

Chapter 2

Introduction to RRI and the Organisational Study



Abstract In this Chapter, we detail our understanding of Responsible Research and Innovation as developed through the RRI-practice project. Further, we introduce the theoretical framework for the organisational study and provide details of the methodology of the RRI-Practice study, and organisations surveyed. In the subsequent Chaps. 3 and 4, we discuss drivers and barriers to RRI, how drivers and barriers interact, and how these differ across types of organisations. In Chap. 5, we discuss key findings in the project emanating from the organisational analysis and the neo-institutional theoretical approach.

Keywords Definition of responsible research and innovation · Research methodology · Neo-institutional theory

2.1 Our Understanding of RRI

In this book we have operationalised RRI as embodying five RRI Keys (Ethics; Gender Equality and Diversity; Open Access and Open Science; Science Education; and Societal/Public Engagement) and four process dimensions (Anticipation and Reflexivity; Diversity and Inclusiveness; Openness and Transparency and; Responsiveness and Adaptation).¹ We now set out brief descriptions below.

RRI Key: Ethics

The Ethics key includes notions of research integrity, ethical regulation and assessment, and ethical reflection. Relevant to this RRI dimension are ethical codes and regulations, ethical committees, research integrity training, ethics or integrity offices and officers, as well as the inclusion of ethical considerations in research and innovation projects or processes. There is broad overlap between this key and the dimension Anticipation and Reflexivity, as well as with the dimension Responsiveness and Adaptation, which we discuss in our analysis of drivers and barriers.

¹The process dimensions are sometimes called the AIRR dimensions. Locally and nationally situated aspects of RRI, also researched in the project, are not part of this broad comparative analysis, as this material is more fragmented. See the national reports for a treatment of those.

RRI Key: Gender Equality and Diversity

The Gender Equality key is understood as a “*three-dimensional construct whereby gender equality is reached when (1) women and men are equally represented in all disciplines and at all hierarchical levels, (2) gendered barriers are abolished so that women and men can develop their potential equally, and (3) when the gender dimension is considered in all research and innovation activities*” (European Commission 2018, p. 11). Based on RRI-Practice analyses, we reconfigured the key to include a broader notion of diversity, that includes a broader set of social and demographic distinctions, such as age and cultural or ethnical background. The gender and diversity key is not to be confused with the process dimension of inclusion and diversity, which signifies an opening up of the science process to a wide variety of views and approaches.

RRI Key: Open Access and Open Science

The Open Access key refers to “*the practice of providing online access to scientific information that is free of charge to the end-user and reusable.*” (European Commission 2019). Conjoining the open access key is the open science concept that includes open data, the sharing and making available of research data, either to other scientists, or to other interested parties. Open science can include other aspects such as open code, open lab notes, science blogs, etc.: in other words, opening up the science process from conceptions till publication, to fellow researchers, stakeholders and the public. Even though the open science concept among scholars, and even the European Commission, has developed into a broad concept encompassing societal engagement, citizen science, etc., the respondents in our research almost uniformly understood open science as open access and open data.

RRI Key: Science Education

The Science Education key can be defined as “*helping all citizens acquire the necessary knowledge of and about science to participate actively and responsibly in, with and for society, successfully throughout their lives*” (European Commission 2015, p. 7). With respect to this key, we place emphasis on the provision of educational programmes or activities on science and technology to children in primary and secondary education, and to the population at large. This definition of science education excludes science communication, meaning communicating about specific pieces of science to a broad audience. This particular aspect is often treated as a rudimentary form of societal engagement. However, in the country reports analysed, organisational programmes related to outreach activities are often referred to as both Science Education and Societal/Public Engagement. Being aimed at the public mainly through the school system, science education also excludes traditional university education programs.

RRI Key: Societal/Public Engagement

The Societal Engagement key—or sometimes termed Public Engagement—includes various ways of communicating and engaging with societal stakeholders, that include societal organisations and the broader public. Although societal engagement in an RRI context is inherently two-way communication, many respondents refer to more one-way dissemination activities when asked about this key. Thus, in the following, societal engagement includes communication activities such as media activities, public relations, publications as well as websites for a broader public, open days (e.g. at universities) and public lectures. Furthermore, societal engagement includes forms of participation in research and innovation, such as citizen science initiatives, collaborations with citizens or societal organisations (e.g. in the form of collaborative innovation), as well as the more advanced forms of participatory knowledge co-creation and agenda setting in which societal actors are involved.

Process Dimension: Anticipation and Reflexivity

Anticipation includes various ways in which future consequences can be considered, and future developments are given shape to, in processes of research and innovation. Such anticipation includes uncertainty analyses, the exploration of plausible or desirable futures, and processes in which interested actors engage in early stages in agenda setting, in development, and in the execution of research and innovation activities. In the context of this report, we understand reflexivity as the capacity of an individual or a collective (such as an organisation) to call into question assumptions, activities, theories, framings, or value systems (see for instance Forsberg et al. 2015). As such, this dimension exhibits clear overlaps with the ethics key in most of the country reports.

Process Dimension: Diversity and Inclusion

The Diversity and Inclusion dimension concerns the various ways in which broader publics and societal stakeholders, with often diverging concerns and perspectives, can take part in deliberation or dialogue on research and innovation, i.e. ways of including people and viewpoints that may not otherwise take part or that have been excluded for some reason. In our coding scheme, there is a complete overlap between this dimension and the societal engagement key, thus we have effectively included this dimension in the corresponding RRI key.

Process Dimension: Openness and Transparency

The Openness and Transparency dimension is commonly understood by respondents as related to the Open Access and Open Science RRI key. However, in the empirical material, 8 country reports have separate matrices for this dimension (as opposed to including this dimension in the RRI key). These reports typically use the process dimension to discuss wider aspects of openness and transparency, pertaining to organisational culture or structures that further openness and transparency, sometimes related to formal transparency requirements on public organisations. Conversely, open access and open science are often discussed from the viewpoint of established

procedures of publishing using green or gold open access as well as sharing data via repositories or other established systems. We understand the two aspects of RRI (Open Access and Open Science vs. Openness and Transparency) accordingly.

Process Dimension: Responsiveness and Adaptation

The Responsiveness and Adaptation dimension speaks to the capacity to respond to circumstances, foreseen and unforeseen, and to new knowledge, and to adapt research, innovation, and organisational practices accordingly. This dimension is often understood as integrated in the most embedded version of the three other dimensions. However, some country reports discuss this dimension specifically as the capacity to react and make changes, i.e. for the organisation to have a sensitive interface to what we have dubbed ‘interchange’ in the neo-institutional framework that underpins the RRI-Practice study (Scott and Davis 2007), and to act upon information and needs from wider society.

Our treatment of overlaps and further information

As is evident from the descriptions above, there is some overlap between concepts, and in particular between the RRI Keys on the one side, and the process dimensions on the other. We have coded our data building on our understanding of conceptual centrality for each of the categories, as delineated above. While the majority of country reports have thorough treatments of the RRI Keys, the treatment of the process dimensions is patchier as respondents have often found it difficult to relate to these dimensions. Accordingly, we have used the RRI Keys as our main coding scheme and added codes on the dimensions, where a treatment of these were evident in the texts, either by wording or by heading.

2.2 Methodology

We now discuss the theoretical framework used for Part I before introducing each of the organisations that were researched in the country reports.²

Theoretical framework

The RRI-Practice study is based on a theoretical framework derived from the neo-institutionalist William Richard Scott, and his distinctions of organisational analysis into *rational*, *natural* and *open systems approaches* (Scott 1981; Scott and Davis 2007). Below, we introduce the framework³ and how it was used to structure the analysis in the country reports. In the research protocol, distinctions are made to

²The reader should note that the project refers to *national* case studies, in addition to the organisational, embedded case studies. In this book part, we discuss *organisational* studies as case studies.

³We draw on an unpublished working paper (Forsberg et al. 2018) and on the Norwegian country report (Egeland et al. 2018), and paraphrase these extensively. A similar way of using Scott’s framework has also been presented in Boyle et al. (2001) and by Forsberg et al. (2012).

‘structural issues’, ‘cultural issues’, and ‘interchange dynamics’, based on Scott’s typology of organisations as ‘rational’, ‘natural’, or as ‘open systems’ (Scott and Davis 2007).

First, for Scott and Davis (2007), organisations can be analysed as a *rational system* with a focus on *structural* aspects, on functional rationality, goal specificity and the formalisation of rules and roles. Within this configuration, distinctive characteristics include the following:“(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” (Boyle et al. 2001, p. 31). Herein lies a focus on the regulative and normative aspects that structure organisational behaviour and that make it more predictable, standardised and easier to govern. The regulative aspects are grounded in a view of instrumentality, which assumes a certain rationality in actors’ choices to follow rules and behave expediently, and to pursue their own interests. From the rational system perspective, the structural issues of organisation include:

- Conceptions of current and desirable goals and objectives, ethical norms, expectations and social obligations
- Formalized power and authority structures in the form of formalized power hierarchies, roles and positions in the organisation, mandates, responsibilities, monitoring and assessment systems, formal decision-making structures, reward systems, etc.
- Formalisation of organisations in the form of informal strategies, standards, procedures, performance of duty, defined organisational culture, written rules, codes of conduct, ethical guidelines, but also workload, the availability of resources, etc.

Second, for Scott and Davis (2007), organisations can be analysed as a *natural system* with a focus on *cultural* aspects and on organisations as collective accomplishments. This view leads to two insights; that organisations are encumbered with goal complexity, and that informal and tacit structures matter as much as formal ones. This approach sensitises analysis to the disparity between goals as embedded in policy and goals embedded in practice, to the interconnections between the normative and the behavioural structures of organisational life, and to the study of what may appear to be ‘irrational’ decision processes. From the natural system perspective, the cultural issues of organisations include:

- Conceptions of organisational cultures, values or identities
- Conceptions of professional culture, values or identities
- Perceptions of managers to various RRI aspects, and the factors that encourage or discourage them to act
- The agency of change agents and other actors
- Institutional work performed towards sustaining or curbing aspects of RRI
- Taken for granted assumptions on how things are done

Third, for Scott and Davis (2007), organisations can be analysed as an *open system* with a focus on *interchange* aspects, recognizing that organisations are comprised of multiple and intersecting actors, who receive information, make decisions and direct action. This leads the analyst to explore the ever-changing formation of sub-groups and alliances, and their role in control and coordination. In an open systems perspective, the influence of the organisational environment is considered of paramount importance, as it is in neo-institutional theory (Tolbert and Zucker 1996; Scott 1987). The important insight of open systems scholarship is that organisations are not only influenced by their structure and culture, but with how they engage in interchanges with other organisations, institutions and the broader environment. In other words, organisations are viewed as open systems, recognising that organisational change is commonly sparked by impulses coming from the environment outside but connected to the organisation. The RRI-Practice mapping methodology on how RRI comes to be understood in national discourses, as well as by stakeholders in the organisations researched, enabled us to analyse how elements of context function as a barrier or a driver to how organisations' work on RRI aspects. For example, if open access is a national priority, and implemented in organisations similar to the ones studied in the project, mimetic processes can be a driver for implementation (DiMaggio and Powell 1983). From an open systems perspective, the interchange dynamics of organisations include:

- The impacts of the wider political landscape and policy guidelines on mediating expectations
- The impacts of national and industry culture
- The impacts of external stakeholders of all kinds
- The collaborations of the organisation with other entities
- The impacts of public opinion, the press, etc.
- Concerns related to reputation or preservation of status
- The impact of funding schemes in the widest sense
- The impact of benchmarks or other measures at extra-organisational level

We note that both the national funding organisations explored in the study and the European Commission and its funding of this project, constituted an important part of the interchange environment for the research conducting organisations. Similarly, national governments were an important part of wider environment for the policy organisations, both as funding providers and as research units.

In this book we suggest that these distinctions enable us to describe important aspects of the RRI concept; how ideas on RRI are turned into organisational practice, and constituting vantage points from which to analyse how organisational practices may fit the RRI label and concept. We suggest that seeing organisations and organising from a rational, natural and open systems perspective provides insight on possible uses of RRI across and between types of organisations, with respect to the individual keys and dimensions. In Table 2.1, we set out how Scott's typology was put to use for the Gender and Diversity key.

Table 2.1 Use of theoretical framework; structural, cultural and interchange perspectives on gender

	Structural issues	Cultural issues	Interchange dynamics
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
Potential organisational actions	Establishment of a sexual harassment hotline	Explicit reference to candidates' attitudes to gender balance in job interviews of leaders	Invitation of citizens to the university to learn about their perceptions of gender equality in our university system
Indicators for success	Awareness of the hotline among our employees/users/students	Increase of reported awareness of this issue in our annual employee survey	Number of employees actually interacting in dialogues with the public about their activities

Source RRI-Practice research protocol (Forsberg and Ladikas 2017).

For each key and process dimension, the national RRI-Practice research teams sorted the data according to this type of table with the theoretical framework described above in mind. These matrices formed the basis for much of the analytic work in the project. Research outcomes describing drivers and barriers, good practices, as well as legal conditions and national culture with respect to each aspect of the RRI concept are reported in the country reports for the organisations.

Overview of organisations studied

The RRI-Practice study comprises 23 organisations, located in 12 countries. Below we provide an overview the ten funding organisations studied and the thirteen research institutions. In one case, the responsible ministry is included among the studied funding organisations (Bulgaria) as one case. Some studied funding organisations are very tightly coupled to political entities in the state apparatus (e.g. for China and Bulgaria). The Italian case is the only strictly non-governmental funding agency in the sample in terms of financial arrangements.

In the ‘Policy Organisation’ column, we report if the organisation is formally responsible for implementing policy goals to the scientific community. Hence, if funding organisations are state-owned, but autonomous (at a practice level), we would answer with a ‘no.’ The ‘RRI term in use’ column delineates the extent to which RRI as a term is used in organisational practice. The descriptor ‘little’ denotes that few organisational members are familiar with the term, apart from those familiar with EC funding schemes and Horizon 2020 projects. By ‘some’ we imply that pockets of organisational members, or a disparate but more noticeable community of organisational members use the term, without the term being common parlance amongst the majority of organisational members. We notice that the funding organisations studied differ along several dimensions: the extent to which organisational practices are denoted with the label RRI; the extent of their role as policy providers entangled in the political system of the country; the scope of the funding field (Table 2.2).

Thirteen research-performing organisations are included in the study, the majority of which are large universities, but which also include two organisations that advise governmental bodies (Bulgaria and China); one organisational unit within a large university (USA), and a not-for-profit organisation (Bulgaria). Some of the research institutions have a restricted research mandate, including two that maintain a clear focus on science and technology (France and Germany). In one country, two research performing universities have been researched (the Netherlands). These distinctions are set out in Table 2.3, that includes the prevalence of the RRI term.

To summarise we see variation in research performing organisations alongside the following dimensions: the extent to which organisational practices are denoted with the label RRI; the type of research performing organisation; their mandate in providing advice to governments; and whether they have an applied research focus. We notice that the majority of our funding providers are large-scale national funding providers that constitute a major driving force in shaping national research agendas and that have varying degrees of policy enforcing mandates from the governments in the countries where they operate. Similarly, the majority of our research performing organisations depend on their funding on these kinds of funding providers who also constitute an important part of their institutional environment. The bulk of our research performing organisations are large-scale universities of national and international importance.

Table 2.2 Research funding organisations studied

Country	Name	Type of organisation	Scope	Policy organisation	RRI term in use
Australia	Commonwealth Scientific and Industrial Research Organisation (CSIRO)	National funding provider	Science and technology	Yes	No
Brazil	São Paulo Research Foundation (FAPESP)	Regional funding provider of national importance	Broad, but particularly strong in the natural sciences	No	No
Bulgaria, EU	Ministry of Education and Science (MES)	Ministry	Broad	Yes	Some
Bulgaria, EU	National Science Fund (NSF)	National funding provider	Broad, including humanities	Yes	Some
China	National Science Foundation of China (NSFC)	National funding provider	Natural science	Yes	No
Germany, EU	Helmholtz Association (HFG)	National independent funding provider and largescale applied researcher	Science and technology	Yes	Little
India	Department of Science and Technology (DST)	National funding provider	Science and technology	Yes	No
Italy, EU	Fondazione Telethon	National independent funding provider; and research organisation	Medicine and health care, with a specific focus on rare diseases	No	Some
Netherlands, EU	The Netherlands Organisation for Scientific Research (NWO)	National funding provider	Broad, including humanities	Yes	Yes ^a
Norway, EØS	Research Council of Norway (RCN)	National funding provider	Broad, including humanities	Yes	Yes

(continued)

Table 2.2 (continued)

Country	Name	Type of organisation	Scope	Policy organisation	RRI term in use
United Kingdom, EU	Engineering and Physical Sciences Research Council (EPSRC)	National funding provider	Engineering and physical sciences	Yes	Yes

^aCorresponding national language term in use

Data in the national case studies

In all countries, researchers conducted documentary organisational analysis, using strategic policy documents, the mapping of national contexts, and the analysis of national discourses with respect to RRI and similar terms (such as ‘responsibility’). In addition, expert interviews, national workshops, interviews with organisational members, and focus group feedback sessions were conducted, both in the formulation of reports and outlooks. Table 2.4 present the numbers of each category. In some countries, additional data collection took the form of questionnaire surveys (Bulgaria), and ethnographic research (USA).

2.3 Coding Strategy in the Organisational Analysis

The national reports analyse the barriers and drivers of operationalising and implementing RRI in particular organisational contexts: what the organisations have done—or not done—towards each aspect of RRI, and how the particular aspect may—or may not—fit the focal organisation and its immediate and wider environment. We coded each driver and barrier with respect to the relevant aspect of the RRI concept (keys and process dimensions), as well as to the relevant dimension in Scott’s framework. Most mentions of drivers and barriers relate to only one driver or barrier, but some also show clear relevance for more than one key or dimension. The result is a matrix, where each driver or barrier is coded both with respect to relevant aspects of the RRI concept, and with respect to Scott’s dimensions. This strategy allows us to gauge if some keys and dimensions have predominantly structural, cultural or interchange related drivers or barriers, and to compare drivers and barriers with respect to Scott’s dimensions for each aspect of the RRI concept.

Table 2.3 Research performing organisations studied

Country	Name	Type of organisation	Scope	Policy advisor	RRI term in use
Australia	University of Queensland (UQ)	Large-scale university	Broad	No	No
Brazil	State University of Campinas (UNICAMP)	Large-scale university	Broad	No ^a	No
Bulgaria	Applied Research and Communications Fund (ARC Fund)	Small applied research organisation	Social Science	Yes	Some
China	Chinese Academy of Science and Technology for Development (CASTED)	Smaller applied research organisation	Science and technology	Yes	Some ^b
France	Alternative Energies and Atomic Energy Commission (CEA)	Large-scale specialized applied research organisation	Energy and related sciences	Yes	Little
Germany	Karlsruhe Institute of Technology (KIT)	Large-scale technical university, with applied research unit	Technical and social sciences	No	Some
India	Jawaharlal Nehru University (JNU)	Large-scale university	Broad	No	No
Italy	University of Padova (UP)	Large-scale university	Broad	No	Some
Netherlands	Wageningen University and Research (WUR)	Large-scale technical university with applied research unit	Technical with a focus on agriculture	No	Some ^b
Netherlands	Radboud University (RU)	Large-scale university, with large hospital attached	Broad	No	Yes ^b
Norway	Oslo Metropolitan University (OsloMet)	Large-scale university with applied research unit	Applied sciences	No	Yes
United Kingdom	University of Bristol (UOB)	Large-scale university	Broad	No	Yes

(continued)

Table 2.3 (continued)

Country	Name	Type of organisation	Scope	Policy advisor	RRI term in use
USA	Arizona State University's Biodesign Institute (ASU-BI)	Smaller applied research within large scale university	Biomedicine and health outcomes, sustainability, and security	No	No

^aUNICAMP is nevertheless often represented in commissions and advise institutions that produce policy in Brazil (Monteiro, personal communication)

^bCorresponding national language term in use

2.4 Limitations of the Study

This book is based on national reports from 12 countries on 23 organisations and a study of the national conditions for the uptake of RRI in each report. Therefore, the interpretations by the present authors are based on interpretations made by other researchers in the project on the country in question. In the project, we sought to streamline the reporting through the use of common templates for the reporting of findings and key data. These can be found in the national reports. However, an important aspect of the project was an action research component with interventions taking place in each of the organisations, and with the formulation of policy recommendations at organisational and national levels. A simple delineation between description (what we found) and advocacy (what we advocate) is not always clearly separated in the national reports. In addition to these considerations, research teams (and individual researchers) have diverging research interests and varying theoretical commitments. It is fully possible that the reported national and organisational stance towards the RRI concept in national reports is influenced by the national researchers own commitments and preferences. Nevertheless, in this book we have sought to maintain consistency through consistent convergence, through close engagement with each of the research teams, and through a common analytical framework. Last, we cannot claim our selection of cases 'represents' a larger population in a well-defined way, although they are central to the national science systems of interest, and therefore exerts considerable influence on these.

Table 2.4 Data collected for national case studies

Country	Organisations studied	Documents reviewed	Interviews	Focus group participants	Workshop participants
AU	(1) Commonwealth Scientific and Industrial Research Organisation (CSIRO) (2) University of Queensland (UQ)	91	42	21	13
BR	1) São Paulo Research Foundation (FAPESP) (2) State University of Campinas (UNICAMP)	50	20	19	12
BG	(1) Ministry of Education and Science (MES) (2) National Science Fund (NSF) (3) Applied Research and Communications Fund (ARC Fund)	23+	29	24	18
CN	(1) National Science Foundation of China (NSFC) (2) Chinese Academy of Science and Technology for Development (CASTED)	120	25	8	8
DE	(1) Helmholtz Association (HFG) (2) Karlsruhe Institute of Technology (KIT)	721	18	7	7

(continued)

Table 2.4 (continued)

Country	Organisations studied	Documents reviewed	Interviews	Focus group participants	Workshop participants
FR	(1) Alternative Energies and Atomic Energy Commission (CEA)	29	16	26	16
IN	(1) Department of Science and Technology (DST) (2) Jawaharlal Nehru University (JNU)	50	40	22	59
IT	(1) Fondazione Telethon (2) University of Padova (UP)	n/a	17	15	12
NL	(1) The Netherlands Organisation for Scientific Research (NWO) (2) Wageningen University and Research (WUR) (3) Radboud University (RU)	80	71	7+	30+
NO	(1) Research Council of Norway (RCN) (2) Oslo Metropolitan University (OsloMet)	50+	36	n/a	9
UK	(1) Engineering and Physical Sciences Research Council (EPSRC) (2) University of Bristol (UOB)	350	38	n/a	14

(continued)

Table 2.4 (continued)

Country	Organisations studied	Documents reviewed	Interviews	Focus group participants	Workshop participants
US	Arizona State University's Biodesign Institute (ASU-BI)	56+	18	25	54
Inter-national	Workshop with experts on two days in Berlin				22
Totals	All countries	1620+	370	174+	274+

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