ROSiE

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D3.3: Report on interviews

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ABSTRACT:	This report summarises preliminary findings and key insights derived from interviews with stakeholders. The report describes how the interviewed stakeholders conceptualise open science and which ethical, legal and policy issues they consider important. Furthermore, the report discusses the tentative implications of these findings on the key products ROSiE will develop.
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List of abbreviations

ECoC	European Code of Conduct for Research Integrity
EIGE	European Institute for Gender Equality
ENERI	European Network of Research Ethics and Research Integrity
EOSC	European Open Science Cloud

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ERIC	European Research Infrastructure Consortium
EU	European Union
FAIR	Findable, accessible, interoperable, reusable
GDPR	General Data Protection Regulation
REC	Research ethics committee
RFO	Research funding organisation
RIO	Research integrity office
RPO	Research performing organisation

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1 Introduction

This report summarises preliminary findings and insights from stakeholder interviews conducted in January and February 2022 to identify promises and challenges related to responsible open science practices. Together with additional interviews that will be conducted between March and June 2022, focus groups and workshops, the findings will be a key ingredient to an in-depth analysis of the stakeholder consultation process that will eventually result in a report on recommendations on how to support, promote and safeguard responsible open science. Thus, the report is part of the explore and engage phases of the ROSiE project and builds on the overall stakeholder engagement strategy.

The report is based on nine semi-structured qualitative in-depth interviews with different types of stakeholders. All interviews were conducted online, and an interview guide was used to structure them. The guide was developed by the authors of this report and revised in light of comments by other consortium partners. Further adjustments were made after two pre-tests. The guide divided the interviews into four main sections: 1) background information, 2) open science – conceptions and tasks, 3) open science, ethics and integrity and 4) towards responsible open science. The complete guide can be found in the appendix.

Stakeholders from the following categories described in the stakeholder engagement strategy were interviewed: three researchers (fields covered: medical and health sciences, social sciences, humanities and the arts), three research managers (one from a public university, one from a national research support infrastructure, one from a research performing organisation (RPO)), one research integrity officer, one policymaker and one science educator. The academic backgrounds of the research managers are in natural sciences, engineering and technology and arts and humanities. The other three interviewees who are not primarily researchers are from the medical and health sciences, the social sciences and the arts and humanities. Based on the Frascati Manual of the OECD (see OECD, 2015), the only field of research and development not covered by the interviews is agricultural and veterinary sciences.

Interviewees were selected primarily based on their expertise related to different aspects of open science. Due to this selection strategy, all interviewees had ample experience in the open science field, which should be considered in the analysis of the findings. In other words, the interviewees are not representative of the wider scientific community, where open science is not necessarily a major issue among all actors. Their expertise, however, enables them provide insights particularly valuable to ROSiE.

Eight of the interviewees are female, one interviewee is male. From March to June 2022, further interviews will be conducted to increase the diversity of perspectives by interviewing researchers from hitherto less covered disciplines, members of research ethics committees (RECs) and research integrity offices (RIOs) and representatives of research funding organisations (RFOs) and scientific journals. Consequently, the findings of this report are preliminary and only one of several building-blocks of the overall analysis of the stakeholder engagement process.

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The remainder of this report describes how the interviewees understand and conceptualise open science and what ethical, legal, integrity-related and policy and governance challenges they consider most relevant. Furthermore, the report discusses the tentative implications of these findings on the key products ROSiE will develop and briefly outlines how they will be analysed in more depth based on additional interviews, focus groups and workshops in the upcoming months.

2 Open science: conceptions and understandings

The eventual impact of ROSiE and other projects and initiatives to support and promote open science is crucially dependent on producing outputs aligned to the needs of stakeholders and end-users. This requires understanding how relevant communities perceive open science. To learn more about how stakeholders conceptualise and understand open science, interviewees were thus asked to describe what they associate with the expression. Moreover, several probes during the interviews helped shed light on how they view open science generally. This section summarises prevalent conceptualisations and understandings. Taking them into consideration during the guide and equip phases will help ROSiE to develop products customised to stakeholder needs.

Overall, interviewees view open science favourably, not least because many of them not only are open science experts but also advocates in favour it . Many emphasised that they share many or all of the values underpinning open science, such as availability and transparency:

> Well, for me open science has to do with many values that I share, like making science available globally for many people without the typical barriers (...), so [it is] more accessible science for everybody. (Researcher R1)

> When I hear open science, I am happy because I like transparency, I like openness (...). (Researcher R2)

This positive view was also echoed when asked whether open science is rather a promise or a problem. All interviewees viewed open science mostly as a promise, some initially even saw only few challenges. However, with one exception all interviewees identified significant challenges created by the transition to open science over the course of the interview. The following quotes illustrate the perspective most interviewees seemed to share:

> As a promise. I mean, it's a difficult promise to fulfil at times. And because it is difficult to fulfil on several levels. It's a cultural change aspect, it requires effectiveness, it requires resources (...). (...) But open science in and of itself for me is a non-brainer. It's something that, going forwards, I personally do not see how we can argue for not practicing open science. So I fully believe in open science. It's more a question of making sure that we provide the researchers with an environment in which they can practice open science. (Research manager RM2)

> My first associations are of course about all the benefits and problems regarding open science (...), but I would not work in this field if I would not agree to this paradigm. (Research manager RM1)

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The interviewee who did not name any major challenges often seemingly referred to how open science could elevate research quality once fully implemented. In other words, she focused mostly on benefits on the system level, and she repeatedly stressed that in her view open science is by and large a solution to many problems of the current research system. Yet even she pointed out that a move to open science requires effort from researchers, and that this indeed might be perceived as challenging by some.

In general, many answers to the question what open science means to them centred around the notion that open science means open access to knowledge for everybody, although some interviewees also emphasised that openness should not necessarily mean access without any restrictions in case restrictions are justified and access mechanisms transparently described. When asked about who benefits most from open science, several interviewees stated that researchers are the ones who potentially gain the most. Two interviewees explicitly mentioned researchers from the global south in this regard, a view illustrated by the following quote:

> But sometimes we do not see the benefits for the whole world, like for [researchers from] developing countries who can access open access articles freely and can download the data and go on from this starting point. Previously everything was behind paywalls, and they couldn't even read the results that other researchers had. (Research manager RM1)

With respect to topics covered, all interviews focused on open access to publications and research data. Some interviewees also mentioned citizen science as a core component of and laudable development related to open science, and some discussed explicitly if and how research processes could and should be made more transparent and open. Perhaps interestingly, no interviewee explicitly mentioned open educational resources as a core component of open science, yet all agreed that training is crucial to support the transition to open science.

Interviewees favouring restrictions under certain conditions pointed out that data curation is costly, and that data effectively has become a currency enormously valuable to, for example, several tech companies and insurers. Consequently, the relationship between open science and data commercialisation might merit closer scrutiny. Besides, one interviewee explained that in his view decisions whether to open data should also be informed by considerations whether the data is potentially useful for other researchers. If this is not the case (as, for example, in some small exploratory studies), the costs related to opening data are not outweighed by the potential benefits. Also, concerns about intellectual property rights and patents often enter the equation when weighing whether data or results can be made open.

> From a biomedical science perspective, I definitely see open science as a goal that lies in the future because the science conducted is not open, at least to a certain extent (...). And it's a goal to do this, but it's a goal that has to be negotiated with other goods that speak against open science. (Researcher R3)

On the whole, it seemed that researchers and research managers who closely interact with researchers on a frequent basis are most prone to identify major barriers imposed by the current

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research system that exacerbate the transition to open science, although the small number of interviewees of course does not allow any firm conclusions on whether this pattern holds true in general.

A more general challenge in efforts to support and promote open science was highlighted by a policymaker from the arts and humanities, who stressed that many concepts of open science are not easily transferable to these fields of research. It is, for example, not immediately obvious what the specific meaning of, for example, reproducibility would be for historians and other researchers from other disciplines that employ primarily interpretive methodologies. Even the term open science can be perceived as excluding the arts and humanities because they, strictly speaking, are not considered sciences in the anglophone world. Even though the interviewee did not delve into more inclusive framings in greater depth, open research and open scholarship were mentioned as possible alternatives. This challenge might be exacerbated by the fact that especially scholars from the arts and humanities are very aware that language cannot be fully neutral. As a result, framing open science appropriately matters, perhaps to a larger extent than often recognised.

However, framing was not only mentioned as an important issue by stakeholders from the arts and humanities. Also an interviewee from the life sciences stated that he would recommend to rather use responsible science than open science as umbrella term, and to conceptualise openness as conducive to responsibility and trustworthiness (without, however, being a sine qua non). He expounded that in his experience the expression open science is viewed negatively by many researchers because they incorrectly assume that it suggests openness without limits. Along similar lines, several interviewees as well as other stakeholders in informal conversations mentioned that speaking of fair (or FAIR) rather than open data could help researchers and other stakeholders understand that open science means "as open as possible, as closed as necessary" rather than openness no matter what.

3 Responsible open science: issues and challenges

Many of the issues mentioned so far give rise to specific research ethical, legal and governance challenges that need to be solved or mitigated to support the transition to responsible open science. Even though research ethics (ethics *ad scientia*) and research integrity (ethics *in scientia*) overlap to a significant extent,[1] the following section differentiates between them because important governance mechanisms and bodies (such as RECs and RIOs) crucial to promote and safeguard responsibility in research focus primarily either on one or the other.

[1] See: https://eneri.eu/overlaps-between-re-and-ri/ (accessed 23 February, 2022)

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3.1 Research ethics, law and open science

A core assumption underpinning many efforts to promote and support open science is that it helps strengthening the link between science and society by increasing transparency, facilitating engagement and enhancing trustworthiness. In this way, open science can help prevent, solve or at least mitigate some research ethics problems, that is, moral problems that are associated with or emerge while conducting research.[2] However, some interviewees pointed out that open science also creates new and exacerbates existing research ethical challenges, especially in the realms of data protection, intellectual property rights and societal engagement with research. All these challenges are related to finding the right balance between promoting trust in research through openness and transparency on the one hand and safeguarding privacy rights as well as legitimate interests of innovators on the other hand.

As data protection in the European Union (EU) is governed primarily through the General Data Protection Regulation (GDPR) and attendant national data protection legislation, the ethics of privacy protection in research are inherently intertwined with law. Nonetheless, it should be emphasised that following all relevant legal requirements is not necessarily sufficient to also ensure ethical adequacy of research.

Several interviewees stressed that a major challenge researchers face is to translate the implications of the "as open as possible, as closed as necessary" approach to their own work, not least because some provisions of the GDPR are written in a terminology somewhat opaque to many of them. One interviewee who regularly trains researchers in open science depicted the following experience as exemplary of the problems many researchers face:

> [T]here is this slogan "the data should be as open as possible and as closed as necessary". Then [the researchers in training] always, always start to bring forward examples from their own field where data cannot be opened. They have lots off problems with personal data that they even do not know, whether they can open these data or not. (Research manager RM1)

Due to this uncertainty among at least some researchers, there is a risk that either data is opened up in violation of data protection legislation or that data is not made open because of perceived legal concerns that actually are unwarranted. In the first case, the right to privacy is violated, in the latter case potential benefits of open science are not realised. Perhaps because not respecting privacy rights violates the law, some interviewees suggested that researchers usually prefer to err on the side of caution and thus tend to refrain from opening data. Based on the

[2] See Steneck (2006) for further information on ethical aspects of research and a possible way to differentiate between research ethics and research integrity. See, for example, Penders *et al.* (2018) for a detailed analysis of research ethics and research integrity.

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experiences of two interviewees, this tendency might be particularly acute in countries where personal data processing also for research purposes is only allowed if consent is invoked as applicable legal basis for data processing in accordance with the GDPR.[3]

Aside from the GDPR also intellectual property law and patent requirements create challenges for open science. As one interviewee from the biomedical sciences elaborated, significant parts of research are dependent on the support of sponsors that have a strong interest in patenting innovations and to exploit them commercially. Patents, however, sometimes cannot be granted if the mechanism underlying the patent was openly published before, even if only in a conference paper. Thus, research conducted with the ambition to apply for patents cannot easily be made open without significant strings attached, a challenge that seems particularly relevant in privately funded and industry research. Short of a fundamental overhaul of the entire research and innovation system, such research would not be conducted at all if intellectual property protection and commercial exploitation were not feasible.

Yet not all research ethical challenges of open science have a strong legal dimension. As stated above, a key promise of open science is its alleged potential to strengthen the science-society nexus. Nonetheless, most stakeholders stressed that in their view researchers can benefit most from the transition to open science. While some interviewees explicitly mentioned that also society as a whole can benefit significantly, others expressed more caution. The former suggested that open science can help citizens detect which news are trustworthy and which news are not credible, whereas the latter rather emphasised that reading openly accessible publications and data competently requires training. The following quotes illustrate the slightly divergent (though not necessarily contradictory) viewpoints:

> (…) [D]uring this course [the students] discovered for themselves how open science and research integrity are interconnected, and how it's important for society, for them as citizens, for them as future professionals, as consumers of information, also for their everyday tasks (…). (Researcher R2)

> To my consideration, the linkage of science and society is about asking society what the issues are they want science to solve. How they want it to be solved, if they have some ideas, to involve them entirely in research and to keep communication and engagement all the way. (Research integrity officer RIO1)

> So I think, you know, open science definitely has a broader societal promise. But for that to happen, for that to come to fruition, there has to be much more knowledge generation also on the receivers' side. Because you cannot ask a politician to go and look at an open dataset and make anything

[3] Importantly, the ethical requirement to obtain consent is unrelated to consent as legal basis for personal data processing under the GDPR. Consequently, researchers should always obtain informed consent for participation in research, even if the legal basis for personal data processing is not consent. In such cases, consent to participate in research is a safeguard from a GDPR perspective.

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> useful with it, because they just don't have the tools to interpret it, or to even understand it. Or the same with an open access research paper. (...) [Y]ou have to be trained to be able to read a research paper and understand the implications of a research paper. Just putting something out there, it doesn't mean that it's useful. But I think the promise of open science is already here for researchers. They (...) can immediately benefit from it. (Research manager RM2)

Consequently, it might merit further investigation to assess how and under what conditions open science can yield direct benefits to society at large to understand more fully to what extent and via which pathways it can facilitate and deepen societal engagement with research and innovation.

Interestingly, potential tensions between established informed consent models and open science were not mentioned as major issues in the interviews conducted so far. Even though this might be an encouraging sign that constructive ways to solve such challenges have already been found, it is an issue that will be addressed more explicitly in upcoming stakeholder engagement activities of ROSiE. More generally, readers of this report should keep in mind that the list of research ethical challenges discussed above is not exhaustive. The same is true for the list of research integrity and research policy and governance challenges that will be expounded in the next two chapters.

3.2 Research integrity and open science

The European Code of Conduct for Research Integrity (ECoC) is the most important guidance document on the EU level in the research integrity realm. It outlines four fundamental principles of research integrity – reliability, honesty, respect and accountability – and describes good research practices in eight contexts: 1) research environment, 2) training, supervision and mentoring, 3) research procedures, 4) safeguards, 5) data practices and management, 6) collaborative working, 7) publication and dissemination and 8) reviewing, evaluating and editing.[4] Since the transition to open science affects the entire research system, each of the eight contexts deserves closer scrutiny. In the interviews conducted so far, many issues directly and indirectly related to research integrity were addressed, although in general interviewees consider open science mostly, if not entirely, conducive to research integrity because it increases transparency and has the potential to mitigate the reproducibility crisis experienced by several fields of research in recent years.

Changes in the research environment were mentioned as a crucial precondition for a successful transition to open science by most interviewees. Throughout many interviews various references were made to the necessity to establish a research culture that endorses and rewards open

[4] https://allea.org/code-of-conduct/ (accessed 23 Februay, 2022)

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science. Interviewees strongly emphasised that incentives to follow open science practices need to be created, for example in research and researcher assessment and funding schemes. This clearly shows that in their view the transition to open science will only succeed if open science is aligned to incentives. Moreover, several interviewees underlined the need to create proper infrastructures for data management, although in general technical aspects of infrastructure development were not named as a major concern because existing infrastructural developments tare perceived to be on the right track. Also, several interviewees anticipate that technological progress and investments in platforms such as the European Open Science Cloud (EOSC) will decrease technological barriers further.

All interviewees consider training in responsible open science desirable. Several explicitly argued that in their view open science should be integrated in trainings in responsible research and good scientific practice. Two interviewees suggested that integrating open science into such trainings also could potentially decrease reluctance among researchers to participate in trainings and endorse open science practices because responsible research and good scientific practice are less contested terms than open science. Furthermore, interviewees largely agreed that open science trainings should be hands-on and practice-oriented rather than theoretical and general.

Major challenges related to mentoring one interviewee brought up are potentially detrimental socialisation effects. In his experience, especially older supervisors who are less aware or more critical towards open science often maintain cultures of closed science in their settings (such as their labs, for example). Thus, their younger mentees are socialised with research practices that hamper the transition to open science. Giving an example from biomedical research, the interviewee described that some researchers are unwilling to share all information on how some new technologies have been developed if they assume that this knowledge gives them a competitive edge yet cannot be patented.

With regard to research procedures, the most important tensions mentioned in the interviews related to interests in intellectual property protection already discussed in the previous chapter and the fear of being scooped if research procedures are opened up before studies have been completed and results published. The latter issue was also extensively discussed in focus groups that are analysed in a separate report. A further challenge related to opening research procedures is that doing so requires significant effort and thus presupposes the availability of sufficient resources. In lab-based disciplines electronic lab notebooks were identified as a potentially helpful by an interviewee who, however, also cautioned that implementing them on a broader scale would be a long-term development rather than something that could easily be established over a short time-period.

Issues listed under safeguards in the ECoC fall mostly in the research ethics category as defined in this report and therefore were outlined above in chapter 3.1.

As expected, data practices and management were discussed extensively in all interviews, and many discussions centred on the necessity to create research environments that reward good

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data practices and management. Consequently, in the open science transition research environment and data practices and management are closely related and cannot easily be analysed separately. Essentially all aspects of open science related to open data are inherently linked to data practices. A major specific challenge related to data management some interviewees hinted to and strongly emphasised by a policymaker is that clear guidance is necessary to ensure that research data management becomes an integral component of the entire research processes because "opening data retrospectively is close to impossible" (policymaker PM1).

Another crucial aspect related to responsible data management extensively discussed by one interviewee is the question under what conditions access restrictions are justified and how access to data could be managed. He outlined that curating data is costly and that data is highly valuable to, for example, tech companies and insurers. Therefore, he argued restricting access is justifiable if access conditions are clearly specified and transparent. In such instances access could, for example, be controlled by a data access committee, and waivers could be granted if, for example, patient organisations would like to access data. In this way, open science in his view can also mean creating legitimate yet transparent access restrictions that recognise the value of data. By extension, this also implies that open science should mean transparency about why some data is not or cannot be made open.

Implementing open science practices can create challenges in research collaborations, particularly in multi-centre research projects with partners from different countries. As an interviewee elaborated, the extent to which data can actually be opened still differs between countries, even in the EU. Thus, researchers moving from one country to another sometimes are surprised about regulatory heterogeneity, while international consortia often need advice on which infrastructure to use for storing publications and data in a manner both compliant with pertinent regulation and conducive to open science.

The move to open science also has created new challenges when it comes to publishing and disseminating research, albeit seemingly with some notable differences between different disciplines. A first major challenge identified by an interviewee is that following open science practices sometimes is not possible, even if authors of a publication would generally like to make it openly accessible. She illustrated this point by citing an example where she was invited by a publisher to contribute a chapter to a large edited volume. Accepting the invitation was only possible by agreeing to the publisher's terms on access. This challenge might be particularly acute in disciplines where books are a major type of publication, even though high open access fees could presumably have similar effects on journal publications, unless such fees can be covered by grants or otherwise reimbursed. Another issue particularly relevant to disciplines where book publications are common is related to the problematic effects creative commons licences, such as CC-BY, can have. Publications licenced under CC-BY, as a policymaker from arts and humanities field explained, can be republished in inadequate formats without the consent of authors or original publishers, as long as the text corpus remains unchanged.

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A third issue related to publication and dissemination brought up in the interviews is related to the rise of pre-prints. In general, all interviewees who referred to pre-prints view them by and large favourably, and none of them argued that their negative effects pre-prints outweigh their benefits. Nonetheless, two major challenges related to pre-prints were discussed in the interviews: Firstly, pre-print servers, by facilitating access to research, inadvertently also decrease the barriers to publishing bad research on visible platforms. At least under certain circumstances this becomes a problem because, secondly, not all readers of papers published on pre-print platforms are aware that pre-prints have not been subjected to formal quality control, such as peer review, and thus should be read carefully, especially by non-experts.

Interestingly, an issue generally considered a major challenge in the open science transition was only briefly touched upon in the interviews, but not expounded in greater length by any interviewee, namely high open access fees. While largely omitting discussions of high open access fees might reflect the view shared by several interviewees that RFOs rather than journals should be regarded as the engines of the open science transition, this issue will be addressed in more depth in upcoming stakeholder engagement activities to get a clearer understanding about prevalent opinions.

Reviewing, evaluating and editing was a major issue in many interviews inasmuch the necessity to develop incentive compatible performance assessment systems that reward open science was discussed. Beyond that, two interviewees with a background in research management mentioned that in their view guidelines and trainings also for reviewers (one interviewee referred to ethics reviewers, the other to grant reviewers) would be desirable to ensure they have the necessary understanding and awareness of open science issues.

3.3 Research policy, research governance and open science

Despite not focused explicitly on research policy and research governance, the interviews yield some tentative insights that might merit further consideration. In addition to developing performance assessment schemes that reward open science, which obviously has an important policy component but was already outlined in the previous sub-chapter, interviewees mentioned several issues that could be addressed through policy changes and governance adaptations on different levels. This section summarises the most important issues raised.

Some interviewees pointed out that their countries lack a national open science policy, which they consider a problem. In their view, this tends to make efforts to promote open science more difficult because the lack of explicit guidance on the national level tends to obfuscate the value and importance of open science to researchers. Thus, national open science policies could be helpful to signal to researchers that political commitments to support and promote open science are credible.

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Moreover, interviewees agreed that funding open science practices is crucial, an issue closely related to aligning open science practices to incentive structures. However, opinions on current RFO performances varied to at least a certain extent. Some interviewees view current RFOs policies as exemplary, whereas others rather pointed to the heterogeneity of RFO approaches and policies, as the following quotes illustrate:

> (...) [F]unders, they are doing their own job. Like I said in the beginning, it's like a parallel world. So they have their own code of ethics and they just don't care about [insufficient national policies]. (...) So the funders are doing their job really well. (Researcher R2)

> Now we see with funders that we work with, some of them require for example data management plans already in proposal stage, some of them require it later, the templates are all different. (Research manager RM2)

Yet in general the viewpoints of interviewees who explicitly elaborated on the role of RFOs seemed to converge on the argument that open science should be rewarded financially rather than (only) mandated by, for example, grant requirements. Consequently, interviewees consider RFOs key actors in the open science transition and overall expressed a preference of rewards over conditionality.

Another issue two interviewees mentioned that potentially affects the effectiveness of governance arrangements is the training of reviewers. If open science should be considered in reviews, reviewers need to have the necessary competences to assess whether commitments of research teams and consortia are in line with standards of good practice. One touched upon this issue when discussing competences of grant reviewers, while the other interviewee referred to ethics advisers on the institutional level (somewhat similar to a REC).

When it comes to how institutional governance schemes could help to support researchers in implementing responsible open science practices, several interviewees stated that data stewards on the institute or faculty level could be effective advisers. Unlike advisers on the general institutional level, interviewees see data stewards as better positioned to offer specific advice because of their familiarity with disciplinary cultures and challenges. Furthermore, they are usually more accessible than advisers located on a higher and thus more distant level. The system implemented by the Technical University of Delft was highlighted as a good practice example in two interviews. More generally, various interviewees alluded to the importance of offering guidance on the appropriate level and emphasised the importance of meeting the needs of target groups.

On a more general level, one interviewee pointed out that at least in her country (located in Central Europe) efforts to promote responsible open science are somewhat hampered by the fact that the research ethics and integrity community and the open science community are largely separated. In her view, creating and strengthening linkages between these communities could help to increase synergies between ethics, integrity and open science.

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Finally, interviewees from all stakeholder groups perceive citizen science positively and believe that it can make an important contribution to the open science transition. Several interviewees mentioned citizen science either when asked about what they associate with open science or when asked about good practices they would recommend ROSiE to include among the tools the project will develop. As ROSiE is built around the assumption that citizen science and open science are closely related, this might be counted as tentative evidence that this view is shared in the research community.

4 Implications for ROSiE products

In addition to addressing the challenges described in the previous section, some specific implications regarding the content and design of the products ROSiE will develop can be drawn from the interviews. This section concisely summarises them. The implications are derived from challenges expounded by interviewees and good practice examples shared by them. Informal conversations with several stakeholders provided valuable additional insights.

4.1 Guidelines

Ideally many of the challenges discussed above should be addressed in the ROSiE guidelines, at least if they can be addressed on the level of research conduct. Nevertheless, some more specific recommendations can be given as well. A number of interviewees pointed out that the guidelines for researchers and research teams should be on the appropriate level of granularity to be practically useful. Guidance phrased in overly general terms is considered less useful because it usually is insufficiently operational. While some interviewees agreed that differentiating by disciplines could indeed be useful to ensure practical usefulness, others recommended to rather focus on the types of data used, types of methods employed or research scenarios. Those rather sceptical of disciplinary guidelines tended to emphasise that differences within disciplines are significant and not necessarily smaller than differences between them. It was also pointed out that an increasing amount of research is conducted by interdisciplinary teams and consortia.

Several interviewees recommended to refer to fair (or FAIR) rather than open data and to responsible science or good scientific practice rather than open science. In their view, such a phrasing could help decrease reluctance to engage in open science practices because it would signal that openness is meant to promote and safeguard responsibility and quality as well as that openness can, should and under certain circumstances must have legitimate limits. This recommendation shows that the expression “open science” might be viewed less favourably by some in the research community than is often apparently assumed by open science enthusiasts.

Interviewees mentioned some good practices that could be referred to in the guidelines, namely tools to create data management plans, guidance on GDPR compliance created by European

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Research Infrastructure Consortia (ERICs) and guidance on the importance of gender equality in research developed by, for example, the European Institute for Gender Equality (EIGE).

4.2 Supplement to the European Code of Conduct for Research Integrity

While the focus groups analysed in a separate report partly focused on how the ECoC could support and promote open science, this topic was not explicitly discussed in the stakeholder interviews. Generally, the interviews do not seem to suggest that stakeholders consider fundamental changes to the ECoC necessary because none of the major challenges identified seems to be in obvious tension with its provisions and recommendations. One interviewee suggested that adding a section to the ECoC that specifically focuses on open science and considers recent developments could potentially have added value.

4.3 Strategic policy paper

All challenges described in chapter 3.3 could be taken in the strategic policy paper. This also applies to the policy-related aspects of the challenges outlined in chapters 3.1 and 3.2. Thus, main issues strongly emphasised in the majority of interviews relate to aligning open science to the incentives researchers face, ideally via creating (positive) reward schemes rather than (potentially punitive) mandates. In particular, good practices of some RFOs, such as the Wellcome Trust, could provide useful starting points. One interviewee also recommended to focus initial policy changes especially on the potentially most useful data rather than on advocating for a general opening of all data regardless of the likely cost-benefit ratio.

Moreover, the need to develop and maintain support infrastructures on the institutional level was repeatedly highlighted in the interviews. One interviewee explained that open science mandates and policies of, for example, RFOs gave a crucial impetus to organisational changes at the RPO she is working for. Therefore, analysing interplays between different policy levels might be advisable to identify potentials for synergies and opportunities for aligning agendas.

A further crucial issue policymakers should consider is ensuring open science is inclusive. Currently, open science policy and guidance, due to the terminology and concepts it uses, often risks to inadvertently exclude the arts and humanities where, for instance, the practical meaning of concepts such as reproducibility is not immediately obvious. Consequently, sensitivity to disciplinary differences is crucial to accomplish a full and genuine transition to open science.

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4.4 Training materials

Most interviewees emphasised that training for a variety of target groups is very important to successfully complete the envisaged transition to open science. According to the view of the majority of interviewed stakeholders, training materials should whenever possible be hands-on and action-focused to help researchers develop crucial problem-solving skills. Moreover, the training materials should be linked to the guidelines and reflect the needs of learners. The recommendation to consider framing open science as responsible science, good scientific practice and fair or FAIR research mentioned with regard to the guidelines also applies to the training materials.

4.5 Knowledge hub

When asked about how the ROSiE knowledge should ideally be designed to yield significant added value, many stakeholders specifically emphasised the importance to ensure sustainability after the end of the project, for example though continued funding from interested institutions. In this respect, it seems particularly important to either create an updating mechanism or to develop materials that have a high chance of long-term relevance even if their content remains unchanged. One interviewee explicitly pointed out that based on her experiences the latter strategy might have a higher chance of success, even though it might at first sight appear slightly less attractive than the former.

A further somewhat general issue referred to by many interviewees is the risk that a new platform fails to create unique value added. Interviewees largely seemed to agree that there is no shortage of platforms in the current open science landscape. Therefore, as a new platform the ROSiE knowledge hub should have novel features that do not already exist elsewhere. Also, it should be considered if and how elements of the ROSiE knowledge hub could be integrated into existing platforms to maximise chances of wide uptake. In the same way, the ROSiE knowledge hub should be linked to existing tools that support responsible open science, such as tools to create proper data management plans or data anonymisation tools, such as Amnesia (developed by the OpenAIRE project).

With respect to the general design of the knowledge hub, an interviewee with extensive experience in platform development stressed that user-friendliness is essential. She views especially easy findability of information and easy navigation are critical for success. Because of that, several tests with pilot-users could help identify strengths and weaknesses. Besides, in her experience interactive elements, such as a helpdesk function, are valuable. A helpdesk both creates some degree of collaboration and provides insights about stakeholder needs. Another interviewee stated that a decision-tree that incorporates different disciplinary perspectives could be a user-friendly way to provide guidance.

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5 Next steps

From March to June 2022 further interviews will be conducted to increase the diversity of perspectives taken into account by the ROSiE project. Interviewee selection will be guided by the stakeholder engagement strategy. Furthermore, the interview guide will be adapted based on experiences from the interviews conducted so far and findings from other stakeholder engagement activities, especially two focus groups. Adaptations will be made to maximise access to information on how ROSiE can support stakeholders in promoting and implementing responsible open science practices. In this way, the connection between the explore, engage, guide and equip dimensions of the project will be strengthened.

Interview findings, together with findings from focus groups and other stakeholder engagement activities, will feed into a comprehensive analysis of the stakeholder engagement process based on which recommendations on how to support, promote and safeguard good open science practices will be developed. The ensuing report will become part of the groundwork underpinning the guide and equip phases of ROSiE.

References

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Appendix

Interview guide

Section 1: Background information and building rapport

- **Can you please tell me about the institution (or company, if interviewee is working in industry or journalism) you're working for? What are the main objectives and activities of the institution/company?**

Probes:

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- When was the institution (or company) founded?
- Have the objectives of the organization shifted over time?

- **What is your current position and what are your main tasks?**

Probes:

- Is that position primarily academic or more related to (research) management?
- What is your (academic) background?

Interviewer notes

Section 2: Open science – conceptions and tasks

- **What does open science mean to you?**

Probes:

- Do you view open science rather as a promise or rather as a problem?
- Who do you think will benefit most from open science? *(if open science is viewed as a promise)*
- Who do you think faces the biggest challenges? *(if open science is viewed as a problem)*

- **What, if any, role does open science play for your institution?**

Probes:

- Does your institution promote open science and, if yes, how?
- Does your organization promote open science also with technological solutions / normative instruments, like policies and guidelines?

- **Are any of your tasks related to open science and, if yes, what are these tasks?**

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Probes:

- Which open science issues are most relevant in your work?
- How often do you work on these tasks, and for how long?
- If answer to initial questions is "no": Did you have any contact with open science so far? If yes, what kind of contact?
- Do you have colleagues who work on open science-related tasks? If yes, do you know what they're working on?

- **In your view, has open science improved the work of your institution or has it rather created problems and challenges? / In your view, could open science help improve the performance of institution or do you think it would rather create new challenges?**

Probes:

- Which aspects of open science have helped/will help the most?
- Which aspects of open science have created/will most likely create problems and challenges?
- If issues discussed are technical or legal only, ask about ethical challenges
- Does open science facilitate engaging stakeholders in research? Is stakeholder engagement beneficial to research (outcomes)?

Interviewer notes

Section 3: Open science, ethics and integrity

- **Are any of your tasks related to research ethics or research integrity and, if yes, what are these tasks?** *(only ask this question if it was not already de facto answered before)*

Probes:

- Can you describe these tasks in more detail?

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- Does open science play any role in these tasks? Is open science discussed in your ethics committee/research integrity office/etc.?

- **How would you describe the relationship between open science and responsible conduct of research?**

Probes:

- Overall, do you think research ethics, research integrity and open science are mutually supportive or do you see more pitfalls than promises?
- Can you anticipate new challenges for research ethics and research integrity that are either created or reinforced in an open science context?
- How would you address these challenges?
- How could the promises be realized?
- Do you see ways how open science could support the work of RECs and RIOs?

Interviewer notes

Section 4: Towards responsible open science

- **What are the main ethical challenges of open science?**

Probes:

- Are these challenges primarily technical or normative? Or both?
- Are challenges also related to policy, education etc.?

- **What strategies are you aware of that could mitigate these challenges?**

Probes:

- Do you think trainings in open science should explicitly cover ethical issues? If yes, which? If not, why?

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- What added value could training in responsible open science have? Are there any preconditions that need to be in place for training to be successful?

- **What tools could facilitate the move towards open science for you and your institution?**

Probes:

- Could you also benefit from technological /normative tools (e.g. open science ethics guidelines)? If yes, which and how? If no, why not? Do you know if any of these tools already exist?
- If core tools ROSiE will produce are not mentioned: Could you imagine XY being useful for you and your institution?
- How should these tools ideally be made accessible? How could a knowledge sharing platform ideally look like?

- **Are there any examples of good open science practices you would like to share with us?**

Probes:

- Can you explain what it is that makes this practice good? Why has it been so successful?

Interviewer notes

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