RRI Practice internal RRI review

Deliverable 16.3

Work Package 16

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Abstract	In this internal RRI review deliverable we describe the challenges, choices and results of applying an RRI approach consistently throughout a research project, in our case, the RRI Practice project (Sept 2016 – Aug 2019). This description is based on critical reflection on two rounds of interviews with project members, as well as on discussions held at each of the project's consortium meetings. This research has been used to derive general process recommendations for multi-partner, possibly international research projects (deliverable 16.4). In this internal review we derive a taxonomy of RRI from the observation that the project has been working with two separate structures, the EC policy keys and the AIRR dimensions. We show that the project teams have been using RRI for three different functions: 'bringing agents and communities together', 'expanding agendas and communities' and 'rethinking agendas and communities.' Furthermore, we analyse which tensions we have encountered in the practice of doing RRI, with regard to working in research organisations as well as with regard to fulfilling funder requirements. We conclude by discussing the importance of reflexivity and flexibility for research projects and how various actors in the science system can facilitate this.

Introduction

The RRI Practice project investigates barriers and drivers to RRI implementation in European and non-European research conducting and funding organisations, with the aim of identifying and disseminating best practices that could be scaled up at European and global levels. For this purpose, the project has conceptualised RRI as two distinct frameworks: the EC policy keys and the AIRR dimensions. It has investigated barriers and drivers to the implementation of these keys and dimensions in organisations using a range of methods, including interviews, document studies and focus groups.

According to the European Commission, RRI is about orienting research towards societal values, needs and expectations.[1] However, for RRI Practice it has also been about engaging in research in a fundamentally reflexive way: with regard to the reasons why we do research; the contexts in which we do it; and the (private, institutional and national) forces that influence our research.[2] This is important because doing RRI is not, and should not be, a straightforward application of general principles. Rather, it requires contextualising these principles and finding ways to work with (or against) the different forces that affect researchers. It may also require reconceptualising what RRI is and what it should do in certain contexts.

To reflect on these aspects of research in the RRI Practice project, we have undertaken a reflective RRI review. Our first motivation for undertaking this review is evaluative, to reflect on whether we, as a project, have been able to undertake our work in line with RRI process prescriptions. Our aim is thus to *describe in detail the challenges, choices and results of applying an RRI approach consistently throughout a research project.* Our second motivation for undertaking an RRI review is prescriptive, to derive from our experiences *general process recommendations for doing a reflective RRI review in multi-partner, international projects*. As both objectives require a different form of analysis, namely specific and descriptive versus general and prescriptive, they have been addressed in two different deliverables. Deliverable 16.3 (this deliverable) covers the results of the internal RRI review of the RRI Practice project: The general process recommendations can be found in deliverable 16.4: 'RRI Practice general process recommendations for a reflective RRI audit in multi-partner, international projects.'

Note that for the purpose of these deliverables, the fact that RRI has not only been our method but also our topic of research is relevant only insofar as it has affected the research process. The encountered challenges and provided recommendations are particularly relevant for projects applying RRI or related frameworks such as Open Science or co-creation. Nevertheless, we hold that a reflective RRI review can add value to any multi-partner research project, as all research takes place in particular contexts and is subject to various institutional and policy forces. Researchers cannot avoid this; but they can reflexively engage with these factors, and so choose how to relate to them.

The internal RRI review has the following structure: We start by explaining the methodology. Then we reflect on general findings from the review which we use to explain and contextualise the more detailed challenges and choices. Particularly, we start by identifying what the project partners have considered RRI to be about, and why it was useful, by asking: *How do project partners understand what RRI is and what it can do?* We show that, though the project research teams have been working from the same project description and protocol, those teams considered RRI to have different structures and functions. To identify their interplay and how working with these structures and functions has worked out in practice, we ask: *Which taxonomy of RRI results from these different understandings?*

Moving forward from this taxonomy, we seek to chart the actual practice of doing the RRI Practice project. We do so by asking: *Can we consistently apply the principles and frameworks of RRI to our own research practices?* We show here that, far from being a straightforward application of principles, both doing RRI and implementing it in research conducting and funding organisations requires a good

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[1] See https://ec.europa.eu/programmes/horizon2020/en/h2020-section/responsible-research-innovation. Accessed 11 July 2019.
[2] Cf. Stilgoe, J., Owen, R. and Macnaghten, P. (2013). Developing a Framework for Responsible Innovation. *Research Policy* 42(9), pp. 1568–1580.

understanding of what is possible and feasible in any given context, as well as serendipity in the face of unplanned opportunities. As a second topic we move our focus from the demands of RRI principles and frameworks to the demands of the project funder, the EC, to ask: *Can we consistently apply the call funding requirements to our own research practices?* As with the previous question, we emphasise here that RRI Practice has not been a straightforward fulfilment of funding requirements, but rather has required navigating the (sometimes very political) tensions between those requirements, researcher ideals and contextual possibilities.

We show how these more general observations have worked out in more specific ways in the next section in which we ask: *What are the challenges, choices and results of applying an RRI approach consistently throughout a research project?* We close with discussing some recommendations for various stakeholders within the research system on how to make RRI work in practice. As mentioned earlier, due to the different kind of analysis needed, the general process recommendations derived from this internal review have been developed in a separate deliverable.

Methodology

The RRI Practice project was designed with the internal (RRI) review as a separate work package with dedicated staff and resources. Internal review activities have been undertaken from early on in the project. The internal review team has conducted two rounds of (Skype) interviews with representatives of the national teams: one in the Summer of 2017 in the beginning of the project during the data gathering phase from the case studies, aimed at identifying the different understandings of RRI and its possible functions, and at developing a taxonomy of structures and functions of RRI. The second round of interviews was undertaken halfway through the project, in the fall of 2018, during the phase of the project in which findings from the case study phase were compared to each other. This round of interviews focused on the practice of doing RRI Practice: on finding out whether a consistent application of principles and frameworks from the project had been possible, and to uncover the results from the choices research teams and the project had made in response to the different challenges encountered. In addition to the two rounds of interviews, during each (biannual) consortium meeting a one-hour time slot has been scheduled to collectively reflect on past interview results, or on a specific topic relevant for the internal review.

Verbal consent has been obtained for recording each interview. The interviews have been semi-structured, using questionnaires developed by the Wageningen University & Research team and discussed and approved by the consortium. The interview results have been critically reflected upon to obtain general discussion points for collective reflection at consortium meetings, and to derive the general process recommendations from. This deliverable thus builds upon two rounds of interviews followed by critical reflection on the results, as well as on reflections on the results of the internal review sessions during the consortium meetings.

Understandings of RRI and what it can do

In this section we describe the different understandings of RRI that were present in the project, and the different understandings of partners of what RRI could do for them. During the first round of the internal review interviews, it was noted that RRI can be regarded as a 'tool'. This metaphor is apt as tools have different structures and functions, and this also held for RRI as used in the project. The structures are the different understandings of RRI; the functions are the purposes that RRI is used for. The RRI Practice project has not committed to one specific structure/function combination. Rather, the project has recognised that different contexts call for different (functions of) tools, and allowed the research teams to create or select those that they thought were most appropriate to the task at hand. This decision itself has been widely approved by the research teams, who noted that policy priorities, as well as effective

ways of interaction and creating change, differ widely between organisations and countries. We first explain which structures of RRI were used in the RRI Practice project, followed by the functions. Again, though this discussion focuses on the specific concept of RRI within the RRI Practice project, the observation that key concepts or theories of projects may have multiple structures and functions, and that this will have consequences for project work, is relevant for any project.

Structures

Two different RRI structures have been identified in the project: 'RRI as the EC (policy) keys': ethics, public engagement, gender, Open Access and science education, and 'RRI as the AIRR dimensions': anticipation, inclusion, reflection and responsiveness.[3] Both structures are very different, which means that they do not combine to form a unified or coherent framework, though they can complement each other. One salient difference is that the keys are policy themes or research programmes that are methodologically open, while the dimensions are processes with specific methodological tools. That the project has investigated both keys and dimensions is the result of differences in focus from the funder, the EC, and a number of participating senior researchers. Though both agreed on the general philosophy behind RRI,[4] the EC focused on particular policy themes, the implementation of which would advance this philosophy. The senior researchers rather focused on realising this philosophy through changing research processes. A *challenge* for the project has been to manage these differences in focus. The *choice* has been to regard both structures as relevant to the project, and to investigate them both. We go into the *results* of this choice in the taxonomy section.

Functions

Three different implicitly endorsed functions of RRI have been identified in the RRI Practice project in the first round of interviews: 'Bringing agents and communities together'; 'Expanding agendas and communities' and 'Rethinking agendas and communities.' These functions relate to the different ideas about the kind of impact or change that RRI should bring about.

Bringing agents and communities together primarily uses RRI as an umbrella term to bring various issues related to science governance together, and thereby, various communities that otherwise tend to work in relative isolation. Both structures can fulfil this function: 'RRI as the EC keys' because it ties otherwise disparate policy priorities together, and 'RRI as the AIRR dimensions' because the dimensions themselves act as umbrella terms (e.g. reflexivity can cover ethics and scientific integrity, but also aspects of public engagement). This function tends to be pragmatic and oriented at overcoming fragmentation, whether within organisations or at the national science policy level.

Expanding agendas and communities is also primarily aimed at the organisational and national policy level. RRI tends to be relatively unknown within research conducting and funding organisations, or in national policy arenas. However, it can be used to broaden and expand existing policy concerns, e.g. to expand a focus on scientific integrity into a broader societal responsibility. This function therefore

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[3] Stilgoe, J., Owen, R. and Macnaghten, P. (2013). Developing a Framework for Responsible Innovation. *Research Policy* 42(9), pp. 1568–1580. Formally, RRI Practice used the slightly different conceptualisation of 'RRI as the ROAD dimensions' from the *RRI Tools* project: responsive & adaptive to change, open & transparent, anticipative & reflective, and diverse & inclusive. However, as the AIRR dimensions were also used informally in the project, and have become well-established through the 2013 paper, we refer to this structure throughout the internal review.

[4] "Responsible research and innovation is an approach that anticipates and assesses potential implications and societal expectations with regard to research and innovation, with the aim to foster the design of inclusive and sustainable research and innovation." https://ec.europa.eu/programmes/horizon2020/en/h2020-section/responsible-research-innovation. Accessed 25 July 2019.

benefits most from the synergies between the two structures: RRI as the EC keys and RRI as the AIRR dimensions.

Rethinking agendas and communities can be aimed at the organisational, national and even international levels, using RRI as a critical-reflexive tool to rethink science governance and the role of science in society. Due to its emphasis on the need for a structural transformation of science-society relationships, it is the most radical and idealistic of the functions. 'RRI as the AIRR dimensions' is the structure best suited for this purpose, as the AIRR dimensions themselves form a departure from existing policy cultures and practices. The EC keys, while in themselves important, have been perceived by some project teams as being less well suited for this function, or worse, as a distraction from it. This is because they were perceived as being rather arbitrary, lacking in reflexivity, and not requiring structural changes to science systems in order to be properly implemented. Nevertheless, others emphasised that change is a slow process, and that many small improvements (e.g. regarding the keys) might eventually lead to structural transformations.

An overview of structures and functions of RRI and how they work together is presented in Table 1.

Functions \ Structures	EC Keys	AIRR dimensions
Bringing agents and communities together	RRI used as an umbrella term to connect and coordinate actors working separately to implement the keys in their organisations or in national policy.	AIRR dimensions used as umbrella terms to connect and coordinate actors working separately on policy areas and activities that could all fit under the headings of 'anticipation', 'inclusion', etc.
Expanding agendas and communities	RRI term used to expand science agendas at the organisational or national level, to more explicitly and structurally include the EC keys.	RRI term used to expand science agendas at the organisational or national level, to explicitly and structurally include the AIRR dimensions.
Rethinking agendas and communities	Keys not considered to identify structural problems and their solutions with respect to research processes. However, possibility that strengthening and expansion of keys may at some point bring about transformative change in organisations or national policy.	AIRR dimensions used to transform organisations or national policies of science governance.

Table 1: The different structures and functions of RRI and how they work together

A taxonomy of RRI

In this section we describe how working with the different understandings of the structures and functions of RRI has worked out in practice.

The most salient *result* of the choice to investigate both structures of RRI in a single protocol in the project was that, though they are very different, they were not necessarily perceived as being in conflict. During the second round of interviews, it turned out that those who conceived RRI primarily in terms of the keys saw the dimensions as supporting, enabling and expanding them, and integrating them into a bigger picture. An often-cited example was that AIRR could broaden the focus of gender to diversity and inclusion. AIRR could also connect the disparate keys together into a more cohesive conception of responsible research. Those who conceived RRI primarily in terms of the dimensions often found that they were too abstract to easily discuss with managers or natural scientists. The keys were better for

such purposes, as well as offering clear and immediate added value for organisations. Thus, many teams found that both structures *create opportunities for synergies*. Unfortunately, this result emerged in a relatively late phase of the project, so it could not inform and improve the protocol.

On the critical side, some teams remarked that the protocol had put keys and dimensions in one long list of issues to be investigated. However, this implicitly suggested that they were similar in kind and in importance, and could be studied in (relative) isolation in a single protocol: all of these assumptions could be challenged. Thus, the differences between the two structures of RRI were not reflected in the protocol, and this created both unforeseen challenges and opportunities, such as the one mentioned above.

Furthermore, as became clear at the final consortium meeting, it was relatively easy to investigate the keys in organisations, as most institutions had policies or programs in place that directly addressed them, such as gender equality or scientific integrity programmes. The dimensions, on the other hand, did not have their own policies and were frequently not discussed as such by organisations. This led to research teams coming up with their own interpretation of how and where they could be found, making a comparison of implementation of the dimensions more difficult and sensitive to the different interpretations of the research teams.

It is questionable, however, whether these issues could have been anticipated beforehand. First, this would have required extensive theoretical discussions on the RRI structures, which would have cost time and might have interfered with the flexibility the research teams needed to adapt RRI to their local contexts. Second, the interviews made clear that these issues only emerged during the action research phase of the project, when the research teams acquired practical experience with implementing both RRI structures within the same project.

Complementing the reflection on functions, let us emphasize that we do not consider the existence of different functions for RRI to be a problem that should have been addressed early in the project by focusing on just one kind of function. Rather, it shows that different teams had different concerns and opportunities regarding RRI in their institutional and national contexts. Discussion of these functions was nevertheless considered useful, but to acknowledge those differences and explore their synergies and points of conflict, rather than to decide on the 'best' function to pursue.

However, some project researchers were quite critical in response to this observation, pointing out that the functions of 'bringing together' or 'expanding' were the opposite of the fragmentation and diversification of RRI functions that was actually going on in the project. They found that the project itself had contributed to a fragmentation rather than a unification or expansion of RRI. Moreover, they found that RRI could cause confusion in cases where there were already dominant concepts for integrating issues that RRI (also) seeks to address, such as 'sustainability' in Germany. However, others pointed out that RRI can simply do different things for different communities in different contexts, and that this is not necessarily a problem: contextualisation does not imply fragmentation. An important factor in this was that RRI as a concept is not well known outside of its specific research community. Thus, it has no entrenched institutional meanings that could conflict with project teams' interpretations and contextualisations.

RRI in research practice

In this section we describe our experiences in consistently applying the principles and frameworks of RRI to our own research practices throughout the project. We focus on our experiences in creating change in organisations in order to embed RRI practices therein, as this was the focus of the project call:

'Supporting structural change in research organisations to promote Responsible Research and Innovation.'[5]

As an overarching observation, despite teams working within the same project, from the same protocol and with the same framework for organisational analysis, the variety of results regarding the operationalisation of RRI in organisational change is remarkable: from universities now stimulating doctoral training on RRI to the creation of scientific integrity committees and the appointment of RRI Practice researchers in advisory/policy functions. This is not meant as a negative evaluation of the project: indeed, many teams were content with the change they had been able to achieve in the relatively short time span of the project. Rather, while part of this variation can be explained by differences in context, it illustrates the messiness and unpredictability of research that aims to bring about organisational change. For example, some researchers emphasised the need to align with organisational agendas in order to create change at all, where those agendas might not be aligned with all parts/structures of RRI. Others stressed the importance of serendipity: looking for opportunities within organisations to push for change, including crises or scandals that could prompt a public outcry and a re-evaluation of research governance.

One specific finding was that supporting structural change was seen as a particularly difficult objective in countries that have little experience with the RRI concept or with the AIRR dimensions. As one team remarked, the dissemination of the idea of RRI, and connecting it to relevant local activities and actors needs to happen before one can even think of using the concept to create structural change. In contrast, countries and organisations where RRI had already gained a foothold were also generally more responsive to further RRI implementation. We have thus found that structural change was hardest to bring about in those countries where it was most needed. This illustrates why it was fruitful to allow for different kinds of functions in the project: for some countries, 'bringing together' was the best (or even only possible) way to advance RRI, while for others 'expanding' or 'rethinking' were more viable options.

For those teams in countries having little experience with RRI or similar ideas, transformative change in the science system was experienced as a slow and contested process, requiring significantly more time and collective effort than can realistically be expected in a three-year project. This is particularly the case for countries with large populations, geographical spread and multi-faceted science systems, such as China, India, the US and Brazil. The *challenge* here has been to understand how structural change could be made possible, as much as instigating structural change itself, in a complex science system, with limited time and resources. The *choice* has been to focus on institutional capacity-building, dissemination, connecting activities with stakeholders and very local instances of structural change. This choice was, again, enabled by the opportunity for different teams to use RRI for different purposes and act accordingly.

Another finding of the review regarding the practice of creating organisational change was that, although the RRI Practice project has been working with a framework for identifying barriers and drivers of institutional change, the framework was not able to distinguish between incremental and structural change. This meant that differences of opinion between teams on motivations and aims for change remained largely unnoticed, generating different framings on both the nature of the problem and the needed solution. At the final consortium meeting, we discussed this and distinguished differences of opinion on the following issues:

- Whether the system under study (the research system) could be argued to be structurally in crisis and in need of replacement; or rather structurally sound but in need of repairs and improvements; or whether more explicit diagnostics would be needed to determine this.
- Whether aligning the system to societal needs, values and expectations required structural or incremental changes. Structural change might seem to be needed for a structurally broken system, but might be less feasible and more prone to generate resistance and conflicts. Many at the meeting shared optimism about the potential for incremental changes to lead in time to the

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[5] ISSI–5-2015. See https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/topic-details/issi-5-2015. Accessed 3 May 2019.

desired structural changes. However, some worried that incremental change could also hinder more structural change. For example, an organisation could implement the EC keys and thereby have 'implemented RRI', without having engaged with the more transformative AIRR dimensions.

Again, these observations do not imply that these differences of opinion should have been ironed out in an early phase, as they resulted from challenges and opportunities that differed between the contexts in which the project teams operated. But the opportunity to make these differences explicit and discuss them did lead to a deeper understanding of motivations, aims and criteria for success of the different project teams with respect to creating change.

RRI Practice and funding requirements

In this section we describe our experiences with applying the call funding requirements to our own research practices. We focus particularly on the tensions that resulted from working to further EC priorities within organisations that themselves might have other priorities; and the tensions that arose between funder demands for indicators, and researcher ideals and contextual realities.

Our most general observation for this section arises from the simple fact that RRI Practice researchers received funding from an organisation (the EC) that was different from the ones where they were employed and where they were seeking to instigate structural change. Unsurprisingly, this led to various kinds of tensions. Two of these tensions have already been discussed in the previous sections: the first was that of working with a 'universal' project protocol (and two structures of RRI) that was often in tension with the local and contextual realities of instigating change in organisations. The second was that of implementing the wider (and tacitly political) agenda of the project financer, the EC, versus the task of applying and adapting RRI to the agenda of the employing organisation. One team summarised this tension as follows: organisations rarely implement changes because the EC demands it, as EC research policy has no formal power over research conducting and funding organisations. Rather, organisations implement changes either because they are mandated by national research policy, or because they consider those changes to have added value for them and fit their own plans and ambitions. For this reason it is important to allow flexibility and room in projects to translate EC priorities to local value propositions – and, if possible, to provide resources and training for researchers to translate and adapt their work to different organisational and national contexts.

Another tension encountered was that between the institutional evaluations of researchers, commonly prioritising theoretical work resulting in publications, and project evaluations of researchers, stressing practical work resulting in impact and evidence of organisational change. This tension is prominent in the wider literature on the institutionalisation on RRI (see the evidence base analysed in Deliverable 16.4, the general process recommendations), but was less present in our internal RRI review discussions, possibly because the project management dedicated support to combine the two, e.g. in supporting publications from the action research. Working with EC priorities was sometimes considered in tension with working to change EC priorities, particularly for those who preferred to work with the AIRR dimensions over the EC-endorsed policy keys. Finally, there was a tension between the role of researchers as being RRI critics and RRI ambassadors: some researchers could be quite critical of the concept of RRI or its practical value, usually in discussions at consortium meetings, while at the same time all were required by the project to actively promote it within their organisations. This tension could to some degree be addressed by focusing on the ideas underlying RRI and its functions rather than on specific definitions of the concept itself.

Regarding the political tensions encountered in the project, the *choice* to advocate and implement RRI at least partly as the EC policy keys had as a *result* that the project acquired an (EC) political charge, as this meant the goals of the project were aligned with the EC's wider political agenda, also in non-EU countries. The further *choice* to allow research teams flexibility in interpreting RRI meant that this charge was diluted somewhat by researcher pragmatism. However, several teams noted the effects of this

political charge: it could be positive, e.g. where the EC was seen as a source of good practices or standards, but also negative, e.g. where the EC policy keys or the project's protocol were deemed incompatible with local values and ways of doing things. The results were thus mixed. This suggests that it could be beneficial to have more flexibility regarding project alignment with specific EC policy priorities, as well as regarding a uniform and standardised protocol for research projects in the future. That way, projects would get the opportunity to adapt EC ideas and procedures to non-EU countries and latch on to relevant existing initiatives, while teams operating in countries more receptive to EC ideas could stress the EC aspects of the project. Though this observation is particularly important for projects seeking to actively change organisations and policies, it is in principle relevant for any project that aims to achieve impact or change outside its funding organisation or nation.

Regarding indicators, a tension in the project arose following the project's mid-term reviewer's recommendation of working more with jointly agreed-upon indicators to allow quantification of project results. Some teams considered this practically impossible, e.g. because some organisations wouldn't agree to do that. Others considered it theoretically impossible, e.g. because change processes are always ongoing within organisations and RRI Practice has been one of many causal factors affecting them, rather than having clear, singular and unambiguous 'impacts.' Yet others considered it undesirable, e.g. because RRI inherently resists quantification and box-checking. Indeed, as the comparisons report for the ethics key has noted, a well-defined procedure with relevant indicators can detach researchers from wider responsibilities rather than encourage serious engagement with them.[6] It is thus questionable whether a concept such as RRI could be a tool for generating transformative change in a project whose protocol relies on indicators and quantification of the EC keys and AIRR dimensions. This does not invalidate the point that projects such as RRI Practice should be able to demonstrate their successes and failures to their funders. Rather, it shows that more reflection is needed on the most appropriate method, as in RRI Practice there has been a trade-off between the ability to reliably measure change and the flexibility needed to actually bring about change in different contexts. Narrative accounts could be one (qualitative) example of an alternative.

As this section shows, doing RRI implies navigating various tensions simultaneously. To summarise, the tensions RRI Practice teams have encountered include: whether to follow the protocol or contextualise it, whether to implement the EC agenda or adapt it to organisational agendas, how to combine being subject to institutional evaluations as an employee with being subject to project evaluations as a project researcher, whether to be an RRI critic or an RRI ambassador, as well as navigating tensions resulting from the political charge of the RRI concept as interpreted by the EC, and balancing the demand for progress indicators with the practical and theoretical problems of tracking and evaluating project work.

Specific findings

In this section we discuss some specific challenges, choices and results of applying an RRI approach consistently throughout a research project that are not covered under the more general headings above.

RRI Keys

In line with earlier observations regarding the structures of RRI, the implementation of the RRI keys in RRI Practice was generally considered to be straightforward and unproblematic, also because many institutions where the project's researchers were employed already had codified norms governing the implementation of the keys, e.g. with regard to research ethics and gender.

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[6] Grinbaum, A. and Politi, V. (2019). Comparative study of the Ethics key, p. 29. In: Hennen, L. et al. (2019). *Deliverable D15.1 Implementing RRI: Comparison across case studies.* https://www.rri-practice.eu/wp-content/uploads/2019/06/Deliverable-D15.1-Comparison.pdf. Accessed 12 July 2019.

Clear differences in opinion emerged only regarding *Open Access*. Here, the *practice* of the project was to follow EC prescriptions for publishing Open Access, and to make funds available for that from the project budget. While no research team anticipated problems with publishing Open Access, almost half of the consortium was critical of this strategy. They wanted RRI Practice to challenge the current publishing model as endorsed by the EC. Some wanted to support a transformation in the publishing industry that would not involve paying substantial amounts of public money to private publishing firms, and for RRI Practice to consider this in its publishing strategy. Moreover, several non-EU countries stressed local particularities of the publishing system that made following EC call prescriptions, in this case on the specifics of Open Access publishing, difficult or not really viable, and noted the extremely high costs of Open Access publishing for them. Open Access thus became a case where EC requirements (unwittingly) created a political tension by endorsing a publishing model that was more difficult for some countries to adhere to than for others, particularly for those in the global South.

However, other project teams pointed out that avoiding the big publishers and only publishing in gold Open Access journals would drastically curtail our publishing options and scholarly impact, and mean that we would not be able to disseminate project results in some well-established, high-profile journals read by our target audience. This could also damage career prospects of the project's early-career researchers. Thus, such a strategy would have clear costs, not only with regard to achieving publications, but also with regard to both disseminating project results to the scientific community and supporting our researchers. Finally, regarding the topic of dissemination, two teams stressed the importance of having a good social media presence to reach actors outside the social sciences with our project messages.

Inclusion strategy

The *inclusion strategy* of RRI Practice came up frequently during the interviews. As the project intended to follow the AIRR dimensions in its research process, inclusion had been built into it. The *choice* embedded in the project design was to implement inclusion by having each team organise a national workshop to explore national understandings of RRI and responsibility in STI systems with policy-makers, representatives from research conducting and funding organisations, industry representatives and civil society actors and NGOs. Furthermore, the National Case Study Reports were partly based on interviews with relevant academic and non-academic stakeholders. Because the project was concerned with knowledge creation as well as with RRI implementation, these interviews were not only useful for gathering information, but also facilitated knowledge dissemination and collaborative ways of implementing RRI.

While many research teams were content with the *results* of this strategy as a means to gaining information and creating change, some teams would have preferred having a more extensive inclusion strategy, including more continuous and more diverse input by societal actors during the design of the project (co-creation or co-production) and making room for participatory experiments. One team argued that while research conducting and funding organisations are societal actors, many others in society are affected by the way in which research is conducted and funded, and thus should have been included. However, operationalising such a set-up would have been highly challenging given the constraints of the EC funding call requirements. This shows again the importance for funders of aligning RRI call prescriptions with RRI research process recommendations.

National workshops

The aim of the national workshops, as described in the project proposal, was twofold: to explore national understandings of RRI and responsibility in the science system, and to offer stakeholders a forum for dialogue and learning. The organisation and conduct of the workshops was largely considered to be straightforward and successful, but some research teams found it challenging to involve industry actors. While this was unfortunate in the sense that industry actors could have helped to advance the original aims of the workshops, such findings are themselves relevant, as they indicate an unwillingness for

industry actors to discuss questions of societal responsibility and collaborate with the project, at least in the way proposed by the RRI Practice project. This indicates a challenge with regards to discussing responsibilities within national science systems. While research exists on RRI in industry and business, more research is needed in each national context where this was a challenge to determine the reasons for this, and how this could affect RRI uptake in both the public and the private sector.

Focus on the public sector

The RRI Practice project focuses on public research conducting and funding organisations, and not on private sector actors involved in R&D. This was not so much a choice made by the project board as one made by the EC, as the project consortium responded to the call 'Supporting structural change *in research organisations* to promote Responsible Research and Innovation' (italics added). While understandable given call priorities and time and budget constraints, this choice did have some downsides. For example, in many participating countries the private sector is responsible for more than half of the total R&D budget. This means that RRI Practice has not investigated a significant part of the research and innovation system, including opportunities for introducing more responsible practices in industry as well as for learning from good practices. (The Italy National Case Study Report offers some good examples of the latter.) Several teams indicated that they would have found more industry engagement valuable for the project. More worrying is that, as mentioned in the previous section, several teams indicated that it had been hard to impossible to get industry actors on board for the national workshops. This suggests that the private sector is not 'automatically' interested in current framings of RRI, or in collaboration with public research organisations on implementing RRI, which is important to keep in mind for future RRI projects. Involving private actors has thus been a *challenge* that the project has not taken up (extensively) in favour of prioritising other challenges. As a *result*, our findings have derived from well-documented overviews of responsibility conceptualisations in public research conducting and funding organisations, but not so much in private sector organisations. As said previously, these results are not in themselves bad or even undesirable. Rather, they imply that funders and researchers interested in RRI should keep in mind that R&D takes place in the public as well as in the private sector, and that projects aimed at the one do not necessarily also engage or interest the other, so both should be targeted by specific RRI research and interventions.

Interaction between research teams

RRI Practice is a large European project, undertaken by thirteen research teams in twelve countries, with each team consisting of multiple researchers. In the project proposal, the backbone of the internal communication structure was anticipated to be the bi-annual consortium meetings. These have been conducted successfully and were valued by project members throughout the project. However, even though project members were bound together by the project and a common commitment to RRI, the first round of the internal review interviews identified the *challenge* that some research teams felt rather isolated, especially those working in countries where there are few or no RRI programmes or practitioners. The *choices* to remedy this involved additional Skype (SKID) meetings for more informal communication and a number of extended research visits.

Though *results* were positive, various partners indicated that they would have liked more interaction, e.g. through the conversation options of Trello, through the infrequently used blog, or through more time for discussion and reflection during the consortium meetings. Nevertheless, there were also trade-offs: extending the consortium meetings would have cost time and money, participation in the RRI Practice social media and blog has been modest and some of the planned SKID meetings have been cancelled due to lack of attendance. Thus, though the desire for more interaction has been expressed, it is unclear whether the offered responses were considered attractive enough, or whether more interaction was only considered a good idea in theory, while participants chose not to respond due to competing demands on their time and attention.

The internal review

The RRI Practice internal review has itself been the subject of reflection. The *choice* in the project to include an internal RRI review was to monitor whether we have 'practiced what we preached', and to derive general process recommendations from for future projects interested in incorporating an internal RRI review in their own work. The *choice* was to implement this as a separate work package with its own researchers, budget and deliverables. The method to be followed was two rounds of interviews with the project teams and dedicated review slots at the consortium meetings (see the *Methodology* section).

In general, the *resulting* reflexive exercises were found to be helpful (sometimes even 'beautiful' or 'therapeutic'), particularly to explicate hidden differences or tensions such as the different functions of RRI, and to reflect on the role(s) of the researchers. However, some project teams felt that issues such as those mentioned in this internal review deliverable have not sufficiently been discussed or integrated in the research. They would have preferred more opportunities to discuss critically and comparatively the different concepts, framings and functions of RRI with the project teams, and to revise our research process in response to these discussions. Some teams suggested that the internal review should have been integrated more structurally into the work of each team, to facilitate more group discussions and more local reflection activities.

However, it is unclear whether a more intensive internal review would have been desirable or practically feasible. Indeed, one *challenge* for the internal review team was the size of the project: with thirteen research teams, each consisting of multiple researchers, interviews and group discussions were necessarily time-consuming activities. Another *challenge* was the availability of limited time at the consortium meetings, where the planning of the internal review session was usually an hour near the end. This *choice* was made to give priority to the 'core' programme items and to not stretch the consortium meetings for too long. However, the *result* was having limited time for relevant discussions, at a time when participants were often tired or had already left for early flights. Again, however, this was a trade-off: longer internal review sessions would have required longer consortium meetings and thus, a greater demand on project researchers' time and resources.

Discussion and conclusion

In this internal RRI review deliverable we have described challenges, choices and results of applying an RRI approach consistently throughout a research project. We started with reflecting on the different understandings of RRI and on how we have put RRI and funder requirements into practice. We have shown how different ideas about how to do this have worked out in specific cases, such as with regard to our inclusion strategy and the format of the internal RRI review.

The internal RRI review does not tell us whether the project has been successful in its knowledge creation and institutional change aims. Nor does it tell us whether the project has been successful in implementing an RRI process: the internal review is meant to describe challenges, choices and results of applying an RRI approach, not to judge success or failure. However, in doing so the internal RRI review has shown itself to be a useful place to discuss issues of direct relevance to the research contents, such as the roles and values of the researchers, the way the research process is structured, and how the context (funding requirements, institutional and national discourses and practices) affects the research done. Moreover, the internal RRI review has shown that these issues affect how the contents of the research are conceptualised and what kind of change or impact the research can generate, and how. Thus, an RRI review can expose sources of differences in interpretation and conceptualisation of the research, especially in cases where researchers come from different disciplines and/or have different nationalities, and so benefit the research project itself as well as its management.

Regarding how to facilitate such an internal RRI review, we go into this in more detail in the general process recommendations deliverable. However, in this section we give brief recommendations for the

various stakeholders in the science system on how to facilitate researchers in following RRI prescriptions in research processes.

First, one major lesson of the internal RRI review for *researchers / project designers* is that a mechanism is needed to integrate reflexivity in all stages of the research. For RRI Practice, this was the internal review. As we have argued, this review has uncovered valuable insights for managing and executing the project. Moreover, it has enabled the project researchers to learn lessons for future projects on the interaction between RRI structures and functions; on how research can (not) be contextualised and on the different tensions that researchers have to navigate when doing RRI.

Not all researchers might be used to structurally reflect on these aspects of their work. For the RRI Practice project, this was not so much an issue, as most participants had professional experience with critically investigating research practices, and thus already had relevant skills and training. For other kinds of projects, separate training sessions might be necessary, or the participation of specialised researchers to facilitate discussions. Finally, as this review has shown, there are trade-offs between the amount of time and money that can be spent on such a review and the time needed to discuss research content, e.g. in consortium meetings. However, given the potential benefits of doing an RRI review as mentioned above, we would advocate having at least some time and resources devoted to it, particularly in interdisciplinary, multi-partner, international projects.

Second, a major lesson for *project funders* is that if they require projects to follow an RRI methodology, they need to demand time and dedicated resources for reflection, flexibility, contextualisation and co-design with societal stakeholders in the design of those projects. The tension for funders to navigate is that they should demand detailed work plans in advance, which are necessary for legitimacy requirements. On the other hand, they should also offer the flexibility that a reflexive RRI process requires, with scope for projects to change direction and to leave goals open, which makes it (even) harder to evaluate feasibility of project proposals and success during the project. Ways to navigate this tension that were applied in RRI Practice include agreements on methods and processes rather than on substantive goals; flexible, jointly agreed-upon indicators for success; and a reflective internal RRI review to monitor differences in project interpretation and implementation, and the reasons behind them.

Third, while a degree of flexibility in projects is part and parcel of following an RRI approach, it is also useful for navigating the more political aspects of research projects, as well as other tensions arising out of competing demands made on researchers. This provides us with a recommendation for *research managers*, namely, to recognise these tensions and make them productive. How to do this depends on the specific situation: it may involve revising research evaluation systems, facilitating organisational change, providing skills training, or other measures. Most important is that research managers realise that researchers operate under many and sometimes competing pressures; and that this can be seen as a problem, but also as an opportunity to rethink the role(s) of researchers and how they (should) function within their organisation.

Fourth, from this observation on tensions we also derive a recommendation for *research conducting and funding organisations*, namely, to identify and revise reward structures that are (perhaps unwittingly) promoting behaviour that is at odds with doing RRI. While researchers and their managers can do some of the work of navigating these tensions, working in an environment that enables and supports them to do RRI ensures that they have to put less effort into it. Moreover, it could also stimulate researchers who might otherwise not be so inclined to structure their research according to RRI principles.

Fifth, RRI itself is not only about doing reflective and inclusive research, but also about promoting this by changing research conducting and funding organisations to facilitate doing reflective and inclusive research. Many RRI projects focus on other kinds of impact and change, but as in RRI Practice, change tends not to be easy. The internal review has shown that, even equipped with a theory of organisational change and a relevant mandate, in the RRI Practice project there were disagreements on the kinds of change to be achieved, and the changes actually achieved varied widely across organisations. This shows that *researchers and project managers* (also) aiming at impact or change need proper theories and

methods on achieving change; structural reflection on barriers to and drivers for change; and the recognition that change depends partly on factors outside project control.