



*General process recommendations for a reflective RRI audit in
multi-partner, international projects*

Deliverable 16.4

Work Package 16

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Abstract	<p>In this deliverable we offer general process recommendations for a reflective RRI review in multi-partner, international projects. The recommendations are based on a review conducted within the RRI Practice research project and reflections thereupon by its participants. We offer guidance on how to implement a reflective RRI review process in general, and how to identify and manage the practical aspects of doing research, which includes dealing with the often competing demands from research conducting and research funding organisations.</p> <p>Specifically, we reflect on the experiences of RRI Practice project partners, and compare these to experiences described in the academic literature, on the following topics: managing different interpretations of the core research concept; combining societal impact with the need for rigour in research; negotiating the demand for inclusion of societal stakeholders in research; balancing the need for flexibility with the requirement of clear and consistent research protocols; and integrating particular formulations of policy areas, including the five EC policy keys, in research projects.</p>
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Executive summary: recommendations

In the Executive Summary we summarise the primary process recommendations for conducting a reflective RRI review in multi-partner, international projects. In the following sections we explain how these recommendations were arrived at; we provide recommendations of secondary importance; and we provide examples of how these recommendations have been implemented in the RRI Practice project, or in other projects as described in the academic literature.

On the process of conducting a reflective RRI review, we recommend:

- *To design a separate work package for a reflective RRI review in multi-partner, international projects with dedicated personnel, funds and deliverables;*
- *To design the project with continuous structural interaction between the review team and other project teams;*
- *To design the project so that results of reflective RRI review activities can feed into project tasks and decision-making processes in a continuous manner;*
- *To ensure that the reflective RRI review team possesses relevant skills in the areas of observation/ethnography, facilitation/engagement, and reflection/critical thinking.*

On core theoretical and reflective competence, we recommend:

- *To facilitate project-wide theoretical discussions on the role and interpretation of key concepts (especially those that underpin core project theories, frameworks and protocols);*
- *To consider whether differences in interpretation between project teams in these areas are justified and manageable given the aims and scope of the project;*
- *To consider possible synergies between different interpretations and how the project could make use of them;*
- *To identify the politics of knowledge production and contextualisation in the project and to reflect on its consequences. To do this particularly with regard to differences in perceived importance between scientific disciplines, between quantitative and qualitative research and impact assessments, between expert and non-expert knowledge, and between knowledge generated by and for different countries.*

On societal impact, we recommend:

- *To discuss which factors keep project researchers from working on societal impact, focusing specifically on publication and grant acquisition pressure, and to determine how to achieve an appropriate balance between traditional academic reward structures and criteria, and project goals of delivering societal impact;*
- *To reflect on the project's societal impact strategy: whether its aims are achievable, its means appropriate and the extent to which it is sensitive to differences in context;*
- *To consider whether iteration with / learning from knowledge users occurs and feeds adequately back into the research process.*

On inclusion, we recommend:

- *To reflect on whether the project's inclusion strategy facilitates an opening up of the project to new viewpoints and values of stakeholders and the wider public, or whether these openings are closed down prematurely;*
- *To monitor for the instrumentalisation of inclusion activities by researchers or powerful actors, and for biases and framings that may lead to stakeholders or viewpoints being excluded from the research process.*

On flexibility in research practice, we recommend:

- *To reflect on the extent to which flexibility is built into the project design and associated tasks (e.g. for contextualisation or in response to the input of reflective or inclusive activities) and how this flexibility can be realised within formal project requirements and deliverables;*
- *To reflect on the national and institutional contexts for and in which core project concepts, frameworks, theories and protocols have been developed, and to consider how their contextual aspects may affect their application in different contexts. To do this with particular care if these contexts may be underpinned by power inequalities or differences in culture or in political systems.*

On the RRI keys, besides the relevant actions already mentioned on inclusion and openness, we recommend:

- *On the ethics key, to consider the kinds of ethical assumptions that are built into the project design, whether explicitly or implicitly, regarding the role of research and innovation in society, what constitutes a good society and good research, and what this implies for the responsibilities of researchers and innovators;*
- *On the gender key, to consider which kinds of diversity are morally or instrumentally relevant to the project, and in which areas, and to incorporate where possible affirmative actions to promote those into the project design;*
- *On the Open Access key, to reflect on the kind of publishing systems the researchers would endorse, and how their Open Access publishing strategies can promote such systems, and to consider what broadening 'Open Access' to 'Open Science' could mean for the research project, and how the project could practically implement its understanding of Open Science.*

Introduction

A well-designed research project needs to pay attention to a number of factors. Content is an obvious one, which includes matters such as the research questions, methodology and the project's position in the literature. Management is another factor, especially with larger projects, that includes matters such as monitoring time plans and finances and managing recruitment. However, research projects are not only theoretical, but also practical enterprises: researchers are always also citizens and employees, operating under local, national and international institutional norms and expectations regarding values and behaviour. As such, research projects are affected by a number of factors that tend to remain under-investigated in project design, including but not limited to the roles and values of the researchers; styles of discussion, decision-making and conflict resolution processes; the influence of personal, institutional and national contexts on the research process; and the roles and values of societal stakeholders and how they are incorporated in the research process. If not addressed properly, particularly in multi-partner, international projects these factors can lead to misunderstandings or difficulties in following research protocols. Worse, they can also lead to tensions within the project and to deeper disagreements on the research topic, goal and methodology itself. Therefore, creating space in research projects to collectively reflect on those factors is vital for identifying and managing such issues at an early stage.

The aim of this deliverable is to provide general process recommendations on procedures that research projects can implement to take such factors into account throughout the research process. Note that our aim is not to provide 'solutions' to solve 'problems' in research projects: rather, we identify tensions that may pull projects, as well as individual researchers, in different directions for different reasons. We also suggest ways of how to navigate those tensions productively. Thus, our reflective RRI review does not

recommend what choices to make, but rather where to look for relevant tensions, and to provide examples of how they could be navigated.

We call our method a 'reflective RRI review' as it has been inspired by the Responsible Research and Innovation (RRI) framework as steering relevant areas of reflection, particularly its interpretation as the EC policy keys (ethics, public engagement, gender, Open Access and science education) and as the AIRR dimensions (anticipation, inclusion, reflexivity and responsiveness). In this respect the reflective RRI review is similar to other methods for promoting structural reflection throughout the research process, such as reflexive engineering (Robbins 2007) that is concerned with critical self-reflection, but also with inclusion and taking a systems perspective, or reflexive governance (Voss, Bauknecht and Kemp 2006) that is also concerned with participation and adaptation. Thus, projects can apply a reflective RRI review without necessarily being committed to following the prescriptions of the RRI framework. Finally, projects can implement a reflective RRI review at any stage, though we recommend to implement it as early as possible, preferably from the project design phase onwards. That way, the project team can ensure that sufficient time and resources are budgeted in, and that a structure is in place for monitoring and explicating relevant challenges as they arise.

While the reflective RRI review has been developed as part of a social sciences research project, our process recommendations are general rather than specific to this field, and applicable to research projects in any discipline. In particular, they are useful for projects that require trans- or interdisciplinary work as they provide prescriptions for creating understanding across disciplines, and for identifying and dealing with the politics of knowledge production and translation.

Though the RRI review can be applied to research projects of any size, the recommendations have been developed for multi-partner, international projects, as those are the projects where the greatest differences between contexts and between researcher roles are most likely to occur, and where a reflective RRI review could thus have the most added value. Furthermore, the process recommendations are applicable to fundamental, curiosity-driven research projects as well as to co-creation, innovation and impact-oriented projects. Some of the recommendations in this report may be more relevant for the latter kinds of projects than for the former. However, we would like to stress that identifying potential challenges and disagreements in a fundamental research phase could be helpful for guiding research in later phases that might be more applied or impact-oriented. Thus, the aim of our deliverable is to provide *general process recommendations for a reflective RRI review in multi-partner, international projects*.

We realise this aim through structuring this deliverable in the following way. In the *methodology* section we explain how we have developed the general process recommendations, based on our experiences with developing and undertaking a reflective RRI review in the Horizon2020 RRI Practice project. In the *process* section we make recommendations on the general process and planning of the review. After this section we go into specific discussion topics for the reflective RRI review.

First, in our section on *structures and functions of core theories* we investigate the tensions that may arise because of different interpretations of the research project itself, particularly of its core theories and aims. These different interpretations may result from researchers having a different background or working in a different context. Next, in our section on *research for societal impact* we turn to tensions that may arise between the ambitions of research projects to have societal impact and the requirements of conducting rigorous research in academic institutions. As societal impact cannot be seen apart from questions on how to involve stakeholders and members of the wider public in research, in our section on *inclusion in research* we investigate tensions that have to be navigated by projects seeking to make stakeholder inclusion or co-production an integral part of their research. Next, in our section on *flexibility in research practice* we go into the tensions that may arise between the need for clear and specific research protocols and the need to make research processes flexible, responsive and adaptable. Finally, we discuss the *specific RRI keys* and how they can be integrated in a reflective RRI review. We end with a discussion on factors that affected conducting the reflective RRI review in the RRI Practice project, and the nature of reflexivity and the consequences this has for the formulation of process recommendations.

Methodology

The general process recommendations emerged out of an initial reflective RRI review developed for the Horizon2020 RRI Practice project, whose aim was to investigate barriers and drivers to the implementation of RRI in research conducting and research funding organisations. The project structure was based on a combination of the EC conception of RRI as the policy keys or thematic elements¹, and the academic conception of RRI as the AIRR framework (Stilgoe, Owen and Macnaghten 2013). The reflective RRI review was included in the project with the aim of getting to understand the drivers and barriers to RRI implementation in research from a very direct and self-reflective point of view. The question was whether we could, as a research project with members knowledgeable about and motivated to do RRI, 'practice what we preached' to those organisations, and to find out what factors affected our practice. The idea was that getting a better overview of those factors, the different strategies to handle them and the consequences of following those strategies would assist in the project's fundamental ambition of investigating barriers and drivers to the implementation of RRI in research conducting and funding organisations. We also sought to reflect on the experiences from this exercise to derive general process recommendations for doing a reflective RRI review in multi-partner, international projects in general.

The initial RRI review was structured as a separate task within one of the project's work packages with its own dedicated team, resources and deliverables. Review activities consisted of two rounds of interviews with (members from) each project team: one in the beginning of the project, to investigate understandings of the goals of the project and the structure and function of its core concept (in our case, RRI); and one halfway through the project, after the first round of major deliverables had been finished, to investigate how the actual research had compared to the protocol and initial expectations, and what were the causes of possible deviations. In addition to the interviews, the internal review had a dedicated one hour time slot at the consortium meetings (which were held every six months throughout the duration of the project) during which the internal review team facilitated a discussion related to practical aspects of research that they considered relevant to discuss at that point in time.

The findings of the internal RRI review are described in project deliverable 16.3: 'RRI Practice internal RRI review'. The process and outcomes of this internal RRI review have been reflected upon by the internal review team and contextualised with the help of relevant academic literature to create this deliverable. The resulting general process recommendations have subsequently been reflected upon by RRI Practice research team members after the closing conference, shortly before the project was finalised.

Process recommendations

In this section we discuss who should do reflective RRI review activities, and when to do it.

An important question to address regarding the process, is who is responsible for conducting the reflective RRI review. One way to organise responsibility would be to organise the RRI review as a separate (task within a) work package led by reflective review experts.² This team would then act as facilitators tasked with generating and facilitating relevant discussions with project partners. In a sense, this structure reflects the wider funding structure of Horizon2020, where RRI was principally part of the separate 'Science with and for Society' programme, rather than distributed across the whole funding scheme. What makes this choice for project design attractive is that it works with existing institutional structures that reward disciplinary excellence (the 'experts' do the reflective RRI review) and assigns

¹ See <https://ec.europa.eu/programmes/horizon2020/en/h2020-section/responsible-research-innovation>. Accessed 10 May 2019.

² These can be social scientists but also others, as long as they possess the relevant skills and knowledge.

clear responsibility for conducting the reflective RRI review and creating related deliverables to those experts.

However, the risk of such a structure is that it could isolate and decouple the reflective RRI review from the actual research and innovation process, if no work is undertaken to structurally integrate them. Åm (2019), reflecting on RRI projects funded by the Norwegian research funder RCN, has noted that RRI demands and promises are often accommodated rather than enacted. She argues that RRI is seen as something separate from 'core research', much like research ethics, which is often regarded as a bureaucratic box-ticking exercise rather than a vital part of research itself.³ Åm notes that a major factor in this is institutional pressure: researchers are often so busy with acquisition, supervision, management and teaching that their capacity for original research is already constrained, let alone their capacity for properly reflecting on it. Worse, as Salmon, Priestly and Goven (2017) note, the social scientists who supposedly are the experts on conducting RRI as well as reflective RRI reviews are also institutionally rewarded for disciplinary excellence. Yet publishing in social sciences journals is not the same as communicating with scientists from other disciplines. Moreover, Salmon, Priestly and Goven note tendencies among social scientists to be critical rather than constructive, and to assume a 'public engagement deficit' among natural scientists, which does not invite communication and joint reflection. Thus, a separate reflective RRI review work package / programme may lead to a situation where project researchers accommodate, but do not enact reflection, while those responsible for the work package reflect on the research, but otherwise have little effect on how it proceeds, or on how researchers see their project. Such an arrangement could lead to a 'best case scenario' in terms of both teams generating excellent disciplinary publications on their own, but a 'worst case scenario' in terms of neither team implementing actual reflexive practices.

One possible conclusion from this could be that responsibility for a reflective RRI review should be organised in a different way. However, it is unclear whether Åm's concerns could be addressed by distributing responsibility in a different way, for example, over all project members, or by assigning it to the project leader. Rather, Åm's concerns point to the need to structurally integrate reflective review activities throughout the research, even if they are formally organised as a separate task or work package. For this to be successful, designing the project to allow for such structural integration is crucial, as is commitment from project leadership. *Recommendations* for facilitating structural integration of the reflective RRI review task with other project tasks include:

- Identifying and connecting to existing responsibility practices and reflective discussions within the research teams (Glerup, Davies and Horst 2017);
- Capacity-building for and support of critical reflection, informal trust-building and facilitation of reflective discussions (Aicardi, Reinsborough and Rose 2018);
- Engaged ethnography (Monteiro 2018);
- Engagement at science conferences, by scientists, with humour, to open up conversations in a non-threatening manner in a familiar environment for scientists (Salmon, Priestley and Goven 2017).

A reflective RRI review needs to recognise (and indeed, to facilitate a discussion on) the fact that the capacity to follow through on such recommendations requires certain boundary conditions to be addressed:

- The recognition and management of institutional barriers for scientists to engage in reflexive exercises, and for social scientists to facilitate and connect to other researchers (rather than generating disciplinary publications), particularly for junior researchers envisioning an academic career;
- The need for RRI experts to be humble and open, approaching researchers in their own environments and helping them to reflect on their own responsibility practices, which requires skills and a mindset that may not be taken for granted;

³ See RRI Practice deliverable 15.1: Comparative study of the Ethics key, by Grinbaum, A. and Politi, V.

- The need for reflective RRI review experts to balance engaged participation/facilitation, detached observation/ethnography and the enforcement of funder norms (e.g. ethics requirements), where the first role is most important for stimulating reflections on practical factors in the project, but the second and third roles may both be required and may clash with the demands of the first role (Aicardi, Reinsborough and Rose 2018; Monteiro 2018);
- The negotiation of knowledge politics, or (implicit) value judgements where some otherwise incommensurable disciplines or methods are considered more important than others. Examples would be where the natural sciences are held in greater esteem than the social sciences, or are seen as setting standards for 'good science' that the social sciences should adhere to, but by their nature deviate from (Stöckelová 2016; Monteiro 2018).

Concerning the question of when reflective RRI review activities should take place, in principle these should be undertaken throughout the project, addressing all issues identified in this deliverable pro-actively, as well as during the project if those issues arise. We recommend specifically to organise reflective RRI review activities at the beginning of the project, addressing at least research team ideas regarding project aims and scope, what kind of societal impact to achieve and how, and whether, and if so, how stakeholder inclusion could benefit the research. Another good moment to intensify reflective RRI activities is after major milestones/deliverables have been achieved, and the next phase of the project starts. In this phase, the reflective RRI review should address at least experiences with the structures and functions of the core theories and the relation between funder requirements and research practice. Consortium meetings are a good place to do this: it helps if it is clear which formal and informal communication channels are available to facilitate this communication over the course of the research project, e.g. Skype meetings, blogs or research visits. Managing expectations is a part of this: merely establishing the right communication channels does not guarantee that their usage will be prioritised by researchers busy with research, teaching and other tasks. A review session at the end of the project is useful to establish lessons learned for future projects.

Regarding planning, it is important to keep in mind that many projects build on earlier projects and years of research, and that this may constrain both the mental and the practical manoeuvring room of their participants (Aicardi, Reinsborough and Rose 2018). Again, the reflective RRI review team should coordinate closely with the PI / project board to ensure that enough time and resources are devoted to the work package; that reflective activities are structurally planned throughout the research project to manage the risk of mere accommodation of the reflexive component; and that insights gained from the reflective RRI review can feed into project management.

Structures and functions of core theories

In this section we investigate how to uncover and manage different interpretations of the research project, particularly regarding the structure and function of core project theories (though it also applies to concepts, frameworks, protocols, etc.)

Much like physical tools, core theories within a research proposal have structures and functions. The structures are the definitions, procedures, etc. that constitute the theory. Theories may have a clear, well-defined, unambiguous structure, or they may be more open, flexible or context-sensitive. Functions determine what a theory is intended to do. Again, this may be narrowly prescribed, or relatively open.

It may seem best to have the structure and function of one's theory as clear and unambiguous as possible, and have all project participants jointly agree on the problem, research objective and methodology to ensure shared understanding (Lang et al. 2012). However, whether this is indeed best for the project depends on its aim and the parties involved. Different research teams in different contexts may well have different opportunities and constraints for doing research. A more flexible theory that can be adapted to different contexts may in such cases be more appropriate, enabling relevant research where a too rigid protocol could instead exclude research from taking place in particular contexts. In the RRI Practice project, for example, research teams had considerable freedom in interpreting both what

RRI was and what it could be used for. Particularly, the project had adopted two structures for RRI: the EC policy keys and the AIRR dimensions. A first round of interviews for our reflective RRI review revealed that these were used for three different functions, depending on the needs of and opportunities offered by the organisation in which the researchers were situated: 'Bringing agents and communities together'; 'Expanding agendas and communities' and 'Rethinking agendas and communities'. Because the project allowed research teams to focus on different structures and functions of RRI, they were able to document and facilitate many practices that weren't called 'RRI', but nevertheless were more or less compatible ('de facto RRI'). This flexibility also allowed the research teams to focus on promoting those aspects of RRI that best fit local political or institutional priorities.

The RRI Practice project is hardly unique in working with different structures and functions of core theories: this is especially likely to happen when normative qualifiers are added to project concepts such as 'responsible' or 'sustainable'. To give some examples, Hartley et al. (2019) reflect on a project on 'improved cookstoves', in which only after a year it became clear that project participants had very different understandings of what would count as an improved cookstove; and these different understandings had direct consequences for which methodology was considered appropriate for the project, and what the scope of the project was. And while Aiking and de Boer (2004) note that different ideas of 'food sustainability' may lead to similar recommendations, Aceros, Pols and Domènech (2015) found that different ideas on 'good ageing' could lead to different interventions that could actually contradict and undermine each other. Lang et al. (2012) note that working with different functions is likely to happen in co-creation projects, where scientists and societal stakeholders work together on a common problem, but for different purposes, namely extending the body of scientific knowledge resp. addressing real-world problems.

Thus, though flexibility has particular advantages with regard to adapting a project to different contexts, we recommend that it be accompanied by dedicated time for theoretical discussions on structures and functions of the key concepts, theories, frameworks and protocols during consortium meetings. Not necessarily to remove any ambiguity, but to discuss the consequences and (dis)advantages of working with different interpretations; the different meanings they might have in different contexts; how working with different interpretations would affect the research protocol; and to avoid contradictions and problematic interactions. Also, if some interpretations of key theories are more theoretical and others are more practical, look for possible synergies between those interpretations to facilitate theory-inspired change in different contexts of use.

Research for societal impact

In this section we investigate the tensions that may arise between the ambition of research projects to have societal impact, and other project requirements, such as that of doing rigorous research.

Research projects often aim at knowledge creation and the creation of societal impact. The latter requires work beyond consolidating knowledge creation in peer-reviewed publications, and is frequently done through mechanisms such as technical innovations, policy recommendations and awareness raising. Irwin (2018), in an analysis of business and management research, notes that both goals are often perceived to be in tension with each other rather than complementary. He calls this the difference between rigour and relevance, where rigorous research is research that meets the academic standards demanded by peers and scientific journals, while relevant research is research that is tailored to the needs of business and management professionals. Thus, rigorous research is not automatically relevant and vice versa, and researchers may have different incentives to go in different directions.

Worse, research may not only fail to have an impact, but also generate risks or undesired impacts depending on the incentives that researchers have. To give several recent examples from *Nature*, Lei et al (2019) argue that a desire for fame, fortune and quick successes rather than a wish to help people and society are factors that led to a Chinese scientist helping to make genome-edited babies. And the risk of industry rather than society setting research agendas, which could eclipse important societal

concerns such as equality and transparency, has been noted for self-driving cars by Nunes (2019) and for AI by Benkler (2019). Similar observations have been made for rice research (Ciarli and Ràfols 2019) and for research on avian influenza (Wallace and Ràfols 2018). This is not to say that rigorous research cannot have a positive impact on society in general, but these examples fit Irwin's perceived tension between what researchers should do (such as research for societal benefit and/or out of curiosity) and what they are rewarded for (such as publications in academic journals and research for industry benefit).

For the RRI Practice project team members, fortunately the tension between rigour and relevance has appeared to be less of an issue. The project was a Coordination and Support Action that was explicitly aimed at creating structural change rather than at doing original research. Moreover, project evaluation mechanisms were designed accordingly. Given the disciplinary backgrounds of most project participants, (reflections on) the gathered data about research conducting and research funding organisations could provide resources for initiating change processes and for disciplinary publications. Because of this convergence, the tension between rigour and relevance was not very pronounced in RRI Practice, but due to the specific nature of the project this would seem to be an exception rather than the rule.

Recommendations to deal with the tension between rigour and relevance, in cases where it is more pronounced or expected, tend to focus on the evaluation of research by research funders and universities, and to move evaluation criteria (partially) away from scientific publications and project acquisition and towards more diverse forms of evaluation (Mårtensson et al. 2016, Rau, Goggins and Fahy 2018) or impact portfolios (Salmon, Priestly and Goven 2017). Dilling and Lemos (2011), in an analysis of how to make climate science usable, stress the importance of iteration between knowledge producers and users to make general scientific knowledge work in particular contexts. The RRI Practice project, for example, has discussed with its funder which (qualitative) indicators would be suitable to measure its impact. Moreover, the interaction between project members, advisory board members and members of the involved organisations helped to fit the RRI framework to practices and concerns within those organisations, thereby facilitating organisational change.

Unfortunately, following these recommendations means confronting certain challenges. This includes balancing the need to conform to current reward systems for researchers (rigour) with the need to make research work for society (relevance), but also extends to:

- Navigating the politics of knowledge, particularly the aspect that, in the sciences as well as in politics, certain disciplines (such as the natural sciences and STEM fields) are held in higher esteem than others (such as the social sciences and humanities). A related challenge is that quantitative knowledge and impact assessments tend to be held in higher esteem than their qualitative counterparts (Rau, Goggins and Fahy 2018). This can hinder interdisciplinary work as well as the appreciation of positive project impacts that cannot easily be quantified.
- Navigating the purpose of impact assessments: are they meant to empower researchers, or rather to demonstrate 'value for money' to research funders or managers (Holbrook 2017)?
- Balancing the need for iteration between knowledge producers and users, experiments and learning with research funders' or managers' requirements to specify and achieve definitive targets in the project proposal (Dilling and Lemos 2011; Kuhlmann, Stegmaier and Konrad 2019) and to be accountable for each working hour (Klerkx et al. 2017). This may require planning extra time and resources for learning, experimentation or co-creation activities beforehand. We come back to this issue in greater detail in the section on *flexibility and funding requirements*.

Besides the challenge of defining and measuring impact in an appropriate way for a project, there is also the more practical challenge of how to achieve that impact. We recommend that projects adopt a context-sensitive theory of change that identifies for the project in what context(s) the project aims for impact; and what are likely opportunities and methods for achieving impact. This theory of change can then be used to identify which resources are needed to generate the desired impact (such as time or support from higher management or project stakeholders.) In the RRI Practice project, for example, we utilised a theory of institutional change. However, this theory made little distinction between kinds of

changes: as it turned out during an internal review discussion session, teams differed in opinion on both the ends of change (replacing or repairing/improving the current science system) as well as on the means of change (incremental steps or deep structural transformations).

Furthermore, systems change continuously. This means that 'creating impact' is not so much a single push to an otherwise stable system, but is rather working with or alongside change processes going in the desired direction, and navigating those that go in other or contrary directions. Iteration with knowledge users can be helpful to identify these change processes. Also consider what demands a theory of change places on the researchers: what skills and knowledge researchers need to generate impact, and whether they will have to take on other roles than that of researcher as well, such as that of an honest broker or a change agent.

Finally, transformative change to a system tends to be a lengthy process that can easily exceed the duration of a typical research project (see e.g. Fouquet 2010). Therefore, consider strategies for making impacts / change processes last once the project has finished. Research on development projects points to the need for strategies that involve working with local organisations or initiatives, so that they can take ownership of the project activities, and to help them with network-building (Edwards 1999; Terrapon-Pfaff et al. 2014).

Inclusion in research

In this section we investigate tensions that may arise in designing and implementing strategies to include stakeholders and members of the wider public in research.

Increasingly, researchers are encouraged to include stakeholders in their research: by policy-makers and funders (e.g. as witnessed by the preliminary plans for Horizon Europe; cf. Moedas 2019), but also by members of the research community (e.g. Lang et al. 2012; Stilgoe, Owen and Macnaghten 2013; Taebi et al. 2014). However, inclusion is difficult to do well: done badly, it can even perpetuate the problems it was supposed to address (Stirling 2008). A reflective RRI review can help to reflect on what the nature and purpose of inclusion activities should be for any given project. While the literature on how to do stakeholder inclusion and public engagement is vast, here we focus on the tensions that researchers may encounter when incorporating inclusion activities in research practice.

To start with, we recommend that projects develop an inclusion strategy before or during proposal-writing that addresses the following questions and allocates sufficient time and resources to this strategy to undertake the planned inclusion activities:

- Why stakeholders and members of the wider public are involved, both from the perspective of the research project and from the perspective of the stakeholders themselves. Note that there are different kinds of reasons, namely normative reasons (it being the right thing to do, e.g. to justify the expenditure of public funds), substantive reasons (because it is expected to lead to a better research or innovation outcome), and instrumental reasons (because it is seen as furthering the interests of particular stakeholders) (Stirling 2008);
- Who is involved / who are the relevant stakeholders;
- How to make the stakeholder group sufficiently diverse;
- Whether the interests of some stakeholders should carry priority;
- Through which methods the stakeholders participate;
- When the stakeholders will be included in the project. Preferably this is as early as possible, to jointly set the direction of the research and frame the research questions (Lang et al. 2012).

For example, in the RRI Practice project stakeholders were included for purposes that were normative, for better aligning research with the needs, values and expectations of European society, but also substantive and instrumental, for being more effective in creating organisational change. Who got involved was primarily stakeholders from the research conducting and research funding organisations

that we aimed to change, though a national workshop was organised in each country to include science system stakeholders such as national policy-makers, industry and NGO representatives. With regard to diversity, the project explicitly included NGOs representing national interests in the national workshops, and some teams paid extra attention to gender balance, underrepresented groups and industry actors. No interests were explicitly prioritised, though the project engaged most with stakeholders from the research conducting and research funding organisations that were the object of our research. The methods through which stakeholders were included were interviews, focus groups and the national workshop. Inclusion activities started early in the project, though not already in the design phase. Some project teams would have liked an inclusion strategy where stakeholders could have co-designed the project. However, this would have been difficult to combine with the funding call requirements.

Concerning the deeper challenges of inclusion that require reflection, achieving the aims of inclusion can create particular tensions. We already mentioned that inclusion can take place for normative, substantive and instrumental reasons (Stirling 2008). One risk of insufficient reflection on the inclusion process is that normative or substantive aims can be turned into instrumental ones, where experts or powerful actors take over the inclusion process (Repo and Matschoss 2019) or use it as an instrument to legitimise their views and decisions (Stirling 2008, Ribeiro et al. 2018). Another risk is that biases and framings in the inclusion process may be less obvious than in expert decision-making, but can affect democratic decision-making just as well, thwarting normative or substantive aims (Rahnema 1992, Stirling 2008). One particular bias is that of experts and policy-makers regarding expert knowledge as being the only thing that qualifies as knowledge (as opposed to e.g. practitioner experience), and thus, as being the only thing allowed to feed into knowledge-based decision-making (Kasperowski and Hillman 2018). Worse, Smallman (2019) argues that institutions that should support and check policy-makers, such as agencies and the judiciary, suffer from exactly the same bias. Coupled to broadly accepted wider ideas of science or innovation as 'problem-solvers' (ibid.; Stirling 2008; Pfotenhauer, Juhl and Aarden 2019), such biases are very hard to counteract. Thus, inclusion is not only opening up to stakeholders, but also being clear about the aims of doing so; and being aware of and managing those forces that (unintentionally) work to close it down or instrumentalise it before the inclusion activities can meaningfully affect research.

Suggestions to manage this tension include:

- More interaction of RRI / public engagement experts with equity/sustainability experts to heighten sensitivity towards instrumentalisation and marginalisation of stakeholders (Ribeiro et al. 2018);
- An emphasis on 'soft' skills such as attention, sensitivity, listening and compassion when engaging with stakeholders (Rahnema 1992). Though Rahnema writes about participation in a development context, this recommendation is in line with Stilgoe, Owen and Macnaghten's (2013) emphasis on *taking care* of the future through RRI (italics added);
- Monitoring intensity, openness and quality of the deliberative process (Callon et al. 2009);
- Explicitly aiming to not close down discussions by convincing stakeholders and striving for consensus, but reflecting on one's own values in the light of the arguments and values of those participants, and being responsive towards them (Blok 2014). For the RRI Practice project, this last one was of particular relevance, as the project's aim was creating organisational change. This required its members to present RRI in such a way that it would help advance the goals and interests of the organisation, while remaining true to the spirit of RRI.

Implementing these suggestions requires addressing the following challenges:

- Arranging appropriate skills and knowledge training for public engagement experts, who already need to learn and apply other relevant skills, and who may be institutionally incentivised to be disciplinary experts rather than e.g. compassionate listeners.
- Opening up to stakeholders while keeping in mind limitations of time and resources; the purpose of the inclusion activities; and drivers to instrumentalise the discussion or close it down. (While

at some point the discussion *should* close down, this should depend on the nature and aims of the inclusion activities, not on factors such as the interests of powerful actors).

- Identifying personal and institutional standards for knowledge that only allow for expert knowledge to feed into the decision-making process and broadening those standards, without making them so broad as to become meaningless or unmanageable. Also, researchers should keep in mind the institutional consequences of broadening these standards, such as a loss of rigour in research and therefore, opportunities to publish project results in academic journals).

Finally, an inclusion strategy should be flexible, in case invited stakeholders are unable or unwilling to participate, or new stakeholders would like to join in during the course of the project. The RRI Practice project, for example, had organised national workshops where different stakeholders could reflect on the national science system. However, some teams could not get representatives from industry to attend. This did mean that a specific perspective on those national science systems remained absent from the discussion. Nevertheless, the fact that some stakeholders may not want to participate can itself be informative regarding what a project can (not) achieve with its intended audience, and which framings of problems stakeholders are more or less interested in.

Flexibility in research practice

In this section we investigate the tensions that can arise from the need to adopt clear and specific research protocols to enable the evaluation of scientific quality and project progress; and the need for projects to be flexible and responsive with regard to issues arising during the research. Particularly, we look at the consequences that a flexible research protocol has for the responsibilities of the researcher; and how flexibility can help manage the political aspects of research projects.

The previous sections have in common that they have all advocated for flexibility in the project structure. Working with different structures and functions of core theories requires freedom for researchers to adapt and contextualise project protocols. Creating societal impact requires adapting a project's theory of change and indicators of success to particular contexts. Inclusion requires adapting projects to the values and concerns of societal stakeholders, as well as to those of the wider public. On the other hand, these observations should not be regarded as a call for funders to issue blank cheques⁴, as there is also value in having a clear and specific project description with pre-established progress indicators to enable the evaluation of project quality and monitor research progress (cf. Kuhlmann, Stegmaier and Konrad 2019, Klerkx et al. 2017).

First, it is important to observe that creating a more flexible project structure tends to place more responsibility on the shoulders of the researchers to manage this flexibility in an appropriate and context-sensitive way. Salmon, Priestly and Goven (2017) note that flexibility and under-specification of research activities might be necessary for co-production and contextual adaptation, but that this may appear threatening to natural scientists, because of their uncertainty regarding how such 'blank spaces' should be filled in. They suggest providing examples to give an idea of how such exercises work in practice.

Åm (2019) similarly argues that science policy demanding co-production in research makes researchers responsible for implementing vague policies in a concrete way, while they frequently don't know where the demand or justification comes from, don't have the relevant tools or expertise to do so, and are pushed by institutional factors such as evaluation on the basis of publications to spend their time and attention on other issues. Thus, research funders and policy-makers shouldn't stop at introducing flexibility in funding calls: researchers should also be facilitated by pointers or examples of how to make

⁴ Though we should mention here the academic discussion on the merits and problems of competitive project-based research funding in general, see e.g. Vaesen and Katzav (2017).

good use of it; insight in how it can benefit their research and its societal applications, and supportive institutional arrangements.

While flexibility in research projects places demands on researchers, it also provides benefits. One that is of particular importance is the opportunity it provides researchers to manage the political aspects of research. Research can be political because it is not so much about applying general knowledge to specific contexts: it is rather to translate knowledge generated in specific contexts to other contexts. For the concept of RRI, for example, applying RRI in particular settings requires not only operationalising concepts such as 'anticipation' and 'reflection'. It also requires reflection on the fact that RRI has originally been developed in, in a dominant language of, and for application in, liberal democracies (Wong 2016) in the Global North (Macnaghten et al. 2014, Vasen 2017). A risk of implementing research protocols in another setting than that in – or for – which they have been developed is that they may not work, work poorly or be more difficult to operationalise in those contexts. A second and worse risk is that, because of present or historical power imbalances between countries, research projects have the potential to perpetuate existing inequalities. Stöckelová (2016) argues that if particular countries style themselves as 'core' or 'default', there is value for other countries in presenting themselves as 'peripheral' or 'different': that way, they can 'play in the same game' as the core countries, publish in their journals, and so gain prestige at the price of perpetuating a system that locates them in the periphery.

On the other hand, translating theories or frameworks to new contexts can be helpful and inspiring as well, both for that context and for development of the theory. In the RRI Practice project, we encountered both phenomena: one non-EU partner was decidedly critical of the EU-centric biases in both the contents and the protocol of the project, while another was much more positive regarding the relevance of (a contextualised form of) RRI for their country. Therefore, reflection on the political, the institutional and the personal context of research and the research protocol is of the utmost importance, especially in international projects. This reflection should engage with the context in and for which the project theories, frameworks, concepts and protocols have been developed as well as on the contexts in which they will be applied, to identify possible discrepancies. If large power inequalities exist between cooperating countries, particular care should be taken to not perpetuate those inequalities through the research project.

The RRI keys

In this section we investigate topics that the EC has considered particularly relevant to be addressed in the Horizon 2020 programme. These are the RRI keys: ethics, public engagement, gender, Open Access and science education. This section will be relatively short for two reasons. First, several of these keys have already been covered by the previous sections, particularly *public engagement* by inclusion, and *science education* by inclusion and societal impact. For this reason, we will not give separate process recommendations regarding public engagement and science education. Second, the remaining keys (ethics, gender and Open Access) tend to be institutionalised to some degree in research conducting and research funding organisations, e.g. through codes of conduct or research integrity for ethics. This institutionalisation offers a baseline for researchers for acceptable behaviour regarding that key. However, these keys raise fundamental questions regarding research that might be overlooked if they are only engaged with through adherence to this baseline (e.g. Palm and Hansson 2006). A reflective RRI review can help to explicitly engage with these questions in the following ways:

Ethics: Besides being about research integrity and research ethics, ethics is also about broader, future-oriented questions concerning how research and innovations shape the society we live in; how their benefits and burdens should be distributed, and whether this should happen through the market or through some other mechanism; what kind of society we collectively (should) want to realise; what this means for the responsibility of researchers and innovators; and what this implies for how to design and conduct research projects. Another ethical issue that transcends framing of research ethics and scientific

integrity arises when research protocols impose particular ideologies, priorities or process requirements on countries participating in the research through that research project: this issue is addressed in the section on *flexibility in research practice*. Thus, we recommend that project teams consider the abovementioned ethical aspects of their research as part of the reflective RRI review.

Gender: Several aspects of gender tend to be incorporated in institutional policies, such as how gender should factor in hiring decisions and how institutions deal with sexual harassment. However, as many RRI Practice participants stressed, gender is broader and more pervasive than this and also covers the following issues:

- Gender is not only about gender equality in research teams, but also in other areas, such as research subjects, stakeholder panels and conference speakers.
- Gender is not only about equal numbers of male and female researchers and participants, but also about creating conditions for equal participation, such as equal wages, addressing gender prejudices among participants and affordable childcare.
- Gender is not only about who is invited to participate in the research, but also about identifying and correcting (implicit) gender biases in the research design itself.
- Gender is one aspect of diversity in research: other aspects might also be relevant to take into account in particular projects, such as ethnicity, age, socio-economic status and (dis)abledness.

Thus, as part of the reflective RRI review, we recommend that project teams consider which kinds of diversity are (instrumentally or morally) relevant to the project, and in which areas, and incorporate where possible affirmative actions to promote those into the project design.

Open Access: Research funders often have clear prescriptions on what kinds of Open Access schemes should be followed. What a reflective RRI review can do is similar to what it can do regarding the ethics questions above: to reflect on the kind of publishing systems the researchers would prefer to have, and how their Open Access publishing strategies can promote such systems. For example, in the RRI Practice project about half of the consortium was critical regarding Open Access publications in journals of the major publishing corporations. This was because those corporations are funded through public research money but tend to have very high profit margins (Van Noorden 2013; Larivière, Haustein and Mongeon 2015). Moreover, several non-EU countries noted the relatively high cost for them of publishing Open Access, or the existence of local traditions of Open Access publishing that were not recognised by the EC funding prescriptions as viable options for publishing. Thus, Open Access discussions exposed disagreements on what would be a good model for academic publishing, and also exposed another instance of EU-oriented funding prescriptions being difficult to adapt to non-EU contexts.

Another issue with regard to Open Access that a reflective RRI review can address is that openness in science takes more forms than Open Access publications. A reflective RRI review could thus reflect on what 'open science' could mean for the research project, and how it could be practically implemented. Open Science can include Open Access, but also Open Data in a format that is findable, accessible, interoperable and reusable (FAIR),⁵ citizen science, public engagement, outreach activities and platforms to share protocols and preliminary findings with other researchers and the wider public. Note that doing Open Science in a meaningful way requires dedicated project time, resources and expertise, e.g. to prepare datasets according to FAIR prescriptions, or to cover Article Processing Charges.

Discussion and conclusion

In this deliverable we have developed general process recommendations for a reflective RRI review in multi-partner, international research projects. We have argued that such a review can help to identify and manage practical aspects of conducting a research project. In this section we draw attention to two factors that facilitated doing such a review in the RRI Practice project, and one that rather raised several

⁵ See <https://www.go-fair.org/fair-principles/>. Accessed 26 July 2019.

issues; and we reflect on the essentially open nature of reflexivity and what this means for the formulation of general process recommendations.

The RRI Practice project

While these general process recommendations are based on experiences from the RRI Practice project, the academic literature has identified several issues as being common across multi-partner, international research projects that were not that strong or prominent in RRI Practice. These are the tension of rigour versus relevance, and issues related to inter- and transdisciplinary projects. On the other hand, because of the project's focus on structural change in the science system, one issue was particularly pronounced, which was that some of the research teams challenged the conditions of the research itself. Here we discuss those issues in more detail.

First, RRI Practice was not a regular research project, but a Coordination and Support Action under the programme 'ISSI-5-2015 - Supporting structural change in research organisations to promote Responsible Research and Innovation.' Therefore, from the start onwards it was clear that the project was aimed at societal impact by supporting structural change. This by itself did not defuse the rigour versus relevance-tension, as participating researchers were still evaluated by their institutions on rigorous research, as witnessed by publications. Fortunately, as mentioned in the section on *Research for societal impact*, the data gathered on the participating organisations could be used to support initiatives to create structural change as well as to support academic publications. Therefore, researchers in the RRI Practice project experienced little tension between the demands for rigorous and relevant research.

Second, the disciplinary background of the RRI Practice researchers was relatively homogeneous, with most coming from the social sciences or humanities and having prior experience with RRI or related methods. This meant that there were no problems reported in the internal review that are typical for inter- or transdisciplinary research, such as differences in communication style or epistemology between researchers. Though different teams focused on different structures and functions of RRI, the reason for this was to better enable contextualisation rather than the existence of different understandings of the concept across disciplines. The homogeneous backgrounds of the researchers also meant that there were no issues reported related to the 'politics of knowledge' between disciplines within the project. Finally, given their background and interests, all participants were already knowledgeable about and favourably oriented towards at least some of the ideas underlying RRI. Moreover, most also had training in skills relevant to facilitate a reflective RRI review, such as critical reflection. Finally, given the disciplinary background of the RRI Practice researchers, flexibility and openness in the protocol was experienced as a positive feature rather than a problem. However, some teams argued that the reflective RRI review could have done more to compare the differences in interpretation and implementation of RRI and its consequences across teams.

One issue that seems to be specific to RRI Practice had to do with the fact that its researchers were part of the very system they sought to study as well as change. However, some researchers were more critical of the current system or more interested in structural change than others. One way in which this worked out in practice was that some teams worked towards structural change within the conditions set by the research funder, while other teams saw the project as an opportunity to question these conditions themselves, e.g. with regard to inclusion and Open Access. While the project mostly worked within the conditions set by the funder on these latter issues, it did investigate the more transformative conception of RRI as the AIRR dimensions along with the funder's preferred conception of RRI as the EC policy keys.

Reflections on reflexivity

The reflective RRI review is, as its name implies, fundamentally reflective. This meant that we, as authors describing how to do a reflective RRI review, had to navigate a specific tension between identifying tensions and prescribing actions. The latter would have entailed providing a checklist of

actions to do and questions to ask to get researchers to reflect on topics that we consider relevant. That would have had several advantages: it would have been clear, predictable, easy to implement and would not have required active engagement with the material. However, such a strategy would have risked promoting unreflective engagement rather than a reflexive practice. Therefore, in this deliverable we have leaned towards identifying tensions rather than prescribing actions, as this recognises that knowledge always needs to be contextualised and that learning and adaptation will (and should) occur throughout projects – and this holds for the reflective RRI review as well as for projects in general.

However, this choice has come at a cost, namely, that this deliverable focuses on where to look for tensions to navigate rather than on how to actually navigate them. This openness and lack of action guidance might make researchers nervous, as already observed by Salmon, Priestly and Goven (2017). In line with their recommendations, therefore, we have given suggestions from the literature as well as examples from the RRI Practice project on how those general process recommendations could be implemented in practice.

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