Strengthen collaboration with other research institutions to enable researchers to benefit from external training and skill development opportunities available in other institutions[2]

Best practice examples

1. Transferrable skills training for all researchers can be fostered easily in online webinars, incorporated as part of Structured PhD programmes etc.

2. In Flanders, PhD students and postdoctoral researchers are often invited to participate in training provided at external Flemish institutions. Flemish universities also enables inter-university training networks such as the Flanders' Training Network for Methodology and Statistics (FLAMES) in which students from all Flemish universities can take part.

3. Provide exposure to other sectors

Provide researchers with exposure to other sectors and settings

Exposing researchers, research students, and research staff to different settings is essential to enabling broad transferable skills, adaptability, and intersectoral mobility. Research institutions can help provide and increase visibility to co-financing and mobility opportunities.

H. Research institutions in the academic sector should provide opportunities to conduct research in non-academic sectors (e.g., industry, policy, and public sectors) to ensure that researchers build transferable skills for future employment and for careers outside academia[1, 2]

- Encourage co-financing of research from industry partners to open opportunities for investment and employment
- Provide clear circumstances under which new industry collaborations are allowed (e.g. collaboration with the tobacco industry is prohibited)
- Ensure transparency on industrial collaborations preferences and contributions (e.g., mention both institutions on publication to strengthen the visibility of both)
- Consider enabling forms of mentorship for research students by external partners

I. Provide opportunities to conduct research at other institutions and/or abroad, for example by encouraging mobility schemes at student, faculty, and staff levels[3, 4]

Best practice examples

1. In Wallonia the programme FIRST Spin-Off allows PhD students and postdoctoral researchers to start spin-off projects

2. The European Commission COFUND programme, which is part of the Marie Sklodowska-Curie Actions, enables regional, national, and international funding bodies to obtain co-funding from the European Commission for PhD or Postdoctoral training programs upon the condition that they include a secondment in non-academic sectors to foster inter-sectoral mobility.

3. Exchanges programmes can encourage Masters and PhD students to perform research in the industry for part of their degree. In the UK, universities frequently offer these exchanges.

4. Erasmus scheme at both student and faculty levels can help support exchanges and mobility

4. Foster communication and exchange among researchers

Foster cooperation, communication and discussion among researchers to ensure that they can learn from each other's skills

Promoting exchanges and bottom-up initiatives between researchers can help them share and expand their skills as well as to communicate their needs for future skills development. Many research groups already organise exchange groups and seminars but research institutions can help foster more interdisciplinary exchanges by providing resources and support for researchers' initiatives.

A. Provide the infrastructure, fora, and opportunities to enable researchers to develop and maintain strong collaborations and communication

- For example, encourage work-in-progress seminars within research groups and faculties but also at the interdisciplinary level
- Provide researchers and students the space and the resources needed to enable them to organize bottom up initiatives for support, training, and informal discussion
- Encourage researchers to organize events where they can discuss non-project-specific affairs (e.g., integrity, policy, etc.)

Guideline development process

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Appendix VII – **Guidelines for research performing organizations on Diversity and inclusion**

Guidelines for research performing organizations on

Diversity and inclusion

Guidelines for research performing organizations on **diversity and inclusion**

Research institutions can help foster research integrity and responsible research practices by providing researchers with healthy environments in which to work. In fact, research on research integrity has shown that research environments play a crucial role on researchers' wellbeing, decisions, and practices. Ensuring that researchers work in an environment that is collaborative, positive, inclusive, and enriching is a starting point to enable responsible research practices and research integrity.

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Given the broad diversity that exists among research institutions, it is possible that some recommendations are not applicable in all research settings. Nevertheless, the recommendations can help provide inspiration for areas and practices that can help support diversity and inclusion in research environments.

Guidelines for research performing organizations on **diversity and inclusion**

Key recommendations:

1. Understand the broad meaning of diversity
2. Implement an institutional policy for diversity and inclusion
3. Ensure awareness and commitment within the institution
4. Collect data on diversity and inclusion
5. Ensure a safe environment for all

1. Understand the broad meaning of diversity

Understand diversity in its broad meaning, without limiting to specific diversity issues

The way in which diversity is understood plays an important role in the actions that are taken to foster diversity and inclusion. Gender is an essential aspect of diversity, but diversity goes beyond gender and also includes cultures and ethnicity, disability, and even diversity in terms of background, skills, and sectors.

A. Consider all aspects of diversity, including gender, ethnicity, sexual orientation, disability (including invisible populations such as learning disability), but also different factors that may impact researchers' outputs and achievements, such as caring duties, family issues, medical issues, career change, and differences in backgrounds and sectors

B. Embrace an intersectional approach to diversity issues that considers cumulative impacts

2. Implement an institutional policy for diversity and inclusion

Implement an institutional policy for diversity and inclusion

In setting up their own policy for diversity and inclusion, research institutions reinforce the importance that diversity plays in their research environment. In building a targeted diversity and inclusion policy that extends beyond minimum directives and EU jurisdiction, institutions have the opportunity of fostering diversity for and with the people working in their institution.

A. Implement a holistic institutional framework on increasing diversity and inclusion where various issues are addressed including recruitment, promotions, mentorship, research performance assessment, conference and seminar organization, training, fair pay, working conditions, etc.

B. Implement recruitment strategies that foster diversity and inclusion. These may include:

- Always taking the context from which applicants come from into account (i.e., past opportunities, seniority, caring duties, etc.) to fairly assess different profiles
- Not only considering diversity in the selection of candidates, but also in the composition of selection panels, and providing training on diversity and inclusion to those involved in recruitment and interviewing
- Ensuring that applications and job advertisement are transparent, visible, and open to all[1,2]
- Introducing positive discrimination when it is justified to reduce existing gaps (e.g., quotas)

C. Create action plans on diversity and inclusion with clear deliverables, timeline, resources and responsibilities

D. Seek feedback, perspectives, and personal experiences from both minorities and majorities and adapt policies and initiatives to address their concerns[3]

E. **Remove physical barriers for people with mental or physical disabilities**

F. **Clearly and transparently communicate the diversity and inclusion policy**

Best practice examples

1. Placing vacancy advertisements on (inter)national, publicly accessible websites where all academic job advertising is presented will enable better, more diverse visibility to vacancies than announcing the vacancies only on the university website. An example of such a website is the UK site jobs.ac.uk which announces all academia-related employment in the UK. Allowing different forms of applications (i.e., applications by post, not only by email) may also help foster greater diversity.

2. The way in which vacancy advertisements are worded can impact the types of applicants that feel qualified for the position. It is advisable to formulate advertisements in such a way that they do not only attract the majority profiles but also minorities (e.g., use collaborative terminology and not only leadership terminology).

3. Where associations representing certain minority groups are available (e.g., LGBTQ associations, women in science associations), it is advisable to seek their input in the policy building process

3. Ensure awareness and commitment within the institution

Ensure awareness and commitment to diversity and inclusion at all sections of the institution

A diverse and inclusive research environment is, before anything, a result of the community that builds this environment. Institutions should commit to the standards they set in all domains of the institution and raise awareness through training, open communication, and engagement with those performing research.

G. Embrace high level institutional awareness and commitment towards diversity and inclusion, including among the institution management

H. Involve researchers bottom up to increase community engagement and to make diversity and inclusion an institutional priority

I. Adhere to national and international diversity and inclusion schemes, for example by signing up to the principles of the Athena SWAN Charter

J. Ensure that researchers' performance expectations allow for and support diversity and inclusion

- For example, set standards that allow for parental leave, diversity, and reasonable expectations at different career stages
- Avoid short term contracts since those can impact diversity differently (see more details on career continuity in the associated guideline)

K. Provide diversity and inclusion training program and practices for all researchers and research staff and increase awareness by providing a platform for exchange on diversity and inclusion[1]

- Training should include a broad range of topics, such as cultural awareness, tolerance and openness, acceptance of different ideas and viewpoints, diversity policies and practices, unconscious bias, sex/gender dimensions in research, intersectionality issues, etc.

L. Adopt models, examples, and success stories to showcase the benefits of diversity and inclusion. For example, give prizes and visibility to research

teams where diversity efforts were successful or name important structures such as buildings and aulas to reflect diversity.

Best practice examples

1. When political events in which diversity issues are discussed, events and discussion can be organised in the institution as a platform to increase awareness

4. Collect data on diversity and inclusion

Implement a structure of data collection and metrics for diversity and inclusion

Data collection and metrics on diversity and inclusion enable research institutions to evaluate whether the policies they put in place are effective at improving diversity in the institution. These should be at the center of any diversity and inclusion guideline or policy will aid in improving the D&I policy

A. Monitor diversity policies to ensure that they are adapted to the context and remain helpful without generating further discrimination

B. Include all aspects of diversity in the data collection: including gender, ethnicity, disabilities, socio-economic background, etc.

C. Transparently report the progress on diversity initiatives and diversity metrics (e.g., on the university website), transparently reflecting on the areas that require further efforts in the institution[1]

Best practice examples

1. Using comparative metrics with other institutions can help motivate efforts on diversity and inclusion

5. Ensure a safe environment for all

Ensure a safe environment for all

Discrimination is often invisible to the majority, especially when those who feel discriminated do not feel safe enough to raise their voice. Research institutions can help to foster a safe environment in which clear mechanisms are in place to help minorities communicate their perspective and concerns.

A. Ensure that researchers can work in a safe, inclusive and open environment where they feel responsible and accountable, can share their thoughts, feelings, and concerns about diversity and inclusion, racism, sexual harassment and discrimination[1]

B. Have safe and transparent mechanisms in place for reporting diversity and inclusion issues

C. Adopt and uphold strict consequences for derogatory and discriminatory behaviours

D. Provide support structures to allow mediation and discussion

Best practice examples

1. Involving affected collectives is the best way to determine what a safe environment means to them.

Guideline development process

These guidelines are based on empirical work done by the SOPs4RI consortium. We identified available recommendations on the topic, as well as gaps and lacunas using two scoping reviews on best practices for research integrity promotion [1] and the implementation factors of these [2]; 23 interviews with research integrity experts [3]; and a Delphi consensus-study with 68 research policy makers and research leaders across Europe [4] To ensure sensitivity to various disciplinary contexts, we also conducted 30 focus groups with researchers and other research stakeholders from different disciplines and countries in Europe [5,6]. Following this, we organized 4 co-creation workshops with various research stakeholders to draft the guidelines, the intentions to produce a wide range of practical ideas for the guidelines taking into account users' needs [7,8]. To revise the guidelines, we worked in a small working group with the aim to prioritize, reorganize and optimize the guideline elements (see the revision protocol at https://osf.io/f9ghj/). Our working groups incorporated the results of a European-wide survey on research integrity, including input from over 50 000 researchers [ref]. Furthermore, the working group also sought expert input on the guidelines from external advisors. The guidelines are now ready to be piloted by a number of organizations taking part in the SOPs4RI pilot. Based on the results of the pilot, we will undergo a final revision of the guidelines, to finalize them.

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Names

SOPs4RI guideline revision working group members

Names

External advisors

names

References

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Appendix VIII – **Guidelines on integrity in the PhD trajectory for research performing organisations (*Supervision and Mentoring*)**

Guidelines on research integrity in PhD trajectory for research performing organizations

Guidelines on research integrity in PhD trajectory for research performing organizations

When it comes to research integrity, research organisations, supervisors, and mentors have an important role in shaping students' attitudes and behavior. By adhering to responsible supervision practices in everyday work and being actively involved in educational and support activities, research organisations and supervisors create an environment where early career researchers can conduct research professionally and with honesty and integrity. The relationship between students and supervisors is a unique relationship that requires respect, openness, and accountability from both sides. To achieve these, it is important that both students and supervisors are familiar with their roles and responsibilities and that both sides are aware of requirements and expectations during the PhD trajectory. This guideline is intended for research organisations to set a foundation for responsible supervision and create healthy culture and climate in which responsibilities, roles, and rules are known and respected. By creating this environment, research organisations enable supervisors to act as role models and PhD students to fulfill their full research potential.

Guidelines on research integrity in PhD trajectory for research performing organizations

Key recommendations:

1. Develop a document for PhD students containing essential information related to PhD trajectory
2. Provide adequate training and support for PhD students
3. Require PhD students and supervisors to sign a written agreement regarding supervision at the beginning or in the early stage of the career trajectory
4. Provide independent bodies that students and supervisors can turn to in case of problems

1. Develop a document for PhD students containing essential information related to PhD trajectory

Raising awareness on research integrity and responsible supervision in PhD studies will improve students' and supervisors' knowledge and experiences on existing rules, policies, rights, and responsibilities during a PhD trajectory.

a. **The document should be presented to PhD students before or no later than at the time of enrolling in the PhD studies.**
b. **The document should contain essential information related, but not limited to institutional and national rules, policies, and guidelines, rights and responsibilities of PhD students and supervisors, procedures to change supervisors or terminate a PhD trajectory, ethical considerations, support structures, and practicalities about students' research projects.**
c. **When developing the document, use and promote supervision guidelines presented in the national and international codes of conduct and other relevant guidance documents**

2. Provide adequate training and support for PhD students

Organizations are responsible for prioritising education on responsible supervision and for creating a trustworthy environment which fosters open communication and dialogue.

d. Host educational and training activities for PhD students on responsible supervision and mentoring (e.g., seminars, workshops, lectures)
e. Create, implement, make visible, and approachable support structures for the well-being, care, and mental health issues of students (optional)
f. If possible, ensure tailoring support to meet the needs of individual students (to increase awareness of individuals' own needs) and create extra support mechanisms for foreign and guest students
g. Incentivize the PhD community to set up peer-to-peer support groups and groups to foster interaction among PhDs between and across disciplines and help to make these activities visible and approachable.
h. Support and promote organizing the events where former PhD students can share practical advice and tips with current students
i. Create opportunities for PhD students to supervise junior (master students) students in their research projects

3. Require PhD students and supervisors to sign a written agreement regarding supervision at the beginning or in the early stage of the career trajectory

Having clearly and defined standards, responsibilities, and expectations from all parties involved in the PhD trajectory will enable good cooperation and successful completion of research tasks.

j. **The agreement should center around creating good cooperation between supervisor and supervisee**

k. **The agreement should address and set the common understanding on expectations, roles, rights, and responsibilities of involved parties to incentivize not only practical issues but also social relationships**

4. Provide independent bodies that students and supervisors can turn to in case of problems

It is important to have processes and support structures in place for resolving potential issues and disputes that may arise during PhD trajectory.

l. The independent bodies can be internal or external, and their responsibilities in handling conflicts and problems between supervisors and supervisees need to be clearly defined

m. The Ensure bodies for resolving issues are visible, available, and approachable for students to turn to when facing problems with their supervisors

Best practice example

Example 1: Provide PhD students with an independent mentor (preferably someone who does not have much interaction with the supervisors to avoid conflict of interest) with whom they can meet once a year.

Example 2: If PhD students want to change supervisors or terminate their PhD, have an external board draw up conclusion on the request.

Guideline development process

These guidelines are based on empirical work done by the SOPs4RI consortium. We identified available recommendations on the topic, as well as gaps and lacunas using two scoping reviews on best practices for research integrity promotion [1] and the implementation factors of these [2]; 23 interviews with research integrity experts [3]; and a Delphi consensus-study with 68 research policy makers and research leaders across Europe [4] To ensure sensitivity to various disciplinary contexts, we also conducted 30 focus groups with researchers and other research stakeholders from different disciplines and countries in Europe [5,6]. Following this, we organized 4 co-creation workshops with various research stakeholders to draft the guidelines, the intentions to produce a wide range of practical ideas for the guidelines taking into account users' needs [7,8]. To revise the guidelines, we worked in a small working group with the aim to prioritize, reorganize and optimize the guideline elements (see the revision protocol at https://osf.io/f9ghj/). Our working groups incorporated the results of a European-wide survey on research integrity, including input from over 50 000 researchers [ref]. Furthermore, the working group also sought expert input on the guidelines from external advisors. The guidelines are now ready to be piloted by a number of organizations taking part in the SOPs4RI pilot. Based on the results of the pilot, we will undergo a final revision of the guidelines, to finalize them.

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Names

SOPs4RI guideline revision working group members

Names

External advisors

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Appendix IX – **Guidelines on research integrity in PhD trajectory for research performing organisations (Supervision and Mentoring)**

Guidelines on research integrity in PhD trajectory for research performing organizations

Supervision and mentoring

Guidelines on research integrity in PhD trajectory for research performing organizations – Supervision and Mentoring

When it comes to research integrity, research performing organisations (RPOs), supervisors, and mentors have an important role. It is not without reason that insufficient supervision is considered as the most impactful questionable research practice as supervisors have an extremely important role to play in the education and training of PhD students and foster responsible behavior in students. In this guideline, we will present a set of recommendations that can help institutions to improve their supervision structures and give more support to supervisors in order to improve their supervisionskills. The guideline contains a set of key and nested recommendations that can aspire RPOs to improve their supportstructures for supervisors to provide knowledge, training and support to their supervisors and reward supervision skills in the evaluation/assessment of researchers. The recommendations consist of key recommendations, followed by nested recommendations. Some also are labeled as optional as we consider these not always applicable in diverse settings, countries or disciplines. Furthermore, most are formulated as aspirational with the intention to inspire. With these recommendations, policymakers can implement them in institutions to create a vertile soil for responsible supervision by responsible supervisors.

Guidelines on research integrity in PhD trajectory for research performing organizations

Key recommendations:

1. **Develop a document for supervisors with relevant information and requirements for responsible supervision**
2. **Provide (obligatory) training on supervision to all supervisors**
3. **Promote a positive research environment which fosters good supervision**
4. **Reward and recognize good supervision and make it part of evaluation structures**

1. **Develop a document for supervisors with relevant information and requirements for responsible supervision**

Raising awareness on research integrity and responsible supervision in supervisors with improve supervisors' knowledge, skills and experiences on existing rules, policies, rights, and responsibilities for supervisors. Responsible and skillful supervision should be at the core of supervision tasks

a. *Provide supervisors with a list of requirements to meet as supervisors, such as:*

Knowledge and awareness

i. Familiarity with and knowledge of PhD procedures
ii. Ensuring that supervisees are aware of PhD procedures
iii. Knowledge of relevant policies and institutional structures related to supervision
iv. Knowledge of the institutional support structures, when there is a need to refer the supervisee to other personnel (e.g. for psycho-social support or mental health issues).
v. Provide supervisors with concrete examples of good supervision to teach how supervisors can serve as an exemplar for their supervisees (optional)

Skills

vi. The skills necessary to communicate effectively with supervisees from different disciplines/cultures
vii. Taking the time to explain decisions to the supervisee to engage the supervisee in the decision process
viii. Ensure that supervisors are sufficiently qualified in the specific research field of their supervisee
ix. Assign multiple supervisors per PhD student (preferable/optional)

b. *Provide supervisors with the necessary support structures needed to supervise*

i. Provide and disseminate clear rules, guidelines and procedures about supervision
ii. Enable and support co-supervisors can support each other in supervision tasks
iii. Implement a communication policy between supervisors and higher management levels to ensure good cooperation between all parties, and setting expectations on roles and responsibilities regarding good supervision
iv. How to provide support and personal guidance to the supervisee

c. *Facilitate and stimulate peer to peer support groups for supervisors*
d. *Possible options for peer to peer support include the organization of:*
   i. Interdisciplinary supervisor workshops
   ii. Meetings between supervisors to exchange experiences
   iii. The exchange of knowledge and experience through co-supervision
e. *In some circumstances, consider allowing researchers who do not wish to supervise to progress in their academic career without the need to supervise (room for everyone's talent).*
f. *Ensure that supervisors have sufficient time for supervising research*
   i. Allocate official research time to all doing research, including e.g. clinical researchers
   ii. Allocate official supervision time to all supervisors of research
   iii. Limit the number of PhD students per supervisor

2. **Provide (obligatory) training on supervision to all supervisors**
   Organizations are responsible for prioritising education on responsible supervision and for creating a trustworthy environment which fosters open communication and dialogue.
   a. Implement repeated supervision training to ensure continued learning as a supervisors to keep skills and knowledge up to date
   b. Include a broad range of skills in the training, including skills to ensure that supervisors learn how to listen and communicate
   c. Involve more experienced supervisors in the training of less experienced supervisors

3. Promote a positive research environment which fosters good supervision

Although it is hard to create a positive research climate which fosters responsible supervision, there are a couple of things institutions can do to improve the research environment by improving supervision support structures and to solve potential issues and disputes that may arise in the relation between supervisor and supervisee. Below there are several suggestions that can help.

a. *Value supervision as an important part of the research endeavor*
b. *Use supervision trainings as a tool of fostering culture change (optional)*
c. *Promote and implement a positive error culture, where individuals are allowed to make mistakes (optional, not very concrete)*
d. *Facilitate a positive interaction between students and supervisors*
    i. Facilitate discussions, open and direct communication, between supervisors and students
    ii. Promote an 'open door culture', where supervisees perceive a low barrier to contacting their supervisors – both offline and online
e. *Organise regular meet-ups, especially at the start of the PhD, between the supervisor and supervisee and provide supervisors with guidance on what to discuss with supervisees, e.g.*
    i. Establish best practices for research/supervision
    ii. Support students in all phases of their research (i.e., also when they obtain disappointing results)
    iii. Ask about their well-being and perceived problems
    iv. Acknowledge the academic accomplishments of supervisees
    v. Engage in open and responsive communication with the PhD student about questionable research practices
    vi. Create a structure of regular constructive feedback between supervisor and supervisee, and superiors of supervisor

4. **Reward and recognize good supervision and make it part of evaluation structures**

It is important to reward and recognize good supervision and make supervision part of evaluation schemes.

a. *Reward good supervision with tangible rewards, such as funding, financial rewards and career advancement*
b. *Give supervision more acknowledgment as an important task in the research process*
c. *Set-up a body to periodically evaluate supervision and provide feedback*
d. *Address supervision problems in evaluation meetings*

5. **Optional key recommendation: make supervisors and PhD students to sign agreements regarding supervision**

Having clearly and defined standards, responsibilities, and expectations from all parties involved in the PhD trajectory will enable good cooperation and successful completion of research tasks.

a. The agreement should center around creating good cooperation between supervisor and supervisee
b. The agreement should address and set the common understanding on expectations, roles, rights, and responsibilities of involved parties to incentivize not only practical issues but also social relationships

Best practice example

- Example 1: When providing training for supervisors, provide separate training for starting and experienced supervisors
- Example 2: Reward and stimulate good supervision by attributing a supervisor-of-the-year award

Guideline development process

These guidelines are based on empirical work done by the SOPs4RI consortium. We identified available recommendations on the topic, as well as gaps and lacunas using two scoping reviews on best practices for research integrity promotion [1] and the implementation factors of these [2]; 23 interviews with research integrity experts [3]; and a Delphi consensus-study with 68 research policy makers and research leaders across Europe [4] To ensure sensitivity to various disciplinary contexts, we also conducted 30 focus groups with researchers and other research stakeholders from different disciplines and countries in Europe [5,6]. Following this, we organized 4 co-creation workshops with various research stakeholders to draft the guidelines, the intentions to produce a wide range of practical ideas for the guidelines taking into account users' needs [7,8]. To revise the guidelines, we worked in a small working group with the aim to prioritize, reorganize and optimize the guideline elements (see the revision protocol at https://osf.io/f9ghj/). Our working groups incorporated the results of a European-wide survey on research integrity, including input from over 50 000 researchers [ref]. Furthermore, the working group also sought expert input on the guidelines from external advisors. The guidelines are now ready to be piloted by a number of organizations taking part in the SOPs4RI pilot. Based on the results of the pilot, we will undergo a final revision of the guidelines, to finalize them.

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Appendix X – **Guidelines for building and leading an effective team in research performing organisations**

Guidelines for Building and Leading an Effective Team in Research Performing Organizations

Guidelines for Building and Leading an effective Team in Research Performing Organisations

Principal Investigators (PIs) that have the responsibility of being heads of large research teams are been put into a role that includes administration, management, allocation of financial resources and lab infrastructure, mentoring and guiding/inspiring young scientists to achieve their full potential. In most cases PIs receive little or no training in leadership skills to help them achieve their full potential as leaders. According to a survey, published in 2017, one-quarter of the respondents were dissatisfied with their adviser's guidance on research. These guidelines will aid RPOs to provide their senior researchers that are bound to become PIs with the guidance and resources they need to be able to bult and lead an effective research group. As a result, these guidelines are to be used by decision makers at the highest levels of RPO administration, senior researchers and PIs. The guidelines are composed of seven Key Recommendations, each one of which is broken down into nested recommendations. In some cases the nested recommendations are further broken down in more detailed guidelines, for the sake of completeness. The guidelines provide a comprehensive set of recommendations that an RPO can uptake and apply in its entirety or parts of it, according to its specific needs.

Guidelines for Building and Leading an effective Team in Research Performing Organisations

Key recommendations:

1. The responsibilities of research leaders should be stipulated
2. Organizational support structures facilitating leadership need to be in place
3. Provide research leaders with the time, skills, and resources to build a strong research team
4. Facilitate training for leaders
5. Ensure that research leaders support their team members
6. Reward and recognize good leadership, create evaluation criteria and make it part of evaluation structures
7. Ensure academic freedom by providing research leaders, and in extension the research teams, with adequate opportunities and possibilities to determine the direction of the research

1. The responsibilities of research leaders should be stipulated

It should be clear to PIs and members of a research group what are the responsibilities of the leader. By demarcating the responsibilities of the leader, internal friction between members of the research group and between the leader and members of the research group can be minimized and a healthy working environment is can be cultivated and preserved.

a. Institutions should clearly describe and demarcate the responsibilities of the institutions and of the research leaders
b. Institutions should communicate the responsibilities to research leaders – and communicate which responsibilities are the institutions'
c. Institutions should provide clear guidance to team leaders how to manage their teams as well as setting out clear lines of accountability
d. Institutions should ensure that team leaders do not have research groups that are too large to be effectively managed
e. Institutions should incentivized to stay involved in the research process themselves
f. Research leaders should devote attention to individual research and team members
g. Research leaders should ensure cooperation and communication among team members
h. Research leaders should ensure team members are performing the tasks which are right for them (*team members are content/happy with their tasks)*

2. Organizational support structures facilitating leadership need to be in place

RPOs should aid PIs in their challenging task, by providing all necessary help, both in terms of alleviating their work load relevant to bureaucratic procedures and in terms of creating the appropriate mediating procedures when leadership issues arise.

a. Improve support services for research leaders concerning
   i. Finances
   ii. Grant writing and publications
   iii. Transparent management
   iv. Easing the administrative burden/work of research leaders
   v. Development of interpersonal skills to improve leadership style
b. Improve protection of research leadership against issues of
   i. Research misconduct
   ii. Leadership failure
c. When leadership issues arise in the institution, transparently report the concerns to ensure that they are dealt with
d. Organise "leaders for leaders support groups" for research leaders to learn, support, exchange, discuss, engage and share experiences, ideas and knowledge

3. Provide research leaders with the time, skills, and resources to build a strong research team

RPOs should provide to their PIs the necessary skils needed to lead a research team that works in an environment that boosts collegiality and creativity.

a. Ensure that research leaders are able to create a positive environment
b. Provide sufficient resources to research leaders to create good teams, create support structures and create a good facility
c. Ensure that research leaders have the skills and resources to build their own team with their own knowledge base in which a diversity of profiles (diverse skills and backgrounds) can thrive

4. Facilitate training for leaders

RPOs should provide to their PIs the necessary training in order be able to apply an effective and afficient leadership.

a. The content of the training should include:
   i. Sessions or courses on improving knowledge and communication on research integrity
   ii. Improving interpersonal and leadership skills, such as management skills, listening skills, empathic skills
b. Training should become part of the employment package (and be mandatory)
c. Train research leaders on important skills for research leaders, such as:
   i. Share skills with the research team
   ii. Good communication skills - institutions should require research leaders to develop clear policies and procedures on collecting, maintaining and communicating data with the research group/team
   iii. Keeping a positive attitude
   iv. Interpersonal skills and empathy
   v. Good supervisor skills
   vi. skills in research administration

5. Ensure that research leaders support their team members

RPOs should ensure the deployment of the right people to the positions of research leaders.

a. Ensure research leaders can devote and spend sufficient time to each research project
b. Incentivize research leaders to empower individual researchers (i.e., team members) to do research and to explore and follow their interests.
c. Incentivize research leaders to consider the interests of the team before their own interests, where appropriate
d. Measures should be in place to prevent the abuse of power and exploitation of dependent relationships, both at the leadership level and the individual level
e. Provide guidance to leaders on balancing their time between their own needs and those of their team members
f. Provide support services for well-being and mental health of research leaders

6. Reward and recognize good leadership, create evaluation criteria and make it part of evaluation structures

RPOs should provide to research leaders the incentives to keep up to the highest standards of leadership.

a. Create a working ethos that sees good leadership as important for the conduct of research
b. Recognize supervision as an important task of a research leader
c. Allow researchers/research leaders to set their own goals to realize different ambitions and talents
d. Assess and reward good leadership (e.g., feedback from colleagues)
e. Criteria for promotions and assessment should include other elements besides publications and grants (such as leadership, collaboration, open science practices, etc)
f. Have periodic reviews to assess leadership
g. Ensure that research leaders are sufficiently qualified in their specific research field
h. In some circumstances, consider allowing researchers who are not suitable research leaders to progress in their career with other academic duties without the need to take on research leader tasks

7. Ensure academic freedom by providing research leaders, and in extension the research teams, with adequate opportunities and possibilities to determine the direction of their research

It is important to leave to PIs a margin of freedom from existing contractual obligations, in order for them to be able to seek any new ideas/research initiatives that depart from the original planning.

a. Research leaders should, if no other options are available, have the possibility to change the research plan
b. Any types of resulations either from RPOs and RFOs should not prevent the possibility to change the research plan under changing circumstances
c. Create a financial base that help research leaders to pursue curiosity driven research with their team

Best practice example

Example 1: Cold Spring Harbor Laboratory in New York provides interactive three-day workshops on leadership in bioscience on an annual base.

Example 2: The University of California, San Francisco, provides a 16-hour course on scientific leadership and management skills for individuals who may bacome leaders of research groups.

Guideline development process

These guidelines are based on empirical work done by the SOPs4RI consortium. We identified available recommendations on the topic, as well as gaps and lacunas using two scoping reviews on best practices for research integrity promotion [1] and the implementation factors of these [2]; 23 interviews with research integrity experts [3]; and a Delphi consensus-study with 68 research policy makers and research leaders across Europe [4] To ensure sensitivity to various disciplinary contexts, we also conducted 30 focus groups with researchers and other research stakeholders from different disciplines and countries in Europe [5,6]. Following this, we organized 4 co-creation workshops with various research stakeholders to draft the guidelines, the intentions to produce a wide range of practical ideas for the guidelines taking into account users' needs [7,8]. To revise the guidelines, we worked in a small working group with the aim to prioritize, reorganize and optimize the guideline elements (see the revision protocol at https://osf.io/f9ghj/). Our working groups incorporated the results of a European-wide survey on research integrity, including input from over 50 000 researchers [ref]. Furthermore, the working group also sought expert input on the guidelines from external advisors. The guidelines are now ready to be piloted by a number of organizations taking part in the SOPs4RI pilot. Based on the results of the pilot, we will undergo a final revision of the guidelines, to finalize them.

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Appendix XI **Guidelines for research performing organizationa on research integrity education of bachelor, master and PhD students**

Guidelines for research performing organizations on research integrity education of bachelor, master and PhD students

Guidelines for research performing organizations on research integrity education of bachelor, master and PhD students

Research integrity is about conducting high quality research, in accordance with high ethical and professional standards. Research integrity is crucial for the production of trustworthy knowledge. Research performing organizations have a responsibility to guide and support researchers in conducting research with integrity. One of the key research integrity responsibilities of research performing organizations is providing education and training in research integrity.

Education and training are needed to raise awareness about research integrity and provide researchers with the needed tools to promote responsible research practices. Research integrity education offered to bachelor, master and PhD students, ensures that students learn about responsible research practices at the start of their research trajectory.

This document provide guidance to research performing organizations on what to include in their research integrity education strategy for bachelor, master and PhD students. The guideline provide information relevant for research officers, trainers, managers, and coordinators, as well as deans, rectors and other institutional leaders.

Please note:

- We use the term research integrity 'education' to refer to all approaches used to develop understanding, skills, appreciation for, and knowledge about research integrity.

- When we discuss 'training', we refer to specific formal instructional events used for research integrity education, such as courses and workshops.

Guidelines for research performing organizations on research integrity education of bachelor, master and PhD students

Key recommendations:

1. Integrate into bachelor and master curriculum
2. Deliver mandatory course for PhD students
3. Provide follow-up courses for PhD students
4. Discuss research integrity informally
5. Provide train-the-trainer education
6. Use blended-learning formats
7. Emphasize practice over theory
8. Motivate and reward
9. Evaluate

1. Integrate research integrity education into the bachelor and master curriculum, making it mandatory

Why?: Starting research integrity education as early as possible in the academic curriculum ensures that students learn responsible research behaviors as they are being taught about research.

a. Set a minimum number of contact hours to dedicate to research integrity throughout the curriculum
b. Integrate research integrity education into the introduction to the study curriculum
c. Integrate research integrity education into the thesis research process

Best practice example

Example 1: Path2Integrity learning materials

2. Deliver a mandatory research integrity course at the start of the PhD trajectory

Why?: A mandatory research integrity course ensures that all PhD students are familiarized about research integrity and empowered to engage in responsible research practices.

a. Provide this research integrity training as a complete course, with a minimum number of contact hours and ECTs
b. During the course, teach students about research integrity principles, policies and norms
c. During the course, stimulate students to share and discuss potential differences in their understanding and application of research integrity norms
d. During the course, stimulate students to discuss potential research integrity challenges as well as ways of dealing with them
e. Organize interaction between PhD students and more senior researchers about research integrity as part of the course
f. Involve representatives from multiple disciplines. For instance, a faculty could decide to include both biologists and chemists in one course.

Best practice example

Example 1: 'Research ethics for human science' at Stockholm University

Example 2: Research integrity training at Nanyang Technological University Singapore

3. Provide PhD students with follow-up elective courses on research integrity

Why?: As PhD students progress with their research, they will uncover new research integrity questions and challenges. Follow-up resources and research integrity courses on discipline-specific topics can equip students to address new challenges responsibly.

a. Set a minimum requirement about how often students are to follow a discipline-specific elective research integrity course
b. Provide students with access to educational resources on research integrity, such as online training and online accessible materials like codes of conduct and relevant guidelines.

Best practice example

Example 1: 'Research ethics for human science' at Stockholm University

Example 2: 'Research data management' at Vrije Universiteit Amsterdam

4. Organize possibilities to discuss research integrity informally

Why?: A good research culture entails the possibility for researchers to openly discuss concerns and challenges, and serves as a basis for successful research integrity education.

a. Develop policies for building a responsible research environment, as a prerequisite for open discussion during research integrity education [link to research environment guidelines here]
b. Provide concrete suggestions and tools during research integrity training on how to collaborate responsibly with colleagues and supervisors
c. Stimulate faculties and departments to organize a minimum number of informal events a year to discuss research integrity challenges and solutions
    i. Involve researchers across seniority levels
    ii. Involve representatives from multiple disciplines

Best practice example

Example 1: 'Met de billen bloot'- Alzheimer Center, Amsterdam UMC

5. Provide train-the-trainer education and basic qualifications for research integrity trainers

Why?: Train-the-trainer education ensures that research integrity trainers are qualified and enthusiastic. In case institutions lack resources, they can collaborate with trainers and train-the-trainer programs in other institutions.

a. Provide train-the-trainer education and qualifications for research integrity trainers, focusing on the basics of research integrity and didactic skills
b. Provide additional topic-specific training and qualifications for trainers of elective discipline-specific research integrity courses (for instance data management training for data management curators)
c. Where necessary, collaborate with trainers or training programs from other institutions to deliver quality research integrity training

Best practice example

Example 1: VIRT2UE training program

6. Use blended learning formats

Why?: Blended-learning formats allow students to benefit from the advantages of online and offline training approaches. Online training can be more efficient for informing students about research integrity basics, and allows students to turn back to training materials and form online support groups. Offline training is suitable for joint discussion of and reflection on the material covered in the online training.

a. Use online training programs to inform students about principles, policies and norms
b. Ensure that students are able to turn back to the online training material at later timepoints and inform students accordingly
c. Use offline training to stimulate discussion and reflection among students in class
d. Provide students with the means to organize peer support groups and encourage them to maintain contact with their group

Best practice example

Example 1: Epigeum course on research integrity

Example 2: VIRT2UE training program

7. Emphasize practice over theory in research integrity education

Why?: Focusing on the concrete needs of researchers in their daily practice, rather than merely addressing theory, makes research integrity education appealing, useful and relevant to students. Any research integrity principles, policies or norms taught should be connected to actual research practice.

a. Discuss case studies and real life examples during research integrity education events
b. Integrate research integrity principles, policies and standards with discussions of the daily practice of research
c. Consult with potential participants on what to cover during educational events and update the event based on participants' needs in practice

Best practice example

Example 1: VIRT2UE training program

8. Motivate and reward students to actively take part in research integrity education

Why?: Motivations and rewards help students see the value and importance of research integrity and foster active engagement with research integrity education.

a. Communicate the purpose and value of research integrity education
b. Frame research integrity training as an opportunity to reflect on how to improve research, rather than an attempt to merely tell students what to do or focus on research misconduct
c. Provide students with a tangible reward after completion of training, such as a digital badges or free meals
d. When possible, consult with students about what rewards and incentives motivate them to engage actively with research integrity education, and tailor these accordingly

9. Evaluate educational programs

Why?: Evaluations of educational programs provide valuable information to research integrity trainers and institutions on how to improve and further develop research integrity education.

a. Following each research integrity educational event, conduct an evaluation of the event
b. Use subjective measures such as trainees' perceptions of course usefulness
c. Use follow-up measures, such as the number of participants enrolled in elective courses
d. Review the evaluation information when organizing the next educational event, to continuously update and improve research integrity education

Guideline development process

These guidelines are based on empirical work done by the SOPs4RI consortium. We identified available recommendations on the topic, as well as gaps and lacunas using two scoping reviews on best practices for research integrity promotion [1] and the implementation factors of these [2]; 23 interviews with research integrity experts [3]; and a Delphi consensus-study with 68 research policy makers and research leaders across Europe [4] To ensure sensitivity to various disciplinary contexts, we also conducted 30 focus groups with researchers and other research stakeholders from different disciplines and countries in Europe [5,6]. Following this, we organized 4 co-creation workshops with various research stakeholders to draft the guidelines, the intentions to produce a wide range of practical ideas for the guidelines taking into account users' needs [7,8]. To revise the guidelines, we worked in a small working group with the aim to prioritize, reorganize and optimize the guideline elements (see the revision protocol at https://osf.io/f9ghj/). Our working groups incorporated the results of a European-wide survey on research integrity, including input from over 50 000 researchers [ref]. Furthermore, the working group also sought expert input on the guidelines from external advisors. The guidelines are now ready to be piloted by a number of organizations taking part in the SOPs4RI pilot. Based on the results of the pilot, we will undergo a final revision of the guidelines, to finalize them.

Co-creators (from the SOPs4RI co-creation workshops)

Names

SOPs4RI guideline revision working group members

Names

External advisors

names

References

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Appendix XII – **Guidelines for research performing organisations on the research integrity education of post-doctorate and senior researchers**

Guidelines for research performing organizations on the research integrity education of post-doctorate and senior researchers

Guidelines for research performing organizations on the research integrity education of post-doctorate and senior researchers

Research integrity is about conducting high quality research, in accordance with high ethical and professional standards. Research integrity is crucial for the production of trustworthy knowledge. Research performing organizations have a responsibility to guide and support researchers in conducting research with integrity. One of the key research integrity responsibilities of research performing organizations is providing education and training in research integrity.

Education and training are needed to raise awareness about research integrity and provide researchers with the needed tools to promote responsible research practices. Research integrity education offered to post-doctorate and senior researchers ensures awareness about research integrity among researchers across seniority levels, and helps researchers to stay up to date with the latest developments regarding research integrity.

This document provide guidance to research performing organizations on what to include in their research integrity education strategy for post-doctorate and senior researchers. The guideline provides information relevant for research officers, trainers, managers, and coordinators, as well as deans, rectors and other institutional leaders.

Please note:

- We use the term research integrity 'education' to refer to all approaches used to develop understanding, skills, appreciation for, and knowledge about research integrity.

- When we discuss 'training', we refer to specific formal instructional events used for research integrity education, such as courses and workshops.

Guidelines for research performing organizations on the research integrity education of post-doctorate and senior researchers

Key recommendations:

1. Deliver mandatory training for new positions
2. Provide follow-up training
3. Involve seniors in the training of students and juniors
4. Discuss research integrity informally
5. Provide train-the trainer education
6. Use blended learning formats
7. Tailor education to researcher needs
8. Motivate and reward
9. Evaluate

1. Deliver mandatory training about research integrity for researchers starting new positions

Why?: Mandatory training for those starting new positions ensures that researchers have the awareness and skills necessary to conduct their research and fulfil their roles responsibly from the outset.

a. Provide this research integrity training as a smaller workshop rather than a complete course
b. Include training as part of introduction package for new employees at the institution
c. Include training as part of introduction of employees starting a new position in the same institution, for instance those being promoted as new supervisors or professors
d. During the training, inform researchers about research integrity principles, policies and norms
e. During the training, address the specific responsibilities and skills required for the new position. For instance, training for new supervisors should address supervision skills.
f. During the training, stimulate researchers to discuss research integrity challenges as well as ways of dealing with them
g. During the training, stimulate researchers to share and discuss potential differences in their understanding and application of research integrity norms
h. If post-doctorate researchers have not yet followed a PhD level research integrity training, stimulate them to follow a PhD research integrity course as well

Best practice example

Example 1: Training at University College London

2. Provide researchers with follow-up specialized training on research integrity

Why?: Follow-up training focusing on specific research integrity topics, such as integrity challenges faced during data management, supports researchers in keeping up with the latest research regulations and policies.

a. Provide follow-up training as smaller workshops rather than complete courses.
b. Set a minimum requirement about how often researchers are to follow a discipline-specific follow-up research integrity training
c. Whenever there are changes to research regulations and policies, provide researchers with educational resources to update them, such as online training and online accessible materials like codes of conduct and relevant guidelines.

Best practice example

Example 1: 'Research data management' at Vrije Universiteit Amsterdam

3. Involve senior researchers in the research integrity training of students and junior researchers

Why?: Interaction between students, junior and senior researchers about research integrity can help researchers to learn from each other and commit more strongly to research integrity. There are numerous ways to organize such an interaction, as shown by the examples below:

a. Stimulate students and junior researchers to reflect on research integrity together with their supervisors, as part of their research integrity training assignments
b. Invite senior researchers to share experiences, examples, and challenges relating to research integrity as part of the research integrity training of students and junior researchers.

4. Organize possibilities to discuss research integrity informally

Why?: An open and inclusive research culture entails the possibility for researchers to openly discuss concerns and challenges, and serves as a basis for successful research integrity education.

a. Develop policies for building a responsible research environment, as a prerequisite for open discussion during research integrity education [link to research environment guidelines here]
b. Provide concrete suggestions and tools during research integrity training on how to collaborate responsibly with colleagues, supervisors and supervisees
c. Stimulate faculties and departments to organize a minimum number of informal events a year to discuss research integrity challenges and solutions
    a. Involve researchers across seniority levels
    b. Involve representatives from multiple disciplines.

Best practice example

Example 1: 'Met de billen bloot'- Alzheimer Center, Amsterdam UMC

5. Provide train-the-trainer education and basic qualifications for research integrity trainers

Why?: Train-the-trainer education ensures that research integrity trainers are qualified and enthusiastic. In case institutions lack resources, they can collaborate with trainers and train-the-trainer programs in other institutions.

a. Provide train-the-trainer education and qualifications for research integrity trainers, focusing on the basics of research integrity and didactic skills
b. Provide additional topic-specific training and qualifications for trainers of elective discipline-specific research integrity courses (for instance data management training for data management curators)
c. Where necessary, collaborate with trainers or training programs from other institutions to deliver quality research integrity training

Best practice example

Example 1: VIRT2UE training program

6. Use blended learning formats

Why?: Blended-learning formats allow researchers to benefit from the advantages of online and offline training approaches. Online training can be more efficient for informing researchers about research integrity basics, and allows trainees to turn back to training materials and form online support groups. Offline training is suitable for joint discussion of and reflection on the material covered in the online training.

a. Use online training programs to inform trainees about principles, policies and norms
b. Ensure that trainees are able to turn back to the online training material at later timepoints and inform them accordingly
c. Use offline training to stimulate discussion and reflection among researchers
d. Provide researchers with the means to organize peer support groups and encourage them to maintain contact with their group

Best practice example

Example 1: 'Mind the gap' – KU Leuven

7. Consult researchers about their research integrity education needs and tailor education accordingly

Why?: Researchers from different ranks and disciplines might have different research integrity education needs. A bottom up approach, where researchers are first consulted to assess what their needs are, and education is then tailored accordingly, ensures that research integrity education is useful and relevant.

a. Decide how frequently to conduct an education needs analysis in the institution
b. When conducting the education needs analysis, include researchers from different ranks and disciplines in the institution
c. Tailor research integrity education events to adequately address the needs identified for the specific target group
d. If possible, when designing new educational events, plan a consultation meeting with potential participants to obtain their input on how to develop and implement the event

8. Motivate and reward researchers to actively take part in research integrity education

Why?: Research integrity education may be perceived as time consuming and of little priority for researchers. Motivations and rewards help researchers see the value and importance of research integrity and foster active engagement with research integrity education.

a. Reward researchers for participation in research integrity education and showing commitment to research integrity in promotions and evaluations
b. Communicate the purpose and value of research integrity education
c. Frame research integrity training as an opportunity to reflect on how to improve research, rather than an attempt to merely tell researchers what to do or focus on research misconduct
d. Where necessary, integrate research integrity training into existing mandatory training about research conduct
e. In case of resistance to training, consider labelling training as 'Masterclass' rather than training to make them sound appealing
f. In case of resistance to training, consider not labelling training with normative titles such as 'research integrity', but rather use more relatable and neutral terms such as 'research practices'
g. Highlight the importance of research integrity for the institutional and researcher's reputation

9. Evaluate educational programs

Why?: Evaluations of educational programs provide valuable information to research integrity trainers and institutions on how to improve and further develop research integrity education.

a. Following each research integrity training or informal educational event, conduct an evaluation of the training or event
b. Use subjective measures such as trainees' perceptions of course usefulness
c. Use follow-up measures, such as the number of participants enrolled in elective courses
d. Review the evaluation information when organizing the next educational event, to continuously update and improve research integrity education

Guideline development process

These guidelines are based on empirical work done by the SOPs4RI consortium. We identified available recommendations on the topic, as well as gaps and lacunas using two scoping reviews on best practices for research integrity promotion [1] and the implementation factors of these [2]; 23 interviews with research integrity experts [3]; and a Delphi consensus-study with 68 research policy makers and research leaders across Europe [4] To ensure sensitivity to various disciplinary contexts, we also conducted 30 focus groups with researchers and other research stakeholders from different disciplines and countries in Europe [5,6]. Following this, we organized 4 co-creation workshops with various research stakeholders to draft the guidelines, the intentions to produce a wide range of practical ideas for the guidelines taking into account users' needs [7,8]. To revise the guidelines, we worked in a small working group with the aim to prioritize, reorganize and optimize the guideline elements (see the revision protocol at https://osf.io/f9ghj/). Our working groups incorporated the results of a European-wide survey on research integrity, including input from over 50 000 researchers [ref]. Furthermore, the working group also sought expert input on the guidelines from external advisors. The guidelines are now ready to be piloted by a number of organizations taking part in the SOPs4RI pilot. Based on the results of the pilot, we will undergo a final revision of the guidelines, to finalize them.

Co-creators (from the SOPs4RI co-creation workshops)

Names

SOPs4RI guideline revision working group members

Names

External advisors

names

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Appendix XIII – **Guidelines for research performing organizations on the research integrity education of support staff and research integrity personnel**

Guidelines for research performing organizations on the research integrity education of support staff and research integrity personnel

Guidelines for research performing organizations on the research integrity education of support staff and research integrity personnel

Research integrity is about conducting high quality research, in accordance with high ethical and professional standards. Research integrity is crucial for the production of trustworthy knowledge. Research performing organizations have a responsibility to guide and support researchers in conducting research with integrity. One of the key research integrity responsibilities of research performing organizations is providing education and training in research integrity.

Education and training are needed to raise awareness about research integrity and provide stakeholders with the needed tools to promote responsible research practices. Not only researchers, but also support staff and research integrity personnel can benefit from research integrity education. Research integrity education can equip support staff and research integrity personnel to adequately support researchers in engaging in responsible research practices.

This document provide guidance to research performing organizations on what to include in their research integrity education strategy for support staff and research integrity personnel. The guideline provides information relevant for research officers, trainers, managers, and coordinators, as well as deans, rectors and other institutional leaders.

Please note:

- We use the term research integrity 'education' to refer to all approaches used to develop understanding, skills, appreciation for, and knowledge about research integrity.
- When we discuss 'training', we refer to specific formal instructional events used for research integrity education, such as courses and workshops.

Guidelines for research performing organizations on the research integrity education of support staff and research integrity personnel

Key recommendations:

1. Provide basic training
2. Organize coming together events
3. Provide train-the-trainer education
4. Organize follow-up education
5. Provide peer-to-peer learning opportunities
6. Motivate and reward
7. Evaluate

1. Provide research support staff with basic research integrity training

Why?: Educating all involved in research, including support staff, about research integrity contributes towards a culture of research integrity. Educating staff also ensures that staff are sufficiently informed to support researchers to engage in responsible research practice.

a. During the training, inform staff about research integrity principles, policies and norms
b. During the training, discuss disciplinary considerations in the application of the principles, policies and norms
c. During the training, inform staff about their responsibilities in supporting researchers with research integrity

2. Organize events where research integrity personnel come together to exchange questions and experiences, and discuss how to work together on research integrity

Why?: Bringing research integrity personnel together to share experiences and questions helps them to learn from each other, as well as to work better together in supporting researchers with responsible research practices.

a. Include research integrity committee members, data management personnel, research integrity trainers, research integrity and ethics researchers, research integrity policy staff, confidential counselors, ombudspersons, research integrity officers, and others involved in research integrity
b. Discuss past and potential research integrity case studies relevant for the institution, in a GDPR compliant manner
c. Discuss researchers' research integrity support needs
d. Discuss various research integrity personnel's roles and responsibilities in supporting researchers with research integrity
e. Discuss disciplinary considerations in the application of research integrity principles, policies and norms
f. Where possible, organize offline events and use online sessions to supplement offline sessions

3. Provide train-the-trainer education and basic qualifications for research integrity trainers

Why?: Train-the-trainer education ensures that research integrity trainers are qualified and enthusiastic. In case institutions lack resources, they can collaborate with trainers and train-the-trainer programs in other institutions.

a. Provide train-the-trainer education and qualifications for research integrity trainers, focusing on the basics of research integrity and didactic skills
b. Provide additional topic-specific training and qualifications for trainers of elective discipline-specific research integrity courses (for instance data management training for data management curators)
c. Where necessary, collaborate with trainers or training programs from other institutions to deliver quality research integrity training

Best practice example

Example 1: VIRT2UE training

4. Organize follow-up educational events when research integrity policies and regulations change

Why?: Follow up educational events are necessary to ensure that support staff and research integrity personnel remain up-to-date with the most recent policies and regulations on research integrity.

a. Integrate policy and regulation changes into the follow up events
b. Use examples and cases to illustrate new policies and regulations

5. Provide opportunities for peer-to-peer learning about research integrity

Why?: Peer-to-peer learning about research integrity can contribute to strengthening the research integrity culture by ensuring that all research stakeholders in the institution are aware of and committed to research integrity.

a. Develop policies for building a responsible research environment, as a prerequisite for open discussion during research integrity education [link to research environment guidelines here]
b. Provide continuous research integrity education to all students and researchers , in which the importance of research integrity for research is highlighted [link to continuous education guidelines here]
c. Provide opportunities and financial support for support staff, and research integrity personnel to participate in national and international support groups, seminars and workshops about research integrity
d. Support open access institutional research integrity resources, to allow research integrity personnel to share resources externally an facilitate peer-to-peer learning

Best practice example

Examples: ERION, Recaphe, Eurashe, EURAXESS

6. Motivate and reward support staff and research integrity personnel to actively take part in research integrity education

Why?: Support staff and research integrity personnel have many tasks and responsibilities. Motivations and rewards can ensure their active engagement with research integrity education.

a. Reward engagement of support staff and research integrity personnel in research integrity education during promotions and evaluations
b. Reward the work of research integrity personnel in fostering research integrity during promotions and evaluations
c. Reward researchers who also take on research integrity support roles during promotions and evaluations, for instance researchers who also serve as research integrity trainers, confidential advisors, or ombudspersons

7. Evaluate educational programs

Why?: Evaluations of educational programs provide valuable information to research integrity trainers and institutions on how to improve and further develop research integrity education.

a. Following each research integrity training or informal educational event, conduct an evaluation of the training or event
b. Use subjective measures such as trainees' perceptions of course usefulness
c. Use follow-up measures, such as the number of participants enrolled in optional training
d. Review the evaluation information when organizing the next educational event, to continuously update and improve research integrity education

Guideline development process

These guidelines are based on empirical work done by the SOPs4RI consortium. We identified available recommendations on the topic, as well as gaps and lacunas using two scoping reviews on best practices for research integrity promotion [1] and the implementation factors of these [2]; 23 interviews with research integrity experts [3]; and a Delphi consensus-study with 68 research policy makers and research leaders across Europe [4] To ensure sensitivity to various disciplinary contexts, we also conducted 30 focus groups with researchers and other research stakeholders from different disciplines and countries in Europe [5,6]. Following this, we organized 4 co-creation workshops with various research stakeholders to draft the guidelines, the intentions to produce a wide range of practical ideas for the guidelines taking into account users' needs [7,8]. To revise the guidelines, we worked in a small working group with the aim to prioritize, reorganize and optimize the guideline elements (see the revision protocol at https://osf.io/f9ghj/). Our working groups incorporated the results of a European-wide survey on research integrity, including input from over 50 000 researchers [ref]. Furthermore, the working group also sought expert input on the guidelines from external advisors. The guidelines are now ready to be piloted by a number of organizations taking part in the SOPs4RI pilot. Based on the results of the pilot, we will undergo a final revision of the guidelines, to finalize them.

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Names

SOPs4RI guideline revision working group members

Names

External advisors

names

References

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Appendix XIV – **Guidelines for research performing organizations on continuous research integrity education**

Guidelines for research performing organizations on continuous research integrity education

Guidelines for research performing organizations on continuous research integrity education

Research integrity is about conducting high quality research, in accordance with high ethical and professional standards. Research integrity is crucial for the production of trustworthy knowledge. Research performing organizations have a responsibility to guide and support researchers in conducting research with integrity. One of the key research integrity responsibilities of research performing organizations is providing education and training in research integrity. Education and training are needed to raise awareness about research integrity and provide researchers with the needed tools to promote responsible research practices.

Please note:

- We use the term research integrity 'education' to refer to all approaches used to develop understanding, skills, appreciation for, and knowledge about research integrity.
- When we discuss 'training', we refer to specific formal instructional events used for research integrity education, such as courses and workshops.

Training is an important aspect of research integrity education, but continuous research integrity education requires informal approaches to teaching about research integrity as well. These include teaching about research integrity through responsible supervision, socialization in a responsible research environment, as well as learning by doing.

This document provides guidance to research performing organizations on providing continuous research integrity education outside of formal training. The guideline provides information relevant for research officers, trainers, managers, and coordinators, as well as deans, rectors and other institutional leaders.

Guidelines for research performing organizations on continuous research integrity education

Key recommendations:

1. Provide educational resources
2. Show institutional commitment
3. Provide advice on day-to-day questions
4. Foster responsible supervision and leadership
5. Build a responsible research environment

1. Provide researchers with educational research integrity resources to consult when needed

Why?: As researchers are conducting research, they will encounter questions and challenges. Having access to research integrity educational resources supports researchers' education in research integrity.

a. Provide researchers with information on where to find institutional policies and guidelines for research integrity
b. Provide researchers with information on available courses, guidelines and additional resources related to research integrity
c. Refer students to online platforms where they can ask fellow researchers for advice about research integrity.

Best practice example

Example 1: The Embassy of Good Science

Example 2: COPE Resources

Example 3: Editage resources

2. Show institutional commitment to providing continuous RI education

Why?: Continuous research integrity education requires significant institutional commitment to research integrity, for instance in terms of material and human resources.

a. Include research integrity as one of central value in the institutional mission and vision statement.
b. Allocate resources and time to research integrity training for researchers and staff.
c. Hold forums with researchers every few years to explore their research integrity education needs.
d. Instruct research integrity counselors and support staff to collect research integrity case studies and questions encountered at the institution, in a GDPR compliant manner, for use in research integrity education

3. Provide researchers with contact persons who can support continuous research integrity education, by providing low-threshold, disciplinary-specific advice on day-to-day research integrity questions

Why?: As researchers are conducting research, they will encounter questions and challenges. Having access to low-threshold advice on day-to-day research integrity questions provides context-specific information and support to researchers.

a. Provide researchers with contact persons for information about domain specific research integrity issues, for instance privacy officers, data stewards, librarians and ethics committee members.
b. Recruit volunteer researchers in each faculty to act as informal 'first responders' to researchers with day-to-day research integrity questions.
c. Provide research integrity education and basic qualifications for all contact persons and 'first responders'
d. Make 'first responders' and contact persons' information and contact details visible on the institutional or faculty website
e. Inform informal 'first responders' about each others' roles so they can refer researchers to one another when necessary

Best practice example

Example 1 Research integrity champions at King's College London

4. Develop policies to foster responsible supervision and leadership

Why?: Researchers learn about research practice informally through their supervisors and research leaders. Fostering responsible supervision and leadership supports continuous research integrity education.

a. Inform PhD students about responsible supervision [link to supervision guidelines on this topic]
b. Foster responsible supervision [link to supervision guidelines on this topic]
c. Foster responsible leadership [link to supervision guidelines on this topic]

5. Develop policies for building a responsible research environment

Why?: As researchers are socialized in their research environment, fostering a responsible research environment contributes towards continuous research integrity education.

a. Engage in community building for a responsible research culture [link to research environment guideline on this topic here]
b. Manage competition and publication pressure [link to research environment guideline on this topic here]
a. Provide adequate education and skills training for researchers[link to research environment guideline on this topic here]
b. Develop policies on diversity and inclusion [link to research environment guideline on this topic here]
c. Develop procedures for conflict management [link to research environment guideline on this topic here]
d. Develop fair procedures for appointments, promotions and remuneration [link to research environment guideline on this topic here]
e. Support a responsible research process, through support systems and requirements on transparency and quality assurance [link to research environment guideline on this topic here]

Guideline development process

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Appendix XV – **Guidelines on Selection and Evaluation of Proposal for research funding organizations**

Guidelines on Selection and Evaluation of Proposal for research funding organizations

Guidelines on the selection and evaluation of proposal for research funding organizations

Preamble

These guidelines are developed for research funding organisations (RFOs). These RFOs are a very heterogeneous group of organisations depending amongst others on the (legal system within the) country, the size of the organisation, the disciplines they are funding, etcetera. Some have a longstanding experience in implementing research integrity plans policies while others will start to implement these in the near future.

The proposed guidelines are rather to be considered as recommendations than as long wish lists, although they are formulated in such a way that they can inspire most RFO's, independent of their different nature. The guidelines aim to be as concrete as possible, without losing itself in details (that can vary depending the context).

Country specific issues and/or requirements in domestic law should be given due attention by the RFO's, and are not elaborated in these recommendations

Guidelines on research integrity plan (RIP) for research funding organizations

Key recommendations:

1. Specify expectations to RPOs regarding RIPPs

These expectations are covering the relevant parts of the European Code of Conduct [https://allea.org/code-of-conduct], and more concretely the priorities outlined by the SOPs4RI consortium [https://sops4ri.eu/wp-content/uploads/Guideline-for-Promoting-RI-in-RPOs-FINAL-2.pdf]

2. Create a RIPP

The following six topics of SoPs4RI should be considered in order to cover the essential content: [https://sops4ri.eu/wp-content/uploads/Guideline-for-Promoting-RI-in-RFOs_final.pdf]

1. Criteria and processes for assessing grant applications
2. Declaration of interest
3. Monitoring funded grants
4. Dealing with internal breaches of research integrity
5. Expectation of ROPs
6. Compliance with RI standards by applicants

Guidelines on

Methodological requirements for research funding organizations

1. Make clear guidelines and rules about the evaluation process

a. clear guidelines and transparency about the definition of the evaluation criteria
   i. clear definition of RI-related challenges
b. clear guidelines for the assessment (evaluation guidelines) and transparency about this for applicants
   i. checklist for evaluators
   ii. inclusion of best practices
c. RFOs should have in place clear and transparent guidelines on how to evaluate the methodology and other relevant scientific aspects of proposals

2. Include a section on methodology in the proposal

a. Depending on the discipline this section can specify methodology related issues like transparency, reliability, etcetera

Guidelines on

Diversity issues for research funding organizations

Key recommendations:

1. Encourage and support reflections on diversity in the application

a. First of all, a merit-based evaluation process needs to be ensured
   i. In general, equality is a key principle
   ii. minorities/ less represented groups can be prioritised in case of equally ranked proposal

b. A general acknowledgement of diversity can be recognized without taking it into consideration in the evaluation process
   i. No disclosure of personal, sensible, confidential information can be allowed under the umbrella of ensuring diversity, e.g. sexual orientation questions

c. RFO should provide guidance on diversity in interaction with the RPOs

d. The RFO requires submitted research proposals to include a gender and diversity statement regarding a) the researchers in the call and b) when applicable, the researched population.

2. Have policies and regular monitoring in place to examine whether their organisational structures and processes are susceptible to potential diversity issues.

a. If so, the RFO will develop and implement a plan to mitigate any identified diversity issues. It is crucial that the RFO's leadership commits to this plan, sees it through with appropriate encouragement, support and initiatives, throughout the organisation.

3. **Ensure inclusivity in communication:**
    a. The RFO commits to closely monitor potential bias in communication used in recruitment processes and funding calls.

4. **Ensure diversity within the internal staff and evaluators**
    a. RFOs should avoid possible biases (eg. Regarding schools of thought, methods, topics, ...)
    b. RFOs should respect all disciplines within their focus area

5. **Provide good guidelines on how to recognize and avoid diversity-related bias**
    a. COI training is needed as part of bias training

6. **Dedicated calls for specific minority groups e.g. juniors and women might be considered**
    a. A merit-based evaluation system should however be the reference point

Best practice example

Example 1 (Add where it is possible/necessary. If no best practice examples are available or needed, you may remove this box.)

Example 2 ...

Guideline development process

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Appendix XVI – **Guidelines on Monitoring funded projects for research funding organizations**

Guidelines on Monitoring funded projects for research funding organizations

Guidelines on Monitoring of funded projects for research funding organizations

The guideline on Monitoring of funded projects addresses research funding organizations (RFOs) with the aim to give them general recommendations on how to monitor the execution of the grants, looking at scientific, research integrity (RI)-related and financial aspects.

Most of the RFOs already have policies on monitoring funded projects; however, the guideline might serve as inspiration for RFOs in developing internal guidelines concerning the whole monitoring process and external guidelines, directed to the beneficiaries, concerning what RFOs expect from them.

The monitoring process should help RFOs and governmental institutions to think about what is/are the structural problem(s) that makes compliance difficult for the beneficiaries.

The formulation of RFO-related guidelines is made difficult due to the too many variables related to country differences, the size of the RFO, if the RFO is national or international, private or public and disciplines specific.

The implementation of the guidelines is strongly dependent on the type of the RFO and the country where the RFO is based. Small and south/east RFOs might encounter several difficulties in implementing the guidelines.

Guidelines on Execution of research grants for research funding organizations

Key recommendations:

1. Research funding organizations should possess clear guidelines about monitoring the execution of research grants
2. Research funding organizations should possess a system of quality assurance to monitor the monitoring process
3. Research funding organizations should list what has to be monitored
4. Research funding organizations and grant beneficiaries should maintain a close, cooperative and continuous collaboration during the lifetime of the project and whenever relevant after the end of the project

1. Research funding organizations should possess clear guidelines about monitoring the execution of research grants.

The following recommendations contains information concerning what the monitoring process has to monitor, how it has to be done, and the timeline of the overall process. The monitoring process should depend on the lifetime of the project, on the budget and on the capacity and size of the RFO.

a. Internal guidelines about what to monitor.
b. External guidelines for the beneficiary about what is expected and how to comply with the grant agreement.
c. Clear reporting timeline
    i. There should be the possibility to amend in case of specific circumstances by providing a clear justification
d. amendments concerning the timeline
    i. any delay has to be justified
    ii. beneficiaries have to report timely if something goes wrong
    iii. stop funding and ask money back if no justification is provided in due time

2. Research funding organizations should possess a system of quality assurance to monitor the monitoring process.

Monitoring and assessing the monitoring process might help increasing the efficiency of all procedures and might help in preventing possible gaps and problems.

a. **Internal procedures to monitor step by step the monitoring process.**
b. **Internal procedures to monitor any conflict of interest.**

3. Research funding organizations should list what has to be monitored.

RFOs should posses a clear list of what has to be monitored during the lifetime of a funded project. The monitoring process should depend on the lifetime of the project, on the budget and on the capacity and size of the RFO. Moreover, the monitoring should depend also on the research (e.g. clinical trials, education programs, trainings, communication, outcomes) but also on relevant approvals (e.g. ethics approvals), and infrastructure necessary to do the research, budgetary capacities etc.

a. Timing and compliance with the grant agreement
b. implementation of the project
c. RFOs do not need to monitor what other bodies already monitor.

Best practice examples

a. Expected deliverables, publications, participation in conference, meetings, open access and all activities related to the project
b. social impact if relevant (e.g. depending on the scope of the RFO/grant call)

4. Research funding organizations and the beneficiaries should maintain a close, cooperative and continuous collaboration during the lifetime of the project.

This recommendation provides information concerning collaboration between RFOs and beneficiaries. The level of collaboration is closely related to different parameters such as the lifetime of the project, the capacity of the RFO and the grant budget. The monitoring process should depend on the lifetime of the project, on the budget and on the capacity and size of the RFO.

Best practice examples

a. Good IT tools might be of help

b. Pre-monitoring checklist as informal assessment

c. RFO should have a dedicated office for complain

Guidelines on Compliance with research integrity requirements for research funding organizations

Key recommendations:

1. Research funding organizations should possess RI-related guidelines
2. RFOs should possess clear guidelines on what should be monitored in terms of RI, and by whom
3. RFOs should support and promote a responsible RI culture
4. RFOs should monitor if the grant beneficiaries possess investigation procedures in case of RI breaches

1. Research funding organizations should possess RI-related guidelines

Besides monitoring the scientific progress of the projects, RFOs should look with attention to RI-related issues. This recommendation provides information concerning RFO monitoring RI-requirements.

a. Clear guidelines about what is expected from the beneficiary
    i. The beneficiary has to make clear who is responsible for what in the project since the beginning of the project
b. There should be guidance for research ethics as well as research integrity.
c. Reinforce the need for compliance with institutional/national code of conduct, if any.

Best practice example

a. assign an ethics or integrity advisor within the project to have internal monitoring

2. RFOs should possess clear guidelines on what should be monitored in terms of RI, and by whom

This recommendations provides best practice examples concerning what should be monitored.

Best practice example

a. RFOs should monitor compliance with RI standards, RE approvals, Open access/open data, supervision/mentoring, data management plan, authorship, potential COI, RI training and certifications (quality of ethics/RI training is difficult to monitor), pre-registration of the study

3. RFOs should support and promote a responsible RI culture and support infrastructures

Besides monitoring RI requirements, RFOs should help institutions in implementing RI-related education and developing and implementing RI-related policies.

Best practice example

a. RI online trainings, RI available educational resources

4. RFOs should monitor if the grant beneficiaries possess investigation procedures in case of RI breaches are in place in the RPO that is hosting the funded project

a. The RFO should be informed as soon as possible about breaches, the investigation and its outcomes
b. Clear procedures and consequences need to be in place in case of misconduct (e.g. stop available funding and clarify consequences in terms of future funding, ENRIO handbook link)

Guidelines on financial monitoring for research funding organizations

Key recommendations:

1. Research funding organizations should possess clear guidelines for financial monitoring
2. Financial monitoring should take place alongside with the scientific monitoring
3. Financial monitoring should be carried out by a dedicated department, if possible
4. Compliance with the initial financial plan is mandatory
5. Financial monitoring should also serve to prevent financial fraud
6. Financial monitoring should NOT be linked to the positive research results

1. Research funding organizations should possess clear guidelines for financial monitoring

A clear financial monitoring is essential to monitor if the grant money is used properly.

a. Before the start of the project, a mutual agreement between the RFO and the beneficiary has to be in place regarding
   i. financial monitoring
   ii. financial requirements

2. Financial monitoring should take place alongside with the scientific monitoring

a. clear guidelines about the interaction between financial and scientific monitoring should be in place
b. the scientific project manager should also have a financial overview

3. Financial monitoring should be carried out by a dedicated department, if possible

The implementation of a dedicated department should depend on the lifetime of the project, on the budget and on the capacity and size of the RFO.

4. Compliance with the initial financial plan is mandatory

a. All deviations from the initial plan have to be justified
b. Regular report procedures need to be in place

5. Financial monitoring should also serve to prevent financial fraud

a. **RPOs/PIs should report timely possible financial amendments**
b. **Withdrawal of funding would only happen if the RPO/PI failed in its responsibilities**

6. Financial monitoring should NOT be linked to positive research results

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Guideline development process

These guidelines are based on empirical work done by the SOPs4RI consortium. We identified available recommendations on the topic, as well as gaps and lacunas using two scoping reviews on best practices for research integrity promotion [1] and the implementation factors of these [2]; 23 interviews with research integrity experts [3]; and a Delphi consensus-study with 68 research policy makers and research leaders across Europe [4] To ensure sensitivity to various disciplinary contexts, we also conducted 30 focus groups with researchers and other research stakeholders from different disciplines and countries in Europe [5,6]. Following this, we organized 4 co-creation workshops with various research stakeholders to draft the guidelines, the intentions to produce a wide range of practical ideas for the guidelines taking into account users' needs [7,8]. To revise the guidelines, we worked in a small working group with the aim to prioritize, reorganize and optimize the guideline elements (see the revision protocol at https://osf.io/f9ghj/). The working group sought expert input on the guidelines from external advisors. The guidelines are now ready to be piloted by a number of organizations taking part in the SOPs4RI pilot. Based on the results of the pilot, we will undergo a final revision of the guidelines, to finalize them.

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SOPs4RI consortium

Appendix XVII – **Guidelines on 'Defining and preventing unjustified interferences from funders, political and commercial actors' for research funding organizations**

Guidelines on 'Defining and preventing unjustified interferences from funders, political and commercial actors' for research funding organizations

Guidelines on 'Defining and preventing unjustified interferences from funders, political and commercial actors' for research funding organizations

Independence and the avoidance of unjustifiable interference were identified as key considerations for Research Funding Organisations (RFOs) to address in creating a Research Integrity Promotion Plan (RIPP). Independence and transparency in the research and funding process are ultimately about the integrity and trustworthiness of research outputs and are, therefore, vital for the RFO to uphold and protect.

This guideline provides some key recommendations to guide and empower RFOs as they work to develop or enhance their own governance frameworks and RIPPs.

The guidelines concern unjustifiable interferences, by which we mean any financial, professional or other interests of any stakeholder involved that might be seen to negatively influence a decision or to be affected by the outcome of a decision.

The recommendations in this guideline concern what measures RFOs can take to define unjustified interferences, ensuring transparency and integrity in their procedures, and preventing unjustified interferences by funders themselves, political and commercial actors.

Guidelines on 'Defining and preventing unjustified interferences from funders, political and commercial actors' for research funding organizations

Key recommendations:

1. Defining and describing unjustified interferences
2. Transparency and integrity in the evaluation process
3. Monitoring of potential unjustified interferences
4. Evaluators with maximal independence
5. Transparent allocation of money without interference
6. Available guidelines for external-commercial collaboration
7. Requiring collaboration contracts between commercial partners and funded researchers

1. RFOs should have a description/definition of unjustified interferences

It is important that descriptions/definitions are stated clearly to avoid all possible misinterpretations.

a. A clear description/definition should be publicly available online, potentially including a list major/most relevant unjustified interferences
b. In general terms, RFOs should consider legislative, cultural, national, institutional and local differences when defining unjustified interferences
c. When defining RFOs' unjustified interferences, RFOs should commit to refrain from unjustifiably interfering with any phase of the research process.

Examples of unjustifiable interferences

The recommendations do not prescribe how and what RFOs should define as unjustifiable interferences. However, in the co-creation workshops and guideline development process, several examples of justifiable and unjustifiable interferences were discussed. The table below presents these examples, which may inspire RFOs when drafting their own definitions of interferences.

Unjustifiable interferences	
<u>In the selection and evaluation process</u> - External parties interfering in proposal selection and evaluation - Interfering with preselection of proposals due to political interests	<u>In the research and publication process</u> - Interference with the expected outcomes of the research - Blocking publication of certain data or interfering with the publication process
Justifiable interferences	
In case of possible breaches of research integrity or ethical standards and regulations, RFOs can intervene • during the evaluation process • in the project-monitoring phase • during and after the publication process. In the case of allocation of funding for specific purposes/objectives, preselection of topics is justifiable. In the case of project monitoring which demonstrates that a project is not addressing the objectives for which it was funded (unless the reasons for this has a sound scientific basis), interference is justifiable.	

2. RFOs should ensure transparency and integrity during the evaluation process

It is considered important that RFOs do their utmost to ensure transparency and integrity in their procedures to avoid unjustifiable interferences.

a. RFOs should provide clear guidelines for grant proposal evaluators, including a briefing session on unjustified interference and unconscious bias, before starting the evaluations
b. Evaluators have to disclose all Conflicts of Interest (COIs)
c. Special attention should be given to collaboration with industry sponsors, political requests and other external sponsors
d. RFOs should have in place a regular review of the evaluation process
e. RFOs should maintain impartiality and independence and have in place internal policies for staff members to prevent any unjustifiable interference with any phase of the research process
    i. RFO internal staff should disclose all possible COIs
    ii. RFOs should provide guidance to internal staff on their policies
f. The RFO internal staff should have available clear guidelines on how to deal with possible unjustified interferences.

3. Potential unjustified interference should be regularly monitored by the RFO in all stages of the research process

d. In the selection of the proposals
e. In the monitoring of the proposals
f. In the final reporting.

4. RFOs should strive to use evaluators who have maximal independence

This recommendation is aspirational, and implementation of the recommendation can depend on the size of the RFO. RFOs are urged to ensure evaluators with independence, and the RFO should do that by:

a. Ensuring diversity within evaluators (e.g. gender, country, disciplines, and expertise).
b. Ensuring that, in selecting evaluators, there are clear guidelines for them not being:
    i. Associated with the research application, a colleague or co-author of the applicant, applying for funding in the same scheme, and possibly personnaly gaining from the outcome of the evaluation
    ii. Ideally, evaluators are located in a different organisation or country.

5. RFOs should (ideally) allocate their money freely without political/external/commercial interference and be transparent about allocation of funding

a. If specific research priorities have been already set or demands for such have been specified, this should be clearly communicated
b. Approaches for being transparent on funding allocation include (but are not restricted to)
    i. Publishing the projects that have been funded on the RFOs' website
    ii. Making the RFOs' strategic objectives clear on the website

6. Clear guidelines about collaborations/co-financing projects with external-commercial partners should be available. The guidelines should:

a. **Be about how to make the decision process independent from commercial influences**
b. Cover how to be transparent about the allocation of funding from the RFO and external-commercial partner(s) respectively in co-funded projects
c. Require the RPO to conduct research that is in line with good scientific practices (see The European Code of Conduct for Research Integrity)
d. Require full disclosure of all interests, including financial ones, in all formal inputs and outputs of the project.

7. In case of collaborations between commercial partners and funded researchers, clear collaborative contracts between the parties involved, covering all phases of collaboration, should be required by the RFO.

Many aspects of collaborations between commercial partners and funded researchers should be clarified in a contract between them. It is important that RFOs require such contract to be in place. The agreed contract should:

a. Be available at the beginning of the project, prior to the release of the funding
b. Contain clear definitions of the role of each partner
Contain clear descriptions of the objectives, design, methodology, analysis, publication of outputs, availability of data and research materials, and ownership of intellectual property of the research.

Other resources
In the SOPs4RI project, a toolbox of already existing, relevant and easy-to-use guidelineshas been collected, including examples of funding organisations' conflicts of interest policies:

- Fonds Nationale de la Recherche Luxemburg: Ethics Charter and Code of Conduct for Research Assessment
- Wellcome Trust: Conflicts of interest policy
- The Netherlands Organisation for Health Research and Development: Integrity and conflicts of interests
- Dutch Research Council: Code for dealing with personal interests
- The US National Institutes of Health: Integrity and confidentiality in Peer Review

These resources may inspire RFOs when drafting their own guidelines, policies and frameworks on prevention of unjustifiable interferences.

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Guideline development process

These guidelines are based on empirical work done by the SOPs4RI consortium. We identified available recommendations on the topic, as well as gaps and lacunas using two scoping reviews on best practices for research integrity promotion [1] and the implementation factors of these [2]; 23 interviews with research integrity experts [3]; and a Delphi consensus-study with 68 research policy makers and research leaders across Europe [4] To ensure sensitivity to various disciplinary contexts, we also conducted 30 focus groups with researchers and other research stakeholders from different disciplines and countries in Europe [5,6]. Following this, we organized 4 co-creation workshops with various research stakeholders to draft the guidelines, the intentions to produce a wide range of practical ideas for the guidelines taking into account users' needs [7,8]. To revise the guidelines, we worked in a small working group with the aim to prioritize, reorganize and optimize the guideline elements (see the revision protocol at https://osf.io/f9ghj/). The working group sought expert input on the guidelines from external advisors. The guidelines are now ready to be piloted by a number of organizations taking part in the SOPs4RI pilot. Based on the results of the pilot, we will undergo a final revision of the guidelines, to finalize them.

Co-creators (from the SOPs4RI co-creation workshops)

Names

SOPs4RI guideline revision working group members

Names

External advisors

names

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SOPs4RI consortium

Appendix XVIII – **Resource Quality Assessment Process**

1. Background of previous steps leading to the online toolbox

In previous empirical steps, we collected 137 guidelines and SOPs from the systematic scoping review, the Delphi study, and the focus group interviews (see deliverables D3.1, 3.2, 3.4, and 5.2 for more details). All documents were classified per sub-topic(s), and their quality was assessed by two independent reviewers (note that this initial Quality Assessment (QA) is separate from the main QA to be applied in later stages and it is described below). The reviewers gave each document or section of a document a score on a scale from 1 to 5. A score of 1 indicated "*no existing/no information or very scarce and not useful*", a score of 3 indicated "*there is guidance and some information on the topic, but not very structured or complete*", and a score of 5 indicated "*detailed and clear guidance on a topic*" (see D4.2). When discrepancies arose in scoring these were discussed by the reviewers until consensus was reached.

The set of documents and SOPs retrieved in these earlier steps will be the basis for the creation of a repository, the "SOPs4RI repository". Hereafter, all resources in the SOPs4RI repository will be quality assessed (see below) and the resources that have a sufficient quality level of four or above will be included as tools in the online toolbox. Documents included in the online toolbox will be described with tags and general characteristics to help users find relevant, high-quality documents. Section 4 provides an example of the presentation of the general characteristics and information of a resource to be included in the SOPs4RI repository, while section 5 describes the tags to be used for each SOPs4RI repository item. The utility of this amount of information in this specific form has been proven by its use in the initial filling of the RPO part of the online toolbox.

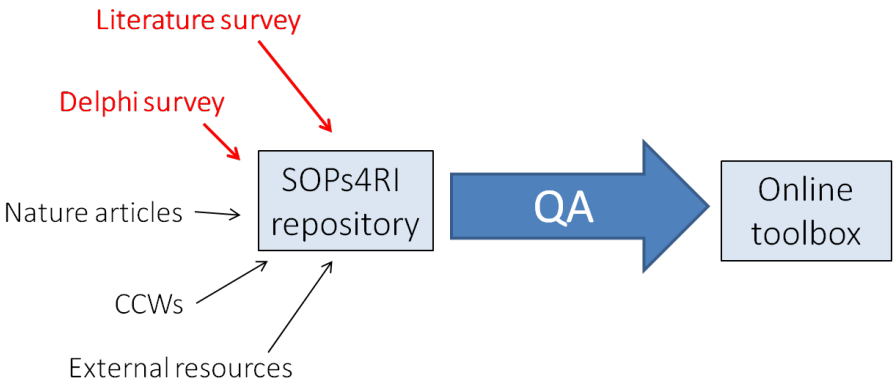

Figure 1: The QA procedure will tranGRWGorm the resources found in the SOPs4RI repository into tools for the SOPs4RI online toolbox. The "front-line" resources, found through the empirical steps in WP3, are indicated in **red letters**. The other resources were found with "*ad hoc*" processes and will act as back-up solutions.

General characteristics

1. Title to present the resource in the Toolbox (NOT necessarily the original title of the resource – up to 20 words)

Example: A procedure to render a replication study as effective as possible.

2. Purpose/Aim of the resource (up to 50 words)

Example: To establish a procedure that is called "precommitment", agreed between the authors of a peer reviewed scientific publication and replicators that will render a replication study to be conducted in an effective and collaborative manner.

3. Text of the resource (the exact content as found tranGRWGormed into plain English– up to 200 words)

Example: Failure to replicate often brings intellectual gridlock. Some researchers insist that a replication refutes the original paper's ideas; others find flaws in the reproduced work. Both replicators and original authors defend their conclusions — or at least their competence — rather than getting on with the difficult, intellectual work of using new evidence to revise ideas. Human nature and the academic incentive system make it hard to do otherwise. How can researchers avoid such stalemates? We need to spend more time early on resolving what is to be tested, the crucial features for doing so and the insight we expect. We need a process that appeals to our better natures, or at least requires that we reveal our lesser selves. The approach should favour seeking an accurate answer over defending previous results. We call it precommitment. After a paper is made public, but before it is replicated, the original authors and independent replicators collaborate to design a replication experiment that both agree will be meaningful, whatever the results. This process will be documented using preregistration or, ideally, a Registered Report (see 'Routes to replication').

4. Link of the resource (if available)

Example: https://www.nature.com/articles/d41586-020-02142-6

5. Reference of the resource

Example: Brian A. Nosek& Timothy M. Errington "Argue about what a replication means before you do it" Nature 583 (2020) 518-520.

6. Which SOPs4RI Topic(s)/Subtopic(s) does the resource cover?

Example:

- *RPO Topic: Research environment*

Subtopic: Supporting a responsible research process (transparency, quality assurance, requirements)

Box 6. Example of descriptions of characteristics of an item included in the SOPs4RI repository.

Tags will include

1. Which of the following best describes the resource?

o SOP

o Guideline

o Case study/example

2. For which discipline(s) is the resource relevant?

o All

o Social Sciences

o Humanities

o Biomedical

o Natural Sciences/Engineering

3. For which stakeholders is the resource relevant?

o Pre-graduate students

o Post-graduate students

o PhD candidates

o Early career researchers

o Senior researchers

o Researchers in industry

o Supervisors

o Tenured faculty members

o Research administrators

o Members of Research Ethics Committees

o Members of Research Integrity Offices/Bodies

o RPO senior management staff (Rectors, Deans)

o Members of RPO research committees

o Ombudsmen

o Funders

o Technicians in RPOs

o Editors

o Publishers

o Peer reviewers

o Policy makers

o All stakeholders of research

Box 7. *Descriptive tags added to the items included in the SOPs4RI repository*

2. Objective of the Quality Assessment

To populate the online toolbox of SOPs4RI, we will undertake a second, more in-depth assessment of the resources in the SOPs4RI repository. This second assessment will also be designed and applied to new documents, found after the initial work described in D4.2. These additional documents have been or will be included in the SOPs4RI repository based on other empirical steps in the SOPs4RI project. They include a collection of Nature papers, documents referred to in the co-creation workshops, and other relevant documents.

The second quality assessment (QA) is meant to maximise the chances that the resources included in the online toolbox are of high quality and can be useful to the end users. Defining quality is difficult and we cannot exclude that different assessors or users in different contexts may perceive the quality of documents differently. Furthermore, parameters such as usefulness or implementability are highly context-dependent, and assessors with different expertise may score them differently.

For these reasons, we find important to reiterate two points. First individual scores will not be shared outside the research team and will only be kept with the research team to ensure transparency on the inclusion/exclusion decisions made towards the toolbox. Second, to capture different perspectives on the selected resources, we chose to assign one assessor with a research-oriented expertise and one assessor with a practice-oriented expertise to each resource. Each assessor will score the resource independently and an average of the two assessors' scores will be computed for each assessment parameter.

In addition to this second QA, a set of new classification terms will be assigned to the documents. The aim of these new classification terms is to provide a more nuanced description of the content of the resources.

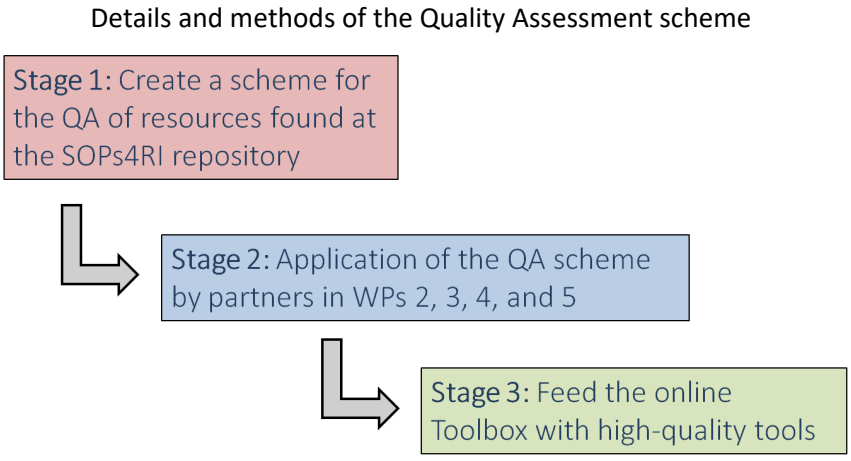

***Figure 2**: Building the QA methodology*

The QA procedure consists of three consecutive stages. First, we created a scheme to evaluate and assess the quality of existing resources in the SOPs4RI repository. Second, in the coming months, we will apply this QA methodology to the resources gathered by partners in WP2, WP3, WP4, and WP5 and stored in theSOPs4RI repository, to be hosted at SOPs4RI's SharePoint site. Third, based on the outcomes of the QA, we will populate the online toolbox of SOPs4RI with high quality tools.

3. Creating the Quality Assessment scheme

To create a robust QA scheme, we took the following steps. First, we created an initial QA scheme, based on discussions between four members of the SOPs4RI team. Next, we tested the scheme by assessing 10 documents (5 documents per member, i.e. each document was assessed by two members). We discussed the results of the test and optimization of the scheme including discussing which points should be changed, and how specific issues of the grading scheme should be addressed. Next, the QA scheme was assessed by two independent reviewers, who are experts in developing guidelines. Based on their feedback, the QA scheme will then be revised and finalized. In the next section we describe the proposed assessment scheme.

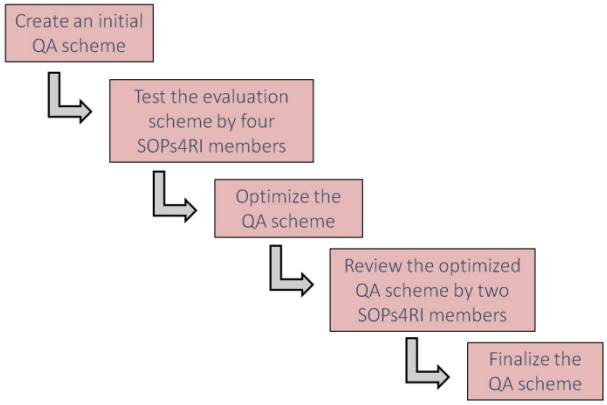

Figure 3: *Flowchart of Stage 1*

4. The Quality Assessment

To maximise the chances that the toolbox includes resources of high quality, we built the following scoring system that includes **four quality parameters** for each resource (Box 3). As mentioned above, the QA will be used for internal purposes only, and the outcomes will be used to select high quality resources for the SOPs4RI online toolbox. Two independent assessors will evaluate the assigned resources and come to a consensus.

Two independent assessors will score resources document on these four quality parameters and come to consensus. After scores on all 4 parameters are determined, an average score is calculated. The average score determines whether the resource is included in the online toolbox or not. In Table 1, the four parameters and a description of scores 1, 3 and 5 are provided.

1: Understandability (easiness to grasp the content of the resource)

2: Implementability (presence of concrete details enabling users to implement the resource)

3: Methodological soundness (robustness of the methodology with which it has been created)

4: Comprehensiveness: (Completeness of the resource/coverage of the subtopic in the context of a specific discipline)

***Box 3**. Quality parameters for each resource to be included in the SOPs4RI repository.*

Score	1	3	5
1) Understandability	The content of the resource is difficult to understand. The resource presents conflicting information, uses confusing language and has unclear terminology.	The content of the resource can be understood for a large part. The resource does not present conflicting information, presents the information in understandable language and has clear terminology most of the times.	The content of resource is very easy to understand. The resource presents extremely coherent information, presents the information in very clear and understandable language and uses the appropriate terminology
2) Implementability	The resource contains little or no guidance for implementation and few or no examples that could help implement the recommendations.	The resource contains some guidance for implementation and/or some examples of implementation, but it is not always clear how the resource can be implemented.	The resource contains clear guidance for implementation and/or concrete examples that provide sufficient details to understand how the resource can be implemented.
3) Methodological soundness	The process used to develop the resource is not methodologically sound or is not reported	The process used to develop the resource is reported and somewhat methodologically sound	The process used to develop the resource is reported, robust and methodologically sound
4) Comprehensiveness*	The resource does not cover the information relevant for the topic at all.	The resource presents a partial image of the topic but provides relevant information most of the time.	The resource covers the topic fully, considers different settings and provides a complete image of the issues related to the topic.

***Table1.** Detailed criteria used for assessing the resources*

*Note: *It should also be noted that, in line with our proposed quality parameters, highly specific resources might not be able to receive a 5 on comprehensiveness. In such cases, for resources assigned to a specific sub-topic (i.e., RPO resources), assessors may assess the comprehensiveness of the resource on the sub topic in which the resource specialises, provided that they classify the resource as 'Specific' (Classification A, as explained below). In other words, a sub topic- or discipline-specific resource may still receive a 5 on comprehensiveness if it covers the sub topic or discipline appropriately.*

To visualize the outcome, a radar chart or dot system will be used (Figure 4). The visualization will be used for internal purposes and analyses only.

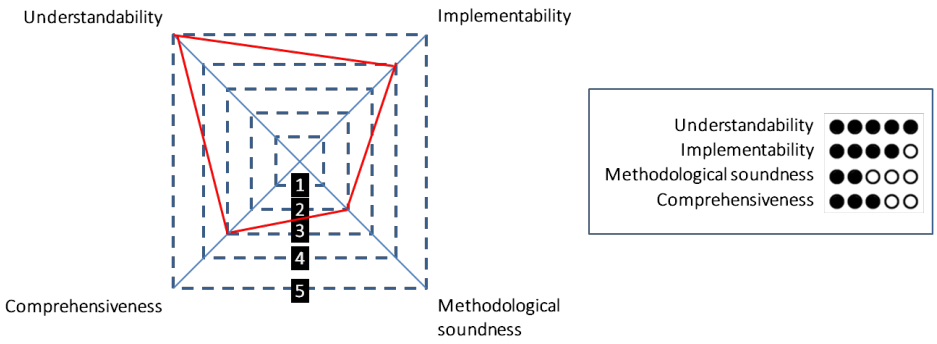

Figure 4: Visualizing the outcome of the QA.

5. The Classification

In addition to the scoring, through the QA scheme described above, additional classification terms will be used internally to describe the nature of documents included in each topic. The classification is especially useful to be able to describe the content of the toolbox, and, at a later stage to enrich the functionalities of the online toolbox.

A) General versus specific: topic specific versus sub-topic specific

The documents will be classified to topics or sub-topics, based on the Delphi ranking. Topic-specific documents describe information about a specific topic and include several sub-topics. Sub-topic-specific documents only cover a certain sub-topic.

B) Descriptive versus concrete

Concrete documents provide concrete/explicit measures. Descriptive documents set a framework and/or implicit measures or provide information on a topic.

C) Normative versus aspirational

The normativity of the document is measured in the language used and in how strongly recommendations are prescribed. Aspirational documents set out aspirational measures, and often include or explain principles.

D) Rigid versus flexible

Flexible documents leave room for flexibility in using the guidelines or provide different options. This is, for instance, relevant for setting up research ethics committees which should account for different situations or institutions. Rigid is when only one course of action can be followed or should be adhered to. For example, when following procedures for breaches of RI this is relevant. This classification is not applicable to all documents.

E) Mandatory versus optional

Mandatory documents enforce the implementation of the guidance. In optional documents, the choice for implementation measures remains open.

F) Visual versus textual

Visual documents use images or other visual elements to convey the message. Textual documents only use text to set out the guidelines.

6. QA teams

NOTE: For returning assessors, please note that your team number may have changed.

Assessors will be organised in 'pairs' (hereafter referred to as teams). We tried to build teams in which assessors may have different perspectives by selecting someone with experience in research as well as someone with experience in practice, policy, or research funding. The teams will be as follows:

- Team 1: Nicole Foeger (Practice) + Noémie Aubert Bonn (Research)
- Team 2: Borana Taraj/Nik Claesen (Practice) + Rea Ščepanović (Research)
- Team 3: Teodora Konach (Practice) + Andrea Reyes Elizondo (Research)
- Team 4: Nick Allum (Practice) + Serge Horbach (Research)
- Team 5: Panagiotis Kavouras (Practice) + Krishma Labib (Research)

Assessors will independently score each resource on the four dimensions of quality indicators. They will then discuss any strong disagreement in scores with the assessor they are paired with, and will classify the resource on the six different classification levels. In case of doubt or disagreement, assessors should reach out to **JT** who will act as referee and guide throughout the Quality Assessment process.

7. Procedure for Quality Assessment teams

Note: These instructions are available in a short explanatory movie in the SharePoint folder.

1. Log into the SOPs4RI SharePoint

   Note: If you do not have access to the SharePoint, please contact SF to request access

2. Locate the folder of resources by reaching to:

   … / SOPs4RI / WP4 - Developing SOPs and guidelines / Repository Quality Assessment / RPO resources / Team assignments

   The folder will contain a word document entitled '*List of resources to review for Team X (where 'X' is your team number)*', in which the resources assigned to your assessor team will be listed.

   NOTE: You may notice that resources are sometimes repeated in different topics. When assessing the quality of a resource, you should ***assess it for the topic and sub-topic*** *in which it is placed. In this regard, it is possible that a resource obtains a different score in different topics or sub-topics. This will help us understand where the resources should be located in the toolbox.*

3. Score each resource on each of the 4 criteria detailed in Box 3. See Table 1 for examples of scores. Do this individually, noting your scores on your own to avoid biasing your scores with the scores of the assessor you are working with.

   NOTE: You are welcome to use the Optional individual working sheet template (download only) to log your scores and notes about the resources if it helps you, but a piece of paper works just fine too, so it's really up to you.

4. Once you're done assessing the references, fill in your scores and evaluations in the shared Excel sheet entitled 'QA Resource Evaluation Scoring Sheet' available at /… /Repository Quality Assessment / RPO resources / 'Shared QA Scoring Sheet RPO'.

   NOTE: Again, keep your scores as you ranked them even if they differ from the scores of your peer, just note the difference and you will discuss them in Step 6.

5. If you think of any additional resources that may be useful to include in the toolbox, you may add then to the 'List of resources to review' document where the resources to assess were listed. You will find a section entitled 'Recommendations of additional resources to include' and can add the resource, direct link, and note directly in the table provided.

6. After you finished assessing the assigned resources, connect with your team member and discuss any strong disagreement (i.e., resources which received a passing average score ≥4 from one assessor and an average score <4 from the other assessor) or differences in the classification options. If possible, highlight your argumentation in the designated section of the 'List of Resources to Review Team X' word document. JT if you need to discuss disagreements further.

7. Together with your team mate, agree on the classifications to each resource according to the classifications A–F detailed in the section “The Classification” above. Feel free to contact NAB for any additional questions in the assessment process.

Appendix XIX – **List of documents included in the Toolbox**

List of new RFO resources added to the toolbox

Audience	Topic	Resource added	Assessment Round
RPO	Research Environment	A comprehensive set of principles for assessing researchers – The Hong Kong principles	1
RPO	Research Environment	San Francisco Declaration on Research Assessment (DORA)	1+3
RPO	Research Environment	Introduction to the EQIPD Quality System	1
RPO	Research Environment	Working with research integrity – guidance for RPOs: The Bonn PRINTEGER Statement	1
RPO	Research Environment	The Leiden Manifesto for research metrics	1+3
RPO	Research Environment	The Royal Society – Résumé for researchers	3
RPO	Research Environment	The Metric Tide: Report of the Independent Review of the Role of Metrics in Research Assessment and Management	3
RPO	Research Environment	Science Europe – Position Statement and Recommendations on Research Assessment Processes	3
RPO	Research Environment	Making FAIReR assessments possible. Final report of EOSC Co-Creation projects: "European overview of career merit systems" and "Vision for research data in research careers"	3

RPO	Research Environment	VSNU, NFU, KNAW, NWO and ZonMw – Room for everyone's talent: *Towards a new balance in recognising and rewarding academics towards a new balance in the recognition and rewards of academics*	3
RPO	Research Environment	The JSQA Guideline for GCP Auditing	3
RPO	Research Environment	Nuffield Council of Bioethics – The culture of scientific research in the UK	3
RPO	Research Environment	DORA – SPACE to evolve academic assessment: A rubric for analyzing institutional conditions and progress indicators	3
RPO	Research Environment	Advance HE – Creating an inclusive environment	3
RPO	Research ethics structures	International Ethical Guidelines for Health-related Research Involving Humans	1
RPO	Research ethics structures	Ethical Principles for Medical Research Involving Human Subjects – The Helsinki Declaration	1
RPO	Research ethics structures	National Ethical Guidelines for Health Research in Nepal and Standard Operating Procedures	1
RPO	Research collaboration	Ten Simple Rules for Establishing International Research Collaborations	1
RPO	Research collaboration	Responsibilities of RPOs and researchers to promote research integrity in cross-boundary research collaborations – The Montreal Statement	1

RPO	Research collaboration	Global Code of Conduct for Research in Resource-Poor Settings	1
RPO	Research collaboration	Deans of Social Sciences in the Netherlands – Code of Ethics for the Social and Behavioural Sciences	
RPO	Research collaboration	ISMPP – GPP3 Guidelines, 2015	
RPO	Supervision and mentoring	UCL – A guide to supervision for new and experienced supervisors	1
RPO	Supervision and mentoring	University of Copenhagen – Guideline for PhD supervisors	1
RPO	Supervision and mentoring	Spanish National Research Council (CSIS) – Research integrity and good scientific practices	3
RPO	Supervision and mentoring	KU Leuven – Charter of the PhD researcher and supervisor	3
RPO	Supervision and mentoring	UC San Diego – Resources for Research Ethics Education: Mentoring	3
RPO	Dealing with breaches of research integrity	Recommendations for the Investigation of Research Misconduct – ENRIO Handbook	1+3
RPO	Dealing with breaches of research integrity	UKRIO – Procedure for the investigation of misconduct in research	1+3
RPO	Dealing with breaches of research integrity	UKRIO – Concordat Self-Assessment tool	3

RPO	Dealing with breaches of research integrity	ORI Guidelines for Institutions and Whistleblowers: Responding to Possible Retaliation Against Whistleblowers in Extramural Research	3
RPO	Dealing with breaches of research integrity	ORI – You've been accused of research misconduct: Now what?	3
RPO	Declaration of interests	The power of transparency: navigating through the labyrinth of ever-changing conflict-of-interest rules in science research	1
RPO	Declaration of interests	Nature Research journals' competing interests policy	1+3
RPO	Declaration of interests	CSIC Manual of Conflicts of Interest	3
RPO	Declaration of interests	Royal Australasian College of Physicians (RACP) – Guidelines for ethical relationships between health professionals and industry	3
RPO	Declaration of interests	COPE – Undisclosed conflict of interest in a submitted manuscript	3
RPO	Declaration of interests	COPE – Undisclosed conflict of interest in a published article	3
RPO	Declaration of interests	Council for International Organizations of Medical Sciences (CIOMS) and the World Health Organization (WHO) – International Ethical Guidelines for Health-related Research Involving Humans	3
RPO	Declaration of interests	COPE – How to recognise potential authorship problems	3

RPO	Research integrity training	University College London (UCL) Research Integrity Training Framework	1
RPO	Research integrity training	European network of Research Ethics and Research Integrity (ENERI) training materials site – The ENERI Classroom	1
RPO	Research integrity training	Stanford University – DoResearch: Responsible and Ethical Conduct of Research	3
RPO	Research integrity training	The National Academies of Sciences Engineering and Medicine – The Next Generation of Biomedical and Behavioral Sciences Researchers	3
RPO	Data practices and management	UCL – Managing research outputs according to the research lifecycle: a phased approach	1
RPO	Data practices and management	University of Edinburgh – Guideline to write a Data Management Plan	1
RPO	Data practices and management	The Three-point FAIRification Framework	1
RPO	Data practices and management	Introduction to the EQIPD Quality System	1
RPO	Data practices and management	ORI – Guidelines for Responsible Data Management in Scientific Research	3
RPO	Data practices and management	Nature Research – Editorial policies	3

RPO	Data practices and management	ERC – Conflict of Interest, Scientific Misconduct and Ethical Issues	3
RPO	Publication and communication	The American Association for the Advancement of Science (AAAS) Communication Toolkit	1
RPO	Publication and communication	ICMJE-Recommendations for the Conduct, Reporting, Editing, and Publication of Scholarly Work in Medical Journals	1+3
RPO	Publication and communication	International standards for responsible publication of research – The Singapore Statement	1
RPO	Publication and communication	Open Access Policy Guidelines for Research Performing Organizations	1
RPO	Publication and communication	Elsevier – Responsible Research Publication: International Standards for Authors	3
RPO	Publication and communication	COPE – Guidelines on good publication practices	3
RPO	Publication and communication	Text Recycling Research Project – Understanding text recycling: A Guide for Editors	3
RFO	Dealing with breaches of RI	NWO – Scientific Integrity Complaints Procedure	2
RFO	Dealing with breaches of RI	Science Foundation Ireland – Research integrity	2
RFO	Monitoring	Health Research Board Ireland – How we monitor and evaluate	2
RFO	Monitoring	Wellcome Trust – Data, software and materials management and sharing policy	2

RFO	Monitoring	National Science Foundation – OIG Review of Institutions' Implementation of NGRWG's Responsible Conduct of Research requirements	2
RFO	Declaration of interest	Fonds National de la Recherche Luxembourg – FNR Ethics Charter and Code of Conduct for Research Assessment	2
RFO	Declaration of interest	NWO – Code for Dealing with Personal Interests	2
RFO	Declaration of interest	ZonMw – Integrity and conflicts of interest	2
RFO	Declaration of interest	Wellcome Trust – Conflicts of interest policy: Wellcome-funded researchers and commercial organisations	2
RFO	Criteria for selection	Science Europe – Recommendations on research assessment processes	2
RFO	Criteria for selection	NIH – Changes to the biosketch	2
RFO	Expectations for RPOs	FWO – Research Integrity within the FWO	2
RFO	Expectations for RPOs	Wellcome Trust – Good research practice guidelines	2
RFO	Expectations for RPOs	Wellcome Trust – Conflicts of interest policy: Wellcome-funded researchers and commercial organisations	2
RFO	Expectations for RPOs	Wellcome Trust – Bullying and harassment policy	2
RFO	Expectations for RPOs	Wellcome Trust – Guidance for research organisations on how to implement responsible and fair approaches for research assessment	2
RFO	Expectations for RPOs	San Francisco Declaration on Research Assessment	2

RFO	Compliance with RI standards	Wellcome Trust – Research involving animals	2
RFO	Compliance with RI standards	Wiley – Best Practice Guidelines on Publishing Ethics	2
RFO	Compliance with RI standards	Wellcome Trust – Anti-racist principles, guidance and toolkit	2

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The project leading to this application has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 824481.