Chapter 1
Implementing Responsible Research and Innovation in Research Funding and Research Conducting Organisations— What Have We Learned so Far?

Ellen-Marie Forsberg, Clare Shelley-Egan, Miltos Ladikas and Richard Owen

Abstract Responsible research and innovation (RRI) has emerged in recent years, especially in Europe, as a science policy framework that (a) seeks to align technological innovation with broader social values and (b) supports institutional decisions concerning the goals and trajectories of research and innovation under conditions of uncertainty, ambiguity and ignorance. Rather than relying simply on consumer choice and market mechanisms on the one hand, or risk-based regulation on the other, RRI seeks to determine what constitute the goals, purposes and trajectories of (and alternatives to) technoscience and innovation, and thus the directions towards which these should be oriented, suggesting that these should be underpinned by shared public values. In addition to this overall philosophy of RRI, the European Commission has focused on five constituent policy keys (sometimes called pillars) of RRI that have their historical roots in the Science-in-Society programme; namely societal engagement, gender in research, open access, science education, and ethics. Action on these keys is seen as integral to an RRI approach and to Europe's ability to respond to societal challenges. A further issue in the European context concerns how to 'federate' the RRI community in the EU and promote institutional changes to foster RRI in research institutions (a topic addressed at the European Commission RRI conference in Rome November 2014). This implies engaging stakeholders, research organisations, universities, funding agencies and public authorities in RRI. Some European research conducting and

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research funding organisations have begun to make formal policy commitments to RRI; others have developed RRI programmes and others still have embedded explicit RRI elements within broader programmes of emerging technologies and innovation. The European Commission's 'open to the world' agenda implies involving non-European countries in the RRI discourse. However, beyond Europe, in emerging economies in the Global South (Brazil, India and China) and also in some advanced economies (Japan, Australia), there is little awareness of the concept of RRI, although some elements of the EC's constituent keys have been taken up as thematic priorities by national research organisations. Considerable work needs to be done before RRI is recognised as a concept that offers traction in non-European contexts and research initiatives. There is a dearth of research that has assessed the challenges, efficacy and impact of the ongoing programmes on RRI, partly due to a lack of standardised methodologies that would be required to produce comparative results, and partly because these initiatives are themselves quite new. The project Responsible Research and Innovation in Practice (RRI-Practice), funded by the European Commission Horizon 2020 Science-with-and-for-Society programme (grant no 709 637), is an attempt to respond to this situation. The RRI-Practice project intends to advance European and global awareness of RRI, support its implementation in practice and provide a solid empirical knowledge base on RRI implementation. The main aim of RRI-Practice is to analyse RRI related discourses and pathways to implementation, including barriers and drivers, in a number of research conducting and research funding organisations worldwide, in order to identify, understand, disseminate and promote RRI implementation best practices that can be scaled up at European and global levels. The project started September 2016 and has so far concentrated on mapping the national RRI discourse in the 12 partner countries. As part of this work, national workshops have been held. This paper will present the analytic concept of the project and the results from the workshops, and will reflect on challenges identified in the work so far.

1.1 Background—on RRI

Responsible research and innovation (RRI) has emerged in recent years, especially in Europe, as a science policy framework that (a) seeks to align technological innovation with broader social values and (b) supports institutional decisions concerning the goals and trajectories of research and innovation under conditions of uncertainty, ambiguity and ignorance. Rather than relying simply on consumer choice and market mechanisms on the one hand, or risk-based regulation on the other, RRI seeks to determine what constitutes the goals, purposes and trajectories of (and alternatives to) technoscience and innovation suggesting that these should be underpinned by shared public values.

In addition to this overall philosophy of RRI, the European Commission (EC) has focused on five constituent policy keys of RRI that have their historical roots in the Science-in-Society programme; namely societal engagement, gender in

research, open access, science education, and ethics.[1] Action on these keys is seen by the EC as integral to an RRI approach and to Europe's ability to respond to societal challenges.

A further issue in the European context concerns how to 'federate' the RRI community in the EU and 'mainstream' institutional changes to foster RRI in research institutions. This implies engaging stakeholders, research organisations, universities, funding agencies and public authorities in RRI. Some European research conducting and research funding organisations have begun to make formal policy commitments to RRI; others have developed RRI programmes; and others still have embedded explicit RRI elements within broader programmes, especially in the field of emerging technologies and innovation. Moreover, most organisations commit at least to some of the EC RRI policy keys, although they usually do not frame this commitment explicitly under the banner of RRI.

The EC's recent 'open to the world' agenda implies also involving non-European countries in the RRI discourse. However, beyond Europe, in emerging economies in the Global South (Brazil, India and China) and also in some advanced economies (Japan, Australia), there is little awareness of the concept of RRI, although some elements of the EC's constituent keys have been taken up as thematic priorities by national research organisations (see Brom et al. 2015). Considerable work needs to be done before RRI is recognised as a concept that offers traction in non-European contexts and research initiatives. By engaging with major global S&T players and their sometimes different and often differentiated needs, it may become clear that research and innovation may have to be 'responsible' in ways that are not an immediate priority for those nations where the RRI discourse has so far largely developed (Macnaghten et al. 2014).

1.2   Implementing RRI

RRI discourses have, in a Foucauldian sense, become constitutive in nature in that they can result in tangible activities, behaviours and outcomes. There have been experiments in implementation, which in turn have informed its theoretical conceptualisation (see e.g. Owen and Goldberg 2010; Macnaghten and Owen 2011). In addition, many research organisations and funding organisations have long established practices for promoting open access, ethical standards, or gender equality, items that could now be classified under the umbrella of RRI. We know from these experiments and practices that attempt to implement RRI across regional, national and local contexts will require a firm understanding of its framing and of the context of implementation, including cultural, political and institutional dimensions (Jacob 2013). However, there is a dearth of research that has assessed the challenges, efficacy and impact of the ongoing programmes on RRI, partly due to a lack of

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[1]In some policy documents 'governance' is noted as a sixth key.

standardised methodologies that would be required to produce comparative results, and partly because these initiatives are themselves quite new.

1.3   Studying RRI Practices

The project Responsible Research and Innovation in Practice (RRI-Practice), funded by the European Commission Horizon 2020 Science-with-and-for-Society programme (grant no 709 637), is an attempt to respond to this situation. The RRI-Practice project intends to advance European and global awareness of RRI, support its implementation in practice and provide a solid empirical knowledge base on RRI implementation. The main aim of RRI-Practice is to analyse RRI related discourses and pathways to implementation, including barriers and drivers, in 24 research conducting and research funding organisations, in 12 European and non-European countries, in order to identify, understand, disseminate and promote RRI implementation best practices that can be scaled up at European and global levels.

The project started September 2016 and has so far concentrated on mapping the national RRI discourse in the partner countries. As part of this work, national workshops in twelve countries across the globe have been held. In the remainder of this paper we will present the research approach and the analytic concept of the project and reflect on findings from the workshops related to the analytical concept.

When studying the implementation of RRI in research organisations at both European and global levels it must be noted that there is still considerable debate in Europe as to relevant processes involved in RRI approaches. Moreover, the concept itself has also yet to enter mainstream S&T debates in non-European countries. A realistic discussion on possible implementation strategies and assessment processes has to therefore investigate and understand not only the RRI keys, as they are defined by the EC, but also the organisations' own framing of responsibility in research and innovation (what might be described as 'de facto RRI'). An example of this is the UK Engineering and Physical Sciences Research Council's (EPSRC) policy for responsible innovation as 'anticipate, reflect, engage and act'. It is therefore important to take a reflective, learning approach to such implementation rather than a top-down paternalist approach.

We also suggest that RRI should be considered a *process* that requires reflection on its *normative orientation* and the institutional values on which RRI activities are anchored. At EC level it has been suggested that normative anchor points for RRI are defined within the Lisbon Treaty (von Schomberg 2013), but these will inevitably vary across countries and specific organisations according to their own mission statements and priorities. This then requires sensitivity towards the organisations' own values, as they are embedded in different national and organisational contexts. More generally, there cannot be a fixed understanding of RRI 'implementation', but rather a family resemblance (Wittgenstein 1953) with

common denominators in a plurality of practices that need to be taken as a starting point instead of an assumed essence of the concept.

Furthermore, one needs to be realistic as to the timeframe that RRI implementation would require in order to allow for proper assessment of its processes and impact, especially when one considers the potential for implementation at a global level. Programmatic changes at organisational levels require years of preparation, followed by years of execution, in addition to a considerable amount of time for assessment. Implementation programs on RRI can both challenge and build on *existing policies and practices* that are already embedded in organisations, using the expertise and commitment of local stakeholders to better understand and, where necessary, adapt such practices towards RRI goals. This does not imply neglecting the role of mutual learning and transfer of best practices and lessons learned *between* organisations.

1.4 The Importance of Understanding Organisations

Organisational practices with regard to, for example, gender equality, open access or anticipation are influenced by a diverse set of contextual and internal forces. Some of these are institutional or national dynamics established and maintained beyond the scope of single organisations; such as legislative prerequisites (e.g. gender quotas), established peer review practices, academic incentive systems, patenting and commercialisation reward systems or the (in)transparency of overall policy making. Some other dynamics relate to organisational particularities, often developed over a significant amount of time, and embedded in distinct organisational identities (e.g. programmatic excellence). Change can also be the result of individuals' formal or informal agenda setting or implementation power (i.e. change champions). Even only one initial RRI promoter in an organisation may create long-term organisational change (Hardy and Maguire 2008). RRI leadership is, therefore, another important factor for encouraging broader uptake of RRI. In total, the norms, roles and governance arrangements of the societal and institutional context and the RRI practices of specific organisations and individuals are inter-related.

Therefore, in trying to increase the uptake of RRI, one needs to take into account the incentives and motivations of actors, the institutional contexts in which RRI practices develop and that promote or constrain the behaviours of actors, and consider the mission and manoeuvring space of the organisations and individuals that own the practices.

Institutional theory is widely used to analyse public administration, and it has, for example, been used to study governance (Cashore 2002; Forsberg 2012a), change management (Henisz and Zelmer 2003), organisational ethics (Boyle et al. 2001; Forsberg et al. 2012) and innovation systems (Moodysson and Zukauskaite 2012; Forsberg 2012b). Scott (1987) distinguishes between studying institutions as 'rational', 'natural' and 'open' systems. This has been interpreted in an ethical

context by Boyle et al. (2001), who claim that many of the ethical challenges of organisations can be understood only by taking these different dimensions into account. This approach is also useful for understanding organisational dynamics related to implementing RRI.

According to Boyle et al. the rational systems approach understands the organisation as having '(1) a visible set of hierarchical authority relations in which (2) work activities are governed by formal rules and clearly defined criteria for evaluation, relations that (3) are designed to pursue some set of goals' (2001, p. 31). From an RRI perspective, the rational system includes formal mandates, hierarchies, ethical guidelines and codes of conduct, monitoring and assessment systems, etc. and studying this also involves scrutiny of workload, the availability of resources, etc. (see also Forsberg et al. 2012). Understanding the organisation as a *natural* system involves scrutinising the informal sides of the organisation. This allows the study of how individuals may have a significant influence on attitudes and conduct in an organisation and how cultures and sub-cultures may flourish more or less decoupled from formal structures, often undermining, replacing or transforming them (Boyle et al. 2001, p. 33). Boyle et al. argue that in an ethical context (and, we can add, an RRI context) this means to 'identify the degree to which actual norms, rules, and practices differ from official or formal ones, and then to enquire into how the informal counterparts influence production outcomes, interpersonal relations, and goal attainment' (ibid., p. 33). Boyle et al. state that although there is a need for both formal and informal systems in an organisation, a gap between them that is too wide might engender hypocrisy, cynicism and disillusionment.

Finally, an *open* systems approach to organisations focuses on the relationships between the organisation and its environment, on which it is 'dependent for resources, personnel, and legitimacy' (ibid., p. 35). For instance, for research conducting and research funding organisations, national Ministries of Research and Innovation represent key contextual agents.

In a similar way as Forsberg et al. (2012) have shown in the case of designing effective ethics programs in a military organisation, studying and implementing RRI in research organisations needs to take into account the dynamics between the rational, natural and open systems and understand how these imply barriers and drivers for the RRI agenda. A potential barrier for an RRI key might, for instance, be that even if gender balance is described as a central value in official documents, leaders communicate that this is of little importance compared to the value of research excellence. Or, conversely, individuals in an organisation may succeed in influencing co-workers to start an open access journal even if there is no formal decision made in their organisation about such a strategy.

We can summarise the above approach to organisations studies in Table 1.

As it seems useful to clarify challenges and conditions for successful RRI work, we will in the RRI-Practice project use this analytic framework to develop organisational RRI reviews and Outlooks.

Table 1 Framework for studying the included organisations

	Rational system	Natural system	Open system
Aspects of organisations	Mandates, legislative frameworks, formal hierarchies	Culture, informal routines, informal reward systems, focus on management	Policy learning, pressures from key stakeholders (owners, the public, etc.)
Potential drivers for RRI	Active ownership (e.g. the state), legislation that includes social responsibility as a core element of the mandate, formal evaluation criteria adapted to RRI goals	RRI dimensions become mainstreamed, managers start seeing RRI dimensions as an obvious part of their responsibilities, no social acceptance for neglect of the RRI dimensions	Pressure from the media, success stories from organisations considered to set 'gold standards' in the field
Potential barriers to RRI	No formalised pressures to conform to RRI dimensions	Informal incentive systems reward economic output/ excellence/etc., effectively marginalising the RRI dimensions	Important stakeholders reward, for instance, excellence and economic performance to a greater extent than RRI related matters
Methods	Analysis of formal documents	Interviews with employees at different levels in the organisations, focus groups	Media analysis, interviews with top management

1.5 Findings so Far

So far the project has focused on mapping the understanding of responsibility in research and innovation in the different partner countries and among different stakeholders, as well as mapping relevant practices. This is important, especially for studying the organisations as open systems, which operate in a context where meanings are translated and expectations negotiated. RRI workshops have been held in all twelve partner countries. The workshops have shown a surprising willingness of stakeholders in all countries to discuss their policies and practices in RRI terms,—even when they were not initially familiar with the concept.

Stakeholders that were unfamiliar with the concept of RRI focused mostly on the EC RRI keys since they could readily identify national debates and ongoing activities related to RRI framed as ethics, gender equality, public engagement and open access. Science education, however, came across as a vague concept that requires a more detailed description and was hence generally less addressed. Some appreciate RRI as an umbrella concept that could integrate policies on the different aspects that were presented as keys. Those organisations that were familiar with the

notion of RRI, were more sceptical to reducing it to a focus on keys. These organisations already had policies and activities on the RRI keys, but considered RRI to indicate a deeper systemic change in the relation between science and society. This indicates that the keys might be positioned as preconditions or prerequisites for a broader imaginary of a responsible innovation system involving reconfiguration of knowledge flows and institutions. In this respect perhaps RRI could be seen as a process of development. If this is the case, the weight put on strengthening the EC keys versus e.g. the AIRR dimensions (anticipation, inclusion, reflexion and responsiveness) may need to be adapted to different national contexts depending on where they are on this development journey.

When regarding RRI as a commitment to anchoring research and innovation better in societal needs, another topic also becomes important, namely who is to define such needs. Does it imply more state steering of research and innovation or does it mean more public engagement in science? And what is the balance between deliberation and representation? The cultural context of the research organisations in different countries has great impact on how the RRI keys (like public engagement) are regarded, and to what extent they are emphasised in the organisations' strategies. Similar dynamics between the organisation—regarded as an open system —and its cultural contexts are likely to play out also in relation to other RRI keys and dimensions. Institutional characteristics that cut across nations are also an important influence: orientations towards certain visions of scientific excellence and researcher autonomy were common barriers to RRI implementation as identified in the workshops.

While the national mapping facilitates the understanding of the included research conducting and research funding organisations as open systems, micro studies have now started that will reveal more details about these organisations also as structural and natural systems. These studies will review the included organisations' work on the RRI keys, the AIRR dimensions and potentially other responsibility-related dimensions the organisations prioritise. In close contact with the organisations, Outlooks with concrete action plans and indicators for prioritized RRI aspects will be developed. These will form the basis for comparative research later in the project.

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