



The potential for learning from good RRI practices and implications for the usefulness of RRI as an umbrella concept

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The potential for learning from good RRI practices and implications for the usefulness of RRI as an umbrella concept

Abstract

Purpose

The purpose of this contribution is to analyze reported good institutional Responsible Research and Innovation (RRI) practices from an organizational and learning perspective in order to discuss the usefulness of RRI as a broad umbrella concept.

Design/methodology/approach

We connect neo-institutional and translation accounts of diffusion to different modes of learning, and discuss reported best practices from 12 reports, including in total 23 organizations in the research system world-wide, in light of this theoretical framework. We categorize the good practices identified in the reports and discuss how the nature of the practices influences the potential learning from them. We then apply the results from our discussion to current policy developments on RRI.

Findings

The two most often mentioned good practices overall are organizational policies and the establishment of organizational units, but the type of good practices recommended differs across the various aspects of the RRI umbrella concept. This diversity within the RRI construct is a practical argument against the effectiveness of RRI as an umbrella concept.

Originality

Our study is novel in the fact that we, building on Wæraas (2020), systematically relate types of good practice to neo-institutional theory and translation perspectives explicitly combined with learning approaches and apply this approach in the field of research organizations. The policy implications from the empirical and theoretical analyses are novel and timely in these early phases of the EU funding framework programme Horizon Europe and can also be relevant for the increasingly important umbrella concept of Open Science.

Keywords: Responsible Research and Innovation; RRI; Best practices; Good practices; Organizational learning; Practice transfer; Translation

Introduction

The development of RRI as an umbrella concept

With the advent of powerful enabling sciences and technologies like biotechnology, nanotechnology and Information and Communication Technologies (ICTs) it has become increasingly clear how radically science and technology is able to change the environment, animals and humans, and society. This insight has led to calls to proceed responsibly in research and innovation. A concept that has been launched to address such issues is Responsible Research and Innovation (RRI). RRI is a policy concept promoted by the European Commission (EC), a selection of national funders and a number of scholars in the Science and Technology Studies (STS) field, calling for a new relation between society, research, and innovation. The EC describes RRI in the following way:

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. Responsible Research and Innovation (RRI) implies that societal actors (researchers, citizens, policy makers, business, third sector organizations, etc.) work together during the whole research and innovation process in order to better align both the process and its outcomes with the values, needs and expectations of society.¹

Other funders and scholars have presented similar conceptions of RRI. For instance, since 2012, in the context of funding programs of the Engineering and Physical Sciences Research Council (EPSRC) in the UK and the Research Council of Norway (RCN), RRI has been described in terms of a set of process characteristics. This approach has been influenced by the British STS scholars Richard Owen, Jack Stilgoe and Phil Macnaghten. According to Owen et al. (2012), research and innovation that is responsible is characterized by being anticipatory, inclusive, reflective and responsive (the so-called AIRR or AREA framework adopted by the EPSRC and the RCN).

In addition to the overall RRI approach emphasizing the responsiveness to societal values, the EC, in its Horizon 2020 research funding programme, connected RRI to five (sometimes six) so-called policy keys: ethics, gender, open access, societal engagement and science education

¹ <https://ec.europa.eu/programmes/horizon2020/en/h2020-section/responsible-research-innovation>

(sometimes also including governance as a key). According to Owen, von Schomberg, et al. (2021)

these keys reflected action lines (and topics within these) in the Science in Society (SiS) work programme that had existed prior to the emergence of RRI at the EC. Framing RRI as the keys provided a form of continuation between the SiS and SwafS work programmes, and the EC staff associated with them. RRI started to become synonymous with this ‘package’ of keys (p. 7)².

This diversity of elements in the concept means that RRI had become a so-called ‘umbrella concept’.

According to Hirsch and Levin (1999), an umbrella concept is “a broad concept or idea used loosely to encompass and account for a set of diverse phenomena” (p. 200). Hirsch and Levin suggest that many umbrella concepts go through a lifecycle: emerging excitement, validity challenge, development of typologies, failure to converge on a commonly shared definition and operationalization, finally leading to a decline in interest and increasing critique of the merits of the concept and ultimately construct collapse.

‘RRI’ seems to have followed these phases of an umbrella concept. Discussions of the “true meaning” of Responsible Research and Innovation are widespread and in the current EC funding programme Horizon Europe, superseding Horizon 2020, the concept of RRI has a less visible role (although it is still an operational objective of the programme). This suggests that there is a crossroads facing the RRI community and policy makers regarding whether to proceed with RRI as a broad umbrella concept or split the concept up into its constituent parts (potentially reserving the term RRI to only parts of what has been included in the broader concept). This choice can be made based upon theoretical or practical considerations and the results of studies of RRI institutional changes and best practices in Horizon 2020 can give a good knowledge base for such considerations.

RRI, institutional changes and best practices

Throughout the period in Horizon 2020 when RRI as an umbrella concept seemed to move through these phases, there was at same time, through the SwafS funding programme, a call for

² The SiS programme was part of the 7th framework programme for research funding in the EU. SiS changed to Science with and for Society (SwafS) in the subsequent Horizon 2020 research funding framework programme.

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3 implementing RRI institutional changes³ and for corresponding descriptions of ‘best practices’
4 of institutionalized RRI. As a response to the EC demand, there has been a growing number of
5 projects aiming to institutionalize RRI as organizational practice(s) (Delaney & Iagher, 2020;
6 Kuhlmann et al., 2016). This is not only of interest for policy making but is also an important
7 contribution to the scholarship of RRI. There is no shortage of theorized accounts of RRI (e.g.
8 Owen et al., 2012; von Schomberg, 2012), but how to transfer RRI into organizational practices
9 in order to obtain institutional changes in the science and innovation systems has been
10 undertheorized (Owen, Pansera, et al., 2021). Moreover, although calls for best practice
11 examples are commonplace, the knowledge of how such best practices can be used for learning,
12 and for the sustenance of concrete RRI practices in ‘recipient’ organizations, has mostly been
13 neglected in the RRI scholarship. While many EC funded projects report on good RRI practices,
14 few systematic reviews or analyses of such good practices exist. Kupper et al. (2015) and
15 Schuijff and Dijkstra (2020) provide interesting analyses of RRI good practices, but not
16 specifically in an organizational perspective. Most of the practices they describe relate to
17 specific projects (workshops, research projects, collaborations, etc.), research fields/topics
18 (biotechnology, nanotechnology, ICT, etc.), overall research policy, etc., and not good practices
19 in institutionalizing RRI. Hennen et al. (2018) and Wittrock and Forsberg (2019) describe a
20 number of good institutional RRI practices, but do not offer any substantial analyses of these
21 (though Wittrock and Forsberg 2019 offer some advice on how to transfer good practices to
22 new organizations). There is therefore a need for research that advances the knowledge of what
23 is understood as institutional RRI good practices and how good practices are related to the broad
24 RRI concept, and assess the apparent usefulness of talking about good RRI practices from an
25 organizational and learning perspective.
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43 In this study, we draw upon the work in the RRI-Practice project⁴ and advance the state-of-the-
44 art in the research on RRI good practices for institutional changes and the potential for other
45 research organizations to learn from these. The RRI-Practice project was one of the more
46 prominent of the European RRI projects, with a broad scope for its research and support actions.
47 The large number of institutional changes (83) and best practices (more than 275) reported in
48 the project allows us to assess whether there in fact is such a thing as “a good RRI practice”
49 and to what extent the umbrella concept of RRI helps to promote the learning of good practices
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57 ³ Indeed, the number of institutional changes achieved was a Key Performance Indicator of the SwafS
58 programme.

59 ⁴ www.rri-practice.eu

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3 related to the diverse content of the concept. The assumption in this study is that if we can find
4 substantial common characteristics among RRI good practices, this indicates that there is an
5 important function in keeping RRI as a broad umbrella concept. If there are no such significant
6 common characteristics and in fact different parts of the umbrella concept require different
7 kinds of actions, there are few practical reasons for keeping the umbrella concept which
8 suggests that from a practical point of view the EC RRI concept including the RRI keys should
9 be dismantled.

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11 In this article we pose the overall question: Does RRI, as an overarching umbrella concept,
12 provide guidance for institutional change and learning processes by means of good practices to
13 adopting organizations?
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16 To answer this query, we first map the good practices suggested in our empirical material (12
17 national reports reporting on 23 research performing and funding organizations and their best
18 practices), and ask (Q1 and Q2):
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- 20 1. Which types of good practices are reported?; and
- 21 2. What are similarities and differences across the different RRI aspects in the material?

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23 The answers to these two questions will give us an empirical basis on which to discuss (Q3 and
24 Q4):
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- 26 3. What may we learn about RRI implementation, and the learning needs of organizations
27 in RRI implementation, from the distribution of the practices across the respective RRI
28 keys and RRI process dimensions?; and
- 29 4. Should we keep RRI as a broad umbrella concept or dismantle it?

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31 The third question will be discussed in light of organizational theory and learning theory. The
32 fourth question is ultimately a prescriptive question and will be discussed as such by the authors,
33 based on the empirical and theoretical analysis.
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36 The paper advances the scholarship on RRI implementation and provides research-based
37 knowledge of how to implement RRI policies in practice.
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40 Below, in the theory section, we first address the nexus of neo-institutional diffusion theory,
41 translation theory, and organizational learning. Then we provide a slightly more substantial
42 account of RRI than provided in this introduction. Both expositions are kept to a minimum due
43 to length limitations for the article. Subsequently, we present our methodology and data. Then
44 we describe the character of the reported good practices across the different aspects of RRI and
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3 subsequently related to each RRI key and process dimension (which we refer to as RRI aspects).
4 We discuss the identified practices in light of the theoretical perspectives provided and discuss
5 the usefulness of the RRI umbrella concept. Finally, we reflect on the nature of our data and
6 findings and provide a brief concluding section.
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10 11 Conceptual framework

12 13 Practices and the notions of good and best practices

14 Before going into organization theory, learning and RRI, we would like to briefly describe what
15 we mean by ‘practice’. ‘Practice’ is a word that is used much, but seldom defined. Oxford
16 Languages refers to practice as ‘the actual application or use of an idea, belief, or method, as
17 opposed to theories relating to it’. Like Schuijff and Dijkstra in their article on RRI practices
18 from 2020, we take a wide approach in this article, simply referring to what other authors (i.e.
19 the authors of the RRI-Practice project’s 12 national reports) refer to as practices. When we talk
20 about an ‘RRI practice’, we mean practices that are related to the umbrella concept of RRI and
21 reported as such in the RRI-Practice 12 national reports. When we talk about RRI ‘best’ or
22 ‘good’ practices it refers to RRI related practices that are seen as exemplary.
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32 In organizational theory, ‘best’ or ‘good’ practices are exemplary accounts of solutions to
33 problems of a generic nature, from which it is assumed that others can learn or be inspired
34 (Bardach, 2004). Therefore, such accounts epitomize the general problem of how practices may
35 be transferred or translated from ‘donor organizations’ to ‘recipient organizations’ (Røvik,
36 2016; Strang, 2010), and the types of learning processes characterizing such a process (Sahlin
37 & Wedlin, 2008; Strang & Macy, 2001). This takes us to organization theory and we will now
38 give a short account of the perspectives we will apply later in the article.
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45 46 Organization theory

47 In the literature describing the transfer of practices between organizations, the terms adoption,
48 adaptation and translation are often used and may be seen as complementary. We will here
49 briefly present main aspects of the three approaches, focusing on the parts we will employ in
50 the analyses of our data.
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54 55 *Institutional pressures and decisions to adopt a new practice*

56 Best practices are called for and described as a source of inspiration for potentially interested
57 recipients. For some reason an organization, or at least one member of an organization,
58 considers doing something new; adopting a new practice. In organizational theory, there have
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3 been several important contributions on the adoption of management concepts, such as Total
4 Quality Management (TQM), (e.g. Westphal et al., 1997), Lean Management (e.g. Benders &
5 Van Bijsterveld, 2002) and The Learning Organization (Calhoun et al., 2012). Adoption is
6 spurred either by a perceived need to search for new ideas to enhance performance (March
7 1991) or by perceived pressures to demonstrate compliance with widely shared norms or salient
8 policies (Tolbert & Zucker 1983). The adoption discourse we make use of here is the central
9 perspective positioned in neo-institutional theory with a focus on describing the pressures
10 motivating adoption decisions. In this tradition, organizations are seen as open systems,
11 adapting to their environment in order to increase their legitimacy (Suchman, 1995) and
12 enhance their survival capabilities (Scott & Davis, 2007). In this view, organizations perceive
13 various types of pressures from their environments that function like constitution mechanisms
14 for organizational alignment and isomorphism (DiMaggio & Powell, 1983).

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When a decision is taken to adopt a certain kind of practice, choices will still need to be made
regarding what ‘good practice’ is most fitting to the recipient organization and how it can be
implemented. This leads us to the literature on the dynamics of the transfer of practices.

Common insights about the transfer of practices

When an adoption decision is taken, a practice is transferred in one way or another. In the
literature on the transfer of practices one typically assumes that an innovation (e.g. an RRI
practice) is either discovered or designed in some constrained locus, i.e., at a specific place and
at a specific time (e.g. Lillrank, 1995; Wittrock, 2015). Scarbrough and Kyratsis (2021) hold
that importing good practices from the original locus can be viewed as a two-step process. The
first involves the adoption decision and process, the latter the implementation work. Both steps
involve processes of interpretation, theorization, and translation. This is in line with Røvik
(2002), Strang and Meyer (1993) and Lillrank (1995) who outline how an innovation (for
instance a good practice) needs conceptualization, packaging or theorizing in order to motivate
adoption at a new location. In this process, the concept is usually de-contextualized (Sahlin-
Andersson, 1996), and generalized (Røvik, 2002) – as is the case with descriptions of good
practices. When a concept is adopted, it is un-packed and (re-)theorized (Czarniawska &
Joerges, 1996; Lillrank, 1995; Strang & Meyer, 1993). The local interpretation is made
according to culturally shaped ‘taken for granted’ assumptions in that particular locus (Strang
& Meyer, 1993).

The process of changing and adopting an innovation or (best) practice can be regarded through
the lenses of adaptation and translation (Wæraas, 2020), which we will now briefly present.

Adaptation

One way to conceptualize the implementation phase of a new practice is to view it as an adaptation process (Wæraas, 2020). Ansari et al. (2010, p. 71) understand ‘adaptation’ as “the process by which an adopter strives to create a better fit between an external practice and the adopter’s particular needs”. Synthesizing research from various strands in the field, Ansari et al. (2010) have suggested a theoretical model to consider practice variations in organizations’ adoption and adaptation of innovative ideas and practices (like RRI). The model uses technical, cultural, and political fit as the main predictors of adoption and adaptation patterns. Ansari et al. (2010, p. 68) define the ‘fit’ of the diffusing practice as “the degree to which the characteristics of a practice are consistent with the (perceived) needs, objectives, and structure of an adopting organization.” In keeping with a neo-institutional tradition, Ansari et al. (2010) also discuss the notion of ‘fit’ from the viewpoint of the salient environments of an adopting organization (such as professional bodies, regulatory institutions, industry norms, legal systems, etc.).

Translation

Translation is another important perspective on both the adoption and the implementation phase where a concept or a good practice is translated into a new context. Translation theory builds on assumptions that practices are conceptualized in order to travel in time and space (see Czarniawska & Joerges, 1996). Inspired by Latour’s Actor Network Theory (Latour, 1987), translation scholars highlight how actors modify, or even manipulate, ideas of practices to their own purposes. Contrary to common practice in the neo-institutional tradition, discussed above, translation scholars tend to focus on humans as shapers of their environments. Focusing on knowledge transfer, Røvik (2016) argues for three potential modes of translation: The reproducing mode, where translation is focused on replicating, to the highest extent possible, the original in the new context; the modifying mode, where the translated innovation or concept is changed in various ways; and the radical mode, in which the translators “consider themselves relatively unbound by source context versions when creating recipient versions” (Røvik, 2016, p. 298).

Learning processes and transfer of practices

Vicarious learning versus trial-and-error, experiential learning and learning by doing

Following Wæraas (2020), we can connect this whole process of adoption, adaptation and translation with learning approaches. An adoption decision is predominantly based on vicarious

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3 learning (Bandura, 1965; Strang & Macy, 2001), because in this early phase the organization
4 does not have first-hand experience with the practice (unless they employ staff with this
5 experience). Once a concept is adopted, the organization (and the organizational members)
6 needs to learn what the concept means in the concrete organization, and how it should in fact
7 be implemented. In the implementation process, translation and adaptation are characterized by
8 modes of learning typically termed trial-and-error, experiential learning, and learning by doing
9 (Wæraas, 2020). It is through such processes of experimentation that the imported practice or
10 idea (in our case an RRI practice) is mixed and matched with previous organizational routines
11 and arrangements (Nielsen et al., 2018). In that sense, vicarious learning ‘meets’ experiential
12 learning. In both adaptation theory and translation theory it is recognized that the concept
13 implemented as well as the implementer and implementing organization are changed through
14 these processes (Wæraas, 2020). Adding to Wæraas (2020), we suggest that this process also
15 involves transfer of learning from previous encounters with similar organizational development
16 processes among organizational members (see e.g. Cohen and Levinthal (1990) and
17 Heusinkveld and Benders (2012)).

28 29 *Explorative and exploitative learning*

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31 March (1991) distinguishes between explorative and exploitative learning. We suggest that the
32 spirit of explorative learning is well captured by translation theory, with its focus on people as
33 active agents, manipulating their environments to their own advantage. In contrast, exploitation
34 as a learning strategy is captured well by neo-institutional accounts stressing how people adhere
35 to cultural frames and various types of pressures, which by implication lessen their creativity,
36 and their will and ability to explore new avenues. This idea is in keeping with for instance
37 Burgelman’s (2002) suggestion that exploitative learning reduces variance, whereas explorative
38 learning increases variance in the organization. Crossan et al. (1999) conceptualizes explorative
39 learning as a feed forward mechanism from the individual to the organization and exploitative
40 learning as a feed backward mechanism from the organization to the individual.

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42 The literature on explorative and exploitative learning typically assumes that the two need to
43 be balanced, as they compete for scarce resources (Brix, 2019; March, 1991). However, how
44 this balance should be obtained, and what it entails, is a matter of debate (see e.g. Brix, 2019;
45 Raisch & Birkinshaw, 2008; Seidle, 2019). In this study, we show that interactions between
46 external pressures, pressures to obtain fit, and the space available for translation may differ
47 between various types of emulated practices.

In the table below, we summarize how the notions of adoption, adaptation and translation can be related to dominant modes of learning.

Table 1 Relation between organizational theory concept and learning approaches

Organizational theory concept	Main function in transfer of a best practice	Example from RRI implementation	Corresponding learning approach
Adoption	Can explain why a learning process is started at all	Implementation in organization is subject to pressures from the external organizational environment	Passive learning, vicarious learning
Adaptation	Can explain how a practice to be implemented must fit the recipient organization	Implementation in organization is subject to pressures from the internal organizational environment	Trial-and-error, experiential learning, learning by doing. Exploitative learning, feedback mechanism from the organization to the individual
Translation	Can explain how actors mould the idea of the practice to fit their needs	Actors in organization actively use the practice to manipulate their environment	Trial-and-error, experiential learning, learning by doing. Explorative learning, feed-forward mechanism from the individual to the organization

It can be pointed out that by discussing learning related to the transfer of practices, we take an empirical realist epistemological standpoint, in that “knowledge is regarded as being codifiable (explicit), and hence, transferrable” (Kringelum & Brix, 2021, p. 32). In contrast, had we taken a critical realist approach, the whole assumption that best practices are useful could be challenged (ibid., p. 33).⁵

RRI as an umbrella concept.

We have above given some introduction to RRI. There is a comprehensive scholarship on RRI (for instance found in the Journal of Responsible Innovation), that is not necessary to summarize here. What is useful for the reader here is to distinguish the different characters of RRI as an overall concept, the RRI keys and the RRI process dimensions.

We have already indicated that RRI initially was an approach to make sure that we are not funding and conducting research and innovation in a way that creates more problems than it solves, in particular related to emerging technologies. Efforts were made to include concepts such as ‘care’ into research policy: “Responsible innovation means taking care of the future through collective stewardship of science and innovation in the present.” (Stilgoe, et al., 2013, p. 1570).

⁵ See also Strang and Soule (1998) on diffusing ideas versus the notion of practices.

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3 With the introduction of the RRI keys, the discourse fragmented substantially. Owen et al.
4 (2021) describe well the history of RRI and the introduction of the so-called RRI keys. The
5 keys were important separate research policy objectives of the EC, but had different orientations
6 than the RRI ethos. It is therefore useful to flesh out in some more detail the content of the keys.
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10 The *science education* key refers to “helping all citizens acquire the necessary knowledge of
11 and about science to participate actively and responsibly in, with and for society, successfully
12 throughout their lives.”⁶ *Ethics* in the RRI framework refers to:
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17 1) research ethics (norms to be respected in the design of research projects
18 and a reflection on the consequences of research projects); 2) scientific
19 integrity (norms and standards which ought to be respected in scientific
20 practice), and 3) a critical reflection on broader societal aspects of science
21 and technology, including a reflection on values (Grinbaum & Politi, 2018).
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25 *Open access* (OA) refers to “the practice of providing online access to scientific information
26 that is free of charge to the end-user and reusable”⁷. *Public engagement* (used interchangeably
27 with *societal engagement*) is defined by the EC in the following way: “Public engagement is
28 about cocreating the future with the public and civil society organisations, and also bringing on
29 board the widest possible diversity of people that would not normally interact on matters of
30 science and technology.”⁸ *Gender equality* is defined by the MORRI project as a three-
31 dimensional construct whereby gender equality is reached when (1) women and men are equally
32 represented in all disciplines and at all hierarchical levels, (2) gendered barriers are abolished
33 so that women and men can develop their potential equally, and (3) when the gender dimension
34 is considered in all research and innovation activities (MoRRI_consortium, 2016). The EC
35 combines the overall RRI philosophy and the keys in the following way: “In practice, RRI is
36 implemented as a package that includes multi-actor and public engagement in research and
37 innovation, enabling easier access to scientific results, the take up of gender and ethics in the
38 research and innovation content and process, and formal and informal science education.”⁹
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53 ⁶ See the report ‘Science Education for Responsible Citizenship’ prepared by the European Commission, p. 7:
54 http://ec.europa.eu/research/swafs/pdf/pub_science_education/KI-NA-26-893-EN-N.pdf

55 ⁷ [https://ec.europa.eu/research/participants/docs/h2020-funding-guide/cross-cutting-issues/open-access-
56 data-management/open-access_en.htm](https://ec.europa.eu/research/participants/docs/h2020-funding-guide/cross-cutting-issues/open-access-data-management/open-access_en.htm)

57 ⁸ [https://ec.europa.eu/programmes/horizon2020/en/h2020-section/public-engagement-responsible-research-
58 and-innovation](https://ec.europa.eu/programmes/horizon2020/en/h2020-section/public-engagement-responsible-research-and-innovation)

59 ⁹ <https://ec.europa.eu/programmes/horizon2020/en/h2020-section/responsible-research-innovation>
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3 In addition to these keys, RRI (as mentioned above) is often defined in terms of process
4 dimensions. They are sometimes defined as the AIRR (or AREA) framework, consisting of
5 anticipation, inclusion, reflexivity and responsiveness. According to Stilgoe et al. (2013)
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8 *anticipation*

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11 “prompts researchers and organisations to ask ‘what if. . .?’ questions [...],
12 to consider contingency, what is known, what is likely, what is plausible and
13 what is possible. Anticipation involves systematic thinking aimed at
14 increasing resilience, while revealing new opportunities for innovation and
15 the shaping of agendas for socially-robust risk research.” (p. 1570).
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18 *Inclusion* refers to that “new deliberative forums on issues involving science and innovation
19 have been established, moving beyond engagement with stakeholders to include members of
20 the wider public” (ibid., p. 1571). The same authors state that *reflexivity*, “at the level of
21 institutional practice, means holding a mirror up to one’s own activities, commitments and
22 assumptions, being aware of the limits of knowledge and being mindful that a particular framing
23 of an issue may not be universally held” (ibid). Finally, they refer to Pellizzoni (2004) and
24 describe *responsiveness* thus: “responsiveness is about adjusting courses of action while
25 recognising the insufficiency of knowledge and control” (ibid., p. 1572).
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32 As the reader can see, the elements or aspects included under the RRI umbrella are diverse and
33 heterogeneous. The national reports from the RRI-Practice project shed further light on this
34 heterogeneity.
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39 Methodology

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41 This study is a document study of 12 national reports published in the RRI-Practice project
42 including RRI related work in altogether 23 research performing and research funding
43 organizations in 12 countries world-wide.¹⁰ The reports traced organizational practices that can
44 be related to the five RRI policy keys and four RRI process dimensions (collectively called *RRI*
45 *aspects*). The RRI keys were described as: Ethics; Gender Equality & Diversity; Open access
46 & Open Science; Science Education; and Societal Engagement. Following the influential RRI-
47 Tools project¹¹, the RRI dimensions were described as Anticipation & Reflexivity; Diversity &
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58 ¹⁰ See <https://www.rri-practice.eu/publications-and-deliverables/deliverables-3-1-14-1/>

59 ¹¹ <https://rri-tools.eu/about-rri>
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Inclusion¹²; Openness & Transparency; and Responsiveness & Adaptation. Most of the empirical work in the national reports was carried out in 2017.

The reports include descriptions or mentions of what the informants or the national research teams themselves considered practices worth highlighting as ‘good’. These were described in separate headings (‘Good practices’) but could also be found throughout the text. Details about the organizations included, the number of documents analyzed, respondents interviewed, etc. can be found in the respective reports.

Using qualitative research software (NVivo), we coded organizational RRI good practices mentioned in the 12 reports. The coding was both top-down (deductive) and bottom-up (inductive) (Fereday and Muir-Cochrane, 2006). The deductive strategy used the RRI keys and process dimensions as categories, as this shed light on our second research question. Taking also a bottom-up, inductive approach (Thomas, 2006), allowed us to identify emerging patterns and characterizing practices as several were similar in character. These were sorted under more generic labels by the authors in collaboration (see Table 2 below), though some practices remained unique. The numbers appearing in tables 3 and 4 refer to the number of national reports mentioning this good practice. As the coding was done collectively, discussions were taken in the course of the coding process and no inter-rated reliability could be assessed. In the further development of the analyses the authors went back to the original reports to further inform and verify the observed numerical patterns.

The categories consisting of more than 6 reported practices (see Table 3) are explained in Table 2 below. In the interest of brevity, practices mentioned fewer times are not explained.

Table 2. Categories of practices.

Type of practice	Characteristics	Example
Awards	Setting up, maintaining and disseminating awards, contests, prizes, etc..	Example: the CSIRO Medal for Diversity and Inclusion, Australia.
Checklists and toolkits	Developing and disseminating checklists and toolkits (including online tools) to be used for instance to supplement policies.	The University of Queensland has developed a decision tree and guides (including videos) to help researchers see the benefit of open access and make good publications decisions.
Codes of conduct	Soft-law measures, with various reference to legal instruments, requiring certain behavior. May be used to sanction researchers.	The Brazilian FAPESP’s Code of Good Scientific Practice.

¹² In practice, it turned out to be hard to distinguish Diversity & Inclusion from Societal Engagement, on one hand, and Gender Equality & Diversity, on the other, so this dimension ended up not being analyzed separately by the research teams.

Cultural measures	Varied practices often including leadership attention, dissemination of organizational values, and self-reflection.	The Bulgarian ARC Fund works to promote a culture of open access in the (at that point) absence of established national policies.
Dialogues beyond specific research projects/programs	The building and facilitation of various types of platforms for interaction between scientists and multiple institutional stakeholders.	The Italian Telethon aim to empower and include patients through several platforms.
Earmarked funding	Prioritizing budgets for funding RRI aspect related activities.	Oslo Metropolitan University introduced funding to cover costs of article processing charges.
Establishing infrastructure	Establishing technical infrastructure like databases, and communication channels.	The Chinese research funder NSFC and universities such as Padova University and Arizona State University have established repositories with the aim of furthering open access.
Formal requirements for funding	Practices where applicants need to comply with various requirements in order to qualify for funding.	Some funding organizations are reported to have requirements related to gender and open access.
Incentive programs	Establishing and disseminating new reward systems for desired researcher behavior.	Oslo Metropolitan University established financial incentives for open access.
Institutionalized collaboration projects	Collaboration over a certain period of time with schools, teachers or other stakeholders.	The French CEA is involved in multiple and well-established collaborations.
Organizational policies	Developing and implementing a policy on an RRI aspect or on RRI as such.	The Biodesign Institute at Arizona State University has policies on sexual harassment.
Organizational unit	The establishment of a unit, which can be a separate office, an organizational function, or the like.	Ethics committees, Institutional review boards, an office dealing with ethics or an ethics ombudsman.
Research topic/unit	Conducting RRI related research in established departments or setting up new research groups or research programs, potentially with the aim of informing the organization on the research topic.	At the Biodesign Institute, research is conducted on the effectiveness of science education practices.
Specialized programs within topic	The initiation and maintaining of a work plan or a bundle of projects anchored in an organizational policy.	Karlsruhe Institute for Technology has set up a program for refugees with 'study ambassadors'.
Training programs	Developing and conducting training programs for staff/researchers.	University of Bristol organizes training for researchers about OA policy, funders requirements and funding opportunities for gold OA.

In the findings section below we present simple frequency tables. This is descriptive statistics, i.e. counting of mentions of the practice. This is meant to shed light on what practices are most frequently presented as a good practice, which we subsequently will relate to the RRI keys and dimensions.

We use the frequency tables for shedding light on research questions 1 and 2. To answer research question 3 we need to turn to the theory presented above as our data alone will not answer this. Question 4 is answered in a further reflection on the answers to the first three questions.

The distribution of good practices for RRI implementation (Q1 and Q2)

Table 3 below shows generic categories of good practices reported across all aspects of RRI. We excluded practices infrequently mentioned, with a cut-off of 6 or less mentions. We also exclude projects of various kinds (which were often mentioned, especially for societal engagement) as they are more loosely connected to the organizations as such. Similarly, we have excluded numerous communication activities with an external (and not organizational) focus for the science education aspect. National policies are also excluded.

Table 3: Occurrence of mentions for good practices in project reports across all RRI aspects.

#	Type of practice	Number of occurrences*
1	Organizational policies	23
2	Organizational unit	20
3	Training programs	16
4	Research topic/unit	16
5	Checklists and toolkits	15
6	Cultural measures	13
7	Establishing infrastructure	11
8	Earmarked funding	10
9	Codes of Conduct	8
10	Awards	8
11	Dialogues beyond specific projects	8
12	Incentive programs	7
13	Specialized programs within topic	7
14	Formal requirements for funding	7
15	Institutionalized collaboration projects	7

* The numbers are counts of mentions related to each RRI aspect for each country report, aggregated across RRI aspects, and can therefore be higher than the number of reports analysed.

Going back to our question of whether these practices provide a path for RRI implementation across RRI aspects (related to the practical usefulness of the umbrella concept of RRI), we need to analyze whether good RRI practices differ across the RRI aspects. Analyzing the individual RRI aspects, we find diverging rankings of practices mentioned. In the list below (Table 4), we use a cut-off at less than three mentions. Good practices pertaining to the responsiveness/adaptation aspect of RRI is excluded on this basis, as none were mentioned more than twice.

Table 4: Occurrence of mentions of good practices for individual RRI aspects in reports

#	RRI aspect	Type of practice	Occu-	National reports
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			rences	mentioning*
1	Ethics	Codes of conducts	7	AU, BG, BR, CN, IN, NL, NO
2	Ethics	Organizational units	7	BG, BR, FR, IT, NL, NO, UK
3	Ethics	Training programs	6	DE, FR, NL, NO, UK, US
4	Ethics	Checklists and toolkits	5	IT, NL, NO, UK, US
5	Ethics	Specialized programs	5	BR, CN, NL, NO, UK
6	Ethics	Research topic/unit	4	DE, NL, NO, UK
1	Gender/Diversity	Organizational policies and action plans	10	AU, BG, BR, DE, IN, IT, NL, NO, US
2	Gender/Diversity	Organizational units	8	AU, BR, CN, IN, IT, NO, UK, US
3	Gender/Diversity	Incentive programs	5	AU, CN, IN, NO, UK
4	Gender/Diversity	Training	5	FR, IT, NO, UK, US
5	Gender/Diversity	Research topics/ units	4	BR, CN, FR, NO
6	Gender/Diversity	Formal requirements for funding	4	BG, CN, NO, UK
7	Gender/Diversity	External boards and reporting	4	AU, DE, IT, NL
8	Gender/Diversity	Mentoring	4	AU, DE, NL, UK
9	Gender/Diversity	Support programs	3	DE, IN, NL
10	Gender/Diversity	Quotas and positive discrimination	3	BR, FR, NL
1	Open access/science	Establishing infrastructure	11	AU, BR, CN, DE, FR, IN, IT, NL, NO, UK, US
2	Open access/science	Organizational policies and action plans	8	AU, CN, DE, FR, IN, NL, NO, UK
3	Open access/science	Earmarked funding	5	DE, IT, NL, NO, UK
4	Open access/science	Deliberative fora	4	BR, CN, IT, NO
5	Open access/science	Checklists and toolkits	3	AU, NO, UK
6	Open access/science	Formal requirements for funding	3	CN, NL, UK
7	Open access/science	Organizational units	3	DE, IT, NO
1	Science education	Institutionalized collaboration projects	5	AU, BG, FR, NL, NO
2	Science education	Awards	4	AU, BG, IT, NO
3	Science education	Organizational policies and action plans	4	BG, CN, FR, NO
4	Science education	Earmarked funding	4	AU, BG, CN, US
5	Science education	Checklists and toolkits	4	FR, NL, UK, US
6	Science education	Research topic	4	BG, BR, NL, US
7	Science education	Popularizing research	4	FR, NL, UK, US
8	Science education	Training programs	3	BG, NO, UK
9	Science education	Setting up center of expertise	3	FR, NL, NO
1	Societal engagement	Dialogues beyond specific research projects/programs	8	DE, IN, FR, IT, NL, NO, UK, US

2	Societal engagement	Checklists and toolkits	3	AU, DE, UK
3	Societal engagement	Funding requirements	3	IT, NO, UK
1	Anticipation/reflexivity	Cultural measures	6	AU, BR, CN, DE, NL, NO
2	Anticipation/reflexivity	Research practice	5	CN, DE, NL, NO, UK
1	Openness/transparency	Creating organizational routines	4	BG, BR, NL, US

* AU: Sehic, S. & Ashworth, P. (2018); BG: Damianova, Z. et al. (2018); BR: Reyes-Galindo, L. & Monteiro, M. (2018); CN: Yandong, Z. et al (2018); DE: Hahn, J. et al. (2018); FR: Grinbaum, A. et al. (2018); IN: Ravi Srinivas, K. et al. (2018); IT: Neresini, F. & Arnaldi, S. (2018); NL: van der Molen, F. et al. (2018); NO: Egeland, C. et al. (2018); UK: Pansera, M. & Owen, R. (2018); US: Doezema, T. & Guston, D. (2018).

The generic good RRI practices

If we consider the order of the good practices on the generic list versus the order emerging on the lists of the individual RRI aspects, we see that the generic list has clear similarities with the lists for ethics, gender and open access. The most frequently mentioned type of good practice in table 3 is the establishment of organizational policies. Establishing organizational policies is also mentioned frequently with respect to gender and open access (and one might argue that a Code of conduct in ethics is an organizational policy). The second most often mentioned good practice generically is organizational units. This practice also receives frequent mention with regard to ethics and gender. The most frequently mentioned practices for science education, societal engagement and the process dimensions do not figure among the top three in the generic list.

The most institutionalized RRI keys

The three RRI aspects that are most institutionalized by national regulation, or national or European funding requirements, are ethics, gender and open access. For these three, we find structural measures mentioned most often as good practices. The most frequently mentioned good practices among these are infrastructure (for open access), organizational policies and action plans (for gender), and codes of conduct (for ethics). In accordance with neo-institutional theory, we suggest that this is due to expectations at the level of national or supra national policies motivating adopting the practices (DiMaggio & Powell, 1983).

The least institutionalized RRI keys

In contrast, for the two least institutionalized RRI keys, science education and societal engagement, there are a variety of practices reported that are more open for the agency of

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3 individual actors in the organizations, as captured well by translation theory. The most
4 frequently mentioned good practices in science education are communication activities directed
5 at external audiences (exhibitions, science clubs, etc.) and are excluded from our list as they are
6 events targeted outwards rather than actions aimed to change practices in the organization. The
7 most frequently mentioned practice in our list is setting up and maintaining institutionalized
8 collaboration projects (with teachers, schools, etc.) which may influence staff practices over
9 time. For societal engagement, the most frequently mentioned practice is societal engagement
10 in research projects (one-off examples rather than institutionalized engagement). This was
11 similarly excluded as not organizational in nature. The second most frequently mentioned
12 practice (first on our list) is societal engagement in more permanent structures than projects,
13 such as in a center. These are practices that depend on policymaking with the individual
14 organization seeking to implement this aspect (often at local levels), and less on extra-
15 organizational pressures pushing organizations to adopt such practices.
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26 The RRI process dimensions

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28 Regarding the RRI process dimensions, inclusion (seen mostly as identical with societal
29 engagement and thus not separately analyzed) is the aspect with most mentions of good
30 practices, probably because societal engagement is promoted in some funding programs.
31 Building a reflective culture is the most frequently mentioned good practice on
32 anticipation/reflection. The reason that several reports identify good practices related to
33 anticipation/reflexivity as a research practice may be because there are RRI research groups in
34 many of the organizations participating in the project. Regarding openness and transparency,
35 organizational routines are important. This is probably because the descriptions of the practice
36 of openness and transparency in the national reports are sometimes connected to legal
37 transparency requirements of public organizations. In other words, establishing organizational
38 routines is here not necessarily related to openness understood as AIRR thinking, contrary to
39 what one may assume in the context of RRI.
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50 How can organizations learn from good RRI practices (Q3)?

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52 It is clear from tables 3 and 4 that learning from one good RRI practice will not necessarily help
53 in succeeding on RRI generally. For instance, though the establishment of organizational units
54 is a frequently mentioned good practice, this practice may not lead to an improvement on the
55 reflexivity dimension of RRI. If the aim is to become a more reflexive organization, good
56 practices to learn from may be cultural measures taken in certain programs. Likewise, if the aim
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is to increase gender equality, establishing technical infrastructure might be irrelevant. Overall, our analysis of good practices identified with respect to the individual aspects of RRI suggests that what is a good practice for one aspect is not necessarily helpful for another.

This also has implications for learning strategies. The organizational literature above helps us reflect on the various learning situations of the different practices. We can condense the categories of practices further as to their organizational characteristics (see Table 5). We again draw on the distinction between adoption, adaptation and translation established above (in Table 1). The learning implications of the clusters are discussed below. We suggest that the modes of learning called for are circumscribed by an interplay between the generic type of good practice (the clusters), adoption pressures, pressures to adapt the imported good practice to organizational needs in order to obtain a fit (adaptation), and the room for actions taken by institutional entrepreneurs or individual actors (translation).

Table 5: Clusters of good practices related to adoption, adaptation and translation characteristics

Type of practice	Cluster	Adoption pressure	Adaptation pressure	Room for translation
Organizational policies	,Hard' structural measures	Often strong adoption pressures from law or policy	Significant pressure to adapt measure to organizational context	Some room, but any institutional entrepreneur needs to anchor practices in the formal decision making in the organization
Organizational units				
Establishing infrastructure				
Codes of conduct				
Formal requirements for funding				
Research topic/unit	Research topic/unit	Often weak adoption pressure	Little adaptation pressure. However, there is some need for adaptation to the organization if the research is integrated in an organizational agenda	Large room, especially if the research agenda is not prescribed centrally.
Institutionalized collaboration projects	Collaborations	Often weak adoption pressure	Often little pressure for adaptation to the centralized organization, but may require adaptation at the department level.	Room for individual actions, but collaborations over time may have a firmer anchoring in the organization.
Dialogues beyond specific projects				
Checklists and toolkits	,Soft' governance measures	Medium adoption pressure. Such practices are often a result of implementing hard structural measures.	Adaptation is essential as these practices must be well integrated into any organizational practices	Individual staff may shape these, but in dialogue with management related to the overall intention of these practices
Training programs				
Earmarked funding				
Specialized programs within topic				
Incentive programs				
Cultural measures	Culture building	Adoption pressures may vary depending on the perceived strength of the need for action	Adaptation to the organizational context is essential as these practices must be targeted to address concrete needs	Individual actors' (such as leaders') translation may play a significant role
Awards				

'Hard' structural measures

The first and second most frequently mentioned good practices, namely organizational policies and organizational units, can be called 'hard' structural measures. To this category also belongs 'establishing infrastructure', codes of conducts and requirements related to funding. Implementing such practices are quite ambitious measures that often require top management or even board level support, as well as potentially significant investments. Often such practices will be attractive for adoption and initial vicarious learning (Bandura, 1965) in cases where there are external pressures, for instance where new legislation is introduced (Tolbert & Zucker 1983). As we have seen, this is most relevant for ethics, gender and open access, which often are regulated in hard or soft law. Organizations can learn from existing best practices when the legislative or policy context is similar (Røvik, 2016). For instance, in Norway, research ethics is regulated in law. This means that a new organization, a university or college, in principle can replicate directly the setup of research integrity and ethics of another Norwegian university. But they may fail to fulfill legal requirements and gain legitimacy if they copied the setup from a university in another country. Here the translation would have to be in a modifying mode (Røvik, 2016), as the political fit might differ (Ansari et al., 2010).

Research topic/unit and institutionalized collaboration/dialogue

In contrast, the good practice of conducting or promoting research on RRI related issues, is much easier to replicate, as research is organized very similarly in research organizations in the international research system. Setting up a research group, for instance on the concept and practice of RRI, does not require complex institutional decision making, only dedicated funding, or simply that researchers are allowed to apply for this kind of external funding. Feed forward mechanisms from initiators of such research can be significant and the need for vicarious learning may be minimal. However, unless RRI research is integrated in a broader organizational agenda, one might question whether there are any adoption pressures at all for these practices, as RRI research in itself likely does not confer much legitimacy (DiMaggio and Powell, 1983). For funders, though, the motivation might be stronger due to concerns of the legitimacy of science and technology investments. Here, vicarious learning can play a more important role.

Similarly, setting up educational collaborations or societal dialogues that exist over a certain time may take place at the discretion of individual organizational actors, but will often have more anchoring (for instance at department level) than simply conducting or initiating research. This may give somewhat less room for translation and requires more adaptation to expectations

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3 in the organization, at a local level. Succeeding in setting up productive collaborations and
4 dialogues, with potentially very different kinds of collaborators (children, patients, industry
5 organizations, etc.), inherently requires trial-and-error learning and learning by doing because
6 here there are no one-size-fits-all approach. Feed forward and feed backward learning may both
7 be required (Crossan et al., 1999; Nielsen et al., 2018).
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10 11 12 'Soft' governance measures

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14 Checklists and toolkits, training programs, earmarked funding, specialized programs and
15 incentive programs, are typologically between the hard structural practices of setting up
16 centralized organizational units and weakly institutionalized practices like engaging in a certain
17 kind of research agenda (Scott, 2014). For instance, regarding societal engagement, there are
18 several check-lists produced by international organizations and consortia, written in a format
19 that will allow them to be used in many different organizations. A university in one country can
20 also ally with another university - in the same or a different country - where they seek
21 inspiration. Still, such adoption must be complemented with adaptation to the recipient
22 university's context, for instance its academic profile and culture (see Ansari et al., 2010). In
23 such cases, there may be action both at the central university level (promoting this practice) and
24 locally in departments or research groups (taking it into use), and experiential learning must
25 gradually take over from the vicarious learning. In this process, there will be a dynamic between
26 individuals' experiences (for instance the experiences of the practitioners using the checklist)
27 and the organization's intention, in both feed forward and feed backward loops (Crossan et al.
28 1999).
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41 42 Culture building

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44 Culture building opens up a large space for adaptation and translation. These processes require
45 experiential learning, and the negotiation of transfer of learning from previous undertakings in
46 the organization (Heusinkveld & Benders, 2012). Awards are often related to culture building,
47 providing an impetus for further learning among organizational members. Though good
48 practices in other organizations may serve as inspiration, culture building must build on the
49 existing culture which can vary significantly between organizations even within a country, as
50 it depends on many individual factors like top management values, influential social
51 entrepreneurs, events in the far and near history, etc. (Schein, 2010). In this context translation
52 may take the modifying mode, or even the radical mode (Røvik, 2016).
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3 Cultural measures are mostly mentioned for the RRI process dimension anticipation and
4 reflection. Besides the fact that learning from other organizations might be difficult in
5 facilitating for creating a reflective culture, we can also question the strength of the pressures
6 for adopting a practice such as anticipation and reflection. The anticipatory or reflective
7 capacities of an organization are hard to measure, and demonstrating such capacities will
8 unlikely be required by law or by funders, or even by stakeholders.
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14 This section has aimed to answer the third question: “What may we learn about RRI
15 implementation, and the learning needs of organizations in RRI implementation, from the
16 distribution of the practices across the respective RRI keys and RRI process dimensions?”. We
17 can see that the most institutionalized keys (ethics, gender and open access) revolve around the
18 practice cluster ‘hard’ structural measures. This is seldom found in the least institutionalized
19 keys, and the AIRR dimensions, where the practices are quite varied. The different profiles of
20 practices regarding the keys and dimensions also indicate different learning situations (as
21 described above). It therefore appears that the implementation and learning situation varies
22 qualitatively across the RRI aspects.
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30 31 **Should we keep RRI as an umbrella concept or dismantle it (Q4)?** 32

33 The empirical findings presented above and the literature-based discussion of how to learn from
34 good practices allow us to reflect on the use of keeping RRI in its broad form of umbrella
35 concept. We see that individual RRI aspects are different in their anchoring in law, in their
36 practical organizing and in their potential to be transferred to new organizations. Moreover,
37 there is no common format for learning from good RRI practices. Learning a good gender
38 practice does not in itself help in learning to become a more socially engaged organization.
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44 One could make the argument that the RRI keys are steps on the way to responsibility in the
45 research and innovation system in the original RRI sense. Indeed, Forsberg et al. (2018) suggest
46 that “the keys might be positioned as preconditions or prerequisites for a broader imaginary of
47 a responsible innovation system involving reconfiguration of knowledge flows and institutions”
48 (p. 10). The argument is that if organizations are struggling to achieve gender equality or
49 facilitate for good research ethics, they will overall struggle to succeed in being responsible in
50 their research and innovation in general. However, this argument may be weakened when we
51 see that what organizations actually do with respect to the different RRI aspects is qualitatively
52 different. It is hard to argue that learning to set up an ethics committee in itself will make the
53 organization more effective in anticipating socially relevant implications of its research.
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Discussion & Contribution

In this section we will briefly relate our findings to the existing comparative analyses of RRI good practices (even if these do not explicitly focus on institutional good practices) and current policy developments. A broader discussion of our analyses in light of organizational or learning theory cannot be done within the length limitation of this article.

All in all, the analyses here indicate that the broad version of the umbrella concept of RRI, and the corresponding ‘best RRI practices’ may create more confusion for organizational actors trying to implement RRI than speaking of ethics, open access, societal engagement, etc. as separate policies. The latter alternative may lead to more targeted actions and more effective implementation processes with clearer learning sources. In this respect, we support the observation of Schujiff and Dijkstra (2020) that: “After all, if RRI with all its elements is too complex to be realised in practice, maybe focusing on specific characteristics, dimensions, or values will lead to a more complete uptake in practice.” (p. 569). Likewise, Kupper et al. state that “As a practice selected might well be a tool that, for instance, is developed with the specific aim of stimulating ethical deliberation, we should not expect such a tool to by itself help tackle any or all of the grand challenges” (p. 29). Moreover, we support Kupper et al.’s concern that one can cherry-pick an RRI aspect without engaging with the overall RRI ethos of proceeding responsibly and with care in research and innovation, expressed in their caution against concluding that “for any practice to be considered RRI, it suffices if one aspect of RRI is covered, or even just touched upon” (ibid.). Our analyses seem to align with these contributions in the worry that the umbrella concept of RRI is counterproductive in promoting the more overall agenda of responsibility in research and innovation.

Our main scholarly contribution, that from the analyses of best practices the current broad umbrella concept of RRI seem to be counterproductive, has the direct policy implication that this presentation of RRI should be avoided. This also seems to be in line with the current policy development in the EC where ethics, gender, open access, societal engagement and science education continue to be important but are less connected to the RRI concept. Responsibility seems now rather to be connected to the broader concept of Open science, which is a new umbrella concept including, among other elements, societal engagement, often under the name of co-creation. Lessons from implementing the umbrella concept of RRI should be considered in this new popular umbrella concept of Open Science.

Limitations

Our study has several limitations and assumptions one could question.

First, the reader should not interpret the findings as representing the status in the respective countries. The reports present results from two organizations in each country (though some only one and one reports on three). Other organizations could indeed have other best practices to offer.

Second, we have focused on institutional best practices, but some of the practices reported in funding organizations extend well beyond their own organizational limits. For instance, when they engage in funding of ethics research in a program on emerging technologies, or establish infrastructure for open science, the researchers (and not their own staff) are the targets. However, as this is related to institutional changes in their core business such practices are included.

A third concern relates to the validation and generalization of our findings: More case studies on good practices and learning processes should be conducted to test our findings in a larger sample of organizations. Likewise, ‘thicker’ descriptions should be sought (Geertz, 1973). Ideally, one would also study the relation between adopted best practices and their original implementations, and one would study the learning processes over time.

When such learning trajectories are better described, future studies could better inform and engage with the current literature on interorganizational learning, for instance as discussed in the special issue on this topic of *The Learning Organization* (issue 28, no 2) than we have been able to in this study. Such future studies should relate in particular to the research directions identified in Anand et al. (2021).

Additionally, many of the good practices are not described in elaborate detail in the national reports, and some are only given in list form. Hence, in many cases, we do not have good measures for the success of, and precise circumstances of, the good practices mentioned.

The at times lacking detail of the reported practices also highlight the issue of correct counting and the use of aggregated numbers in our tables and analysis. For instance, the clustering in Tables 3 and 4 can be debated. In addition, it should be noted that the numbers reported refer to the number of national reports mentioning the practice in question. Each report may report more than one good practice of the same kind, but this is not reflected in the numbers.

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3 A related concern relates to the nature of our data: We rely predominantly on researchers'
4 mentions of good practices in standardized project reports (who again rely on their informants).
5 It is possible – in fact very likely – that what one researcher or informant sees as a good practice,
6 another researcher or informant in a different organization or country sees as obvious and not
7 worth highlighting. This can for instance explain that only six reports mention training in ethics
8 as a good practice. Such training exists also in several of the other organizations studied but is
9 not emphasized as standing out as a particularly good practice.

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11 In practice, the reporting is also not fully streamlined in the national reports that we draw upon.
12 Most reports have dedicated sections describing good practices related to each RRI aspect. For
13 those that do not we have had to interpret from the descriptions what practices are considered
14 good.

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16 However, regardless of the precise accuracy of any specific number, we are confident that they
17 designate clear overall trends of organizational practices as our findings seem to fit well with
18 our background knowledge of the RRI aspects (as indicated in the examples given above).

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20 Finally, in the national reports this analysis is based on, in Hennen et al. (2018) and in Wittrock
21 and Forsberg (2019), where some of these good practices are presented in more detail than there
22 is room for here, it is clear that the practices also require intraorganizational learning (see also
23 Hansen et al., 2020). In addition, RRI in itself is sometimes conceptualized as learning (e.g.
24 Egeland et al., 2019). Ideally, further contributions should address this triple learning objective
25 in an integrated way: learning from another organization how to organize organizational
26 learning processes related to implementation of a learning RRI approach.

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Concluding summary

This paper has discussed the potential for learning from a number of good RRI practices identified in the 12 reports on which this analysis is based. We posed the overall question of whether RRI, as an overarching umbrella concept, provides guidance for institutional change and learning processes by means of good practices to adopting organizations.

To answer this query, we first mapped the types of good practices presented in the reports (Q1). We found that across the RRI umbrella, the two dominant good practices are implementation of organizational policies and dedicated organizational units. Further practices mentioned frequently are the establishment of RRI training programs, RRI as a research topic or research unit, the establishment of checklists and toolkits and various types of cultural measures.

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3 We then proceeded to consider similarities and differences across RRI aspects with respect to
4 reported good practices (Q2). We found that recommended good practices with respect to the
5 RRI keys ethics, gender and open access largely resembles those found for the overall RRI
6 umbrella. These RRI aspects, in turn, are also the most institutionalized RRI aspects in the
7 umbrella. We suggested that vicarious learning with respect to these aspects would often be
8 undertaken due to perceived expectations, and the resulting pressures, stemming from national
9 or supra national level policies. In contrast, for the least institutionalized RRI keys, science
10 education and societal engagement, reported good practices are more disparate, and clearly
11 more open to the institutional work of various ‘translators’. With respect to the RRI process
12 dimensions, we find significantly fewer reported good practices, and a larger variety in those.
13 All in all, recommended good practices differ across the various RRI aspects; it appears there
14 is little coherence in actions that should be taken to implement RRI across RRI aspects.
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24 In the next section of the paper, we attended to what we may learn about RRI implementation,
25 and the learning needs of organizations in RRI implementation, from the distribution of the
26 practices across the respective RRI keys and RRI process dimensions (Q3). This question was
27 addressed through discussing the empirical results in light of organizational theory and learning
28 perspectives. Neo-institutional theory can explain why a learning process is started at all,
29 initially with vicarious learning due to adoption pressures. Adaptation and translation theories
30 can explain how RRI related concepts are shaped in trial-and-error learning or experiential
31 learning after adoption, and in feedback loops between individuals in their local contexts and
32 institutional units safeguarding that the practice is shaped in a way that confers the legitimacy
33 that motivated adopting the practice in the first place. ‘Adaptation’ can designate changes to
34 the imported good practice in order to obtain a fit to the focal organization with a profiling of
35 exploitative learning trajectories, which creates internal pressures to modify the imported
36 practice. ‘Translation’ can designate the work done by institutional entrepreneurs or other actors
37 in efforts to implement RRI, with explorative learning trajectories.
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49 Clustering the good practices across the RRI aspects into five larger categories (‘Hard structural
50 measures;’ ‘Research topic/ Unit;’ ‘Collaborations;’ ‘Soft governance measures;’ and ‘Culture
51 building’) illustrated varying profiles of adoption pressures, internal adaptation pressures, and
52 the potential for translation efforts by institutional entrepreneurs, which again impact on the
53 learning situations. Overall, our discussion suggests that there is no such thing as generalized
54 learning from good RRI practices; effective learning strategies must be more specific, as they
55 vary considerably between clusters.
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3 Finally, we attended to the question of whether we should keep RRI as a broad umbrella. We
4 answered by reflecting on the empirical findings (Qs 1 and 2) and the analysis of the potential
5 for learning from the good practices (Q 3). Our conclusion here was that based on a perspective
6 of learning from good practices, the overall broad umbrella concept of RRI does not appear to
7 give any added value, and might perhaps even obscure the qualitatively different nature of the
8 individually important practices that are bundled together. We warned against replacing one
9 umbrella concept (RRI) with another (Open Science), if the latter is conceptualized in a way
10 that does not allow for a reasonable coherence with respect to implementation trajectories
11 through organizational learning processes.
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