

Library of Ethics and Applied Philosophy 40

Vincent Blok *Editor*

Putting Responsible Research and Innovation into Practice

A Multi-Stakeholder Approach

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Editor

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Contents

| | | |
|--|--|------------|
| 1 | Introduction | 1 |
| | Vincent Blok and Lucien von Schomberg | |
| Part I Responsible Research & Innovation as EU Policy | | |
| 2 | The Drama of Responsible Research and Innovation: The Ups and Downs of a Policy Concept | 11 |
| | Erich Griessler, Robert Braun, Magdalena Wicher, and Merve Yorulmaz | |
| 3 | The Institutionalisation of a New Paradigm at Policy Level | 35 |
| | Stephanie Daimer, Hendrik Berghäuser, and Ralf Lindner | |
| 4 | Democratic Experimentation with Responsibility: A Pragmatist Approach to Responsible Research and Innovation | 57 |
| | Joshua B. Cohen and Robert Gianni | |
| 5 | Cultural Particularities and Its Role in the “Innovation Divide”: A Closer Look at the Origins of “Spreading Excellence and Widening Participation” | 79 |
| | Raúl Tabarés and Antonia Bierwirth | |
| 6 | Joining Forces – Staying Unique: Adapting RRI to Different Research and Innovation Funding Agency Contexts | 101 |
| | Ulrich Schoisswohl, Ulrike Wunderle, Luboš Studený, Lieke Michiels van Kessenich, and Pia Weinlinger | |

Part II Public Engagement for Responsible Research & Innovation

- 7 Public Engagement in the Tradition of Participatory Approaches – An Approximation.** 123
 Philine Warnke, Tanja Bratan, and Ulrike Wunderle
- 8 Social Labs in Public Engagement Processes for RRI.** 147
 Ilse Marschalek, Lisa M. Seebacher, Elisabeth Unterfrauner, Katharina Handler, and Margit Hofer
- 9 Exploring the Ambivalent Nature of Diversity in Social Experimental Settings: First Insights from Social Labs Established to Promote Responsible Research and Innovation** 171
 Merve Yorulmaz and Susanne Bühner
- 10 Engaging Stakeholders by Implementing RRI in the Social Lab Process – A Single Case Study** 193
 Elisabeth Frankus and Helmut Hönigsmayer

Part III Governance of Responsible Research & Innovation

- 11 Implementing Responsible Research and Innovation: From New Public Management to New Public Governance.** 211
 Anne Loeber, Michael J. Bernstein, and Mika Nieminen
- 12 Stakeholders in Research and Innovation: Towards Responsible Governance.** 229
 Robert Braun and Johannes Starkbaum
- 13 Managing the Responsibilities of Doing Good and Avoiding Harm in Sustainability-Orientated Innovations: Example from Agri-Tech Start-Ups in the Netherlands** 249
 Thomas B. Long and Vincent Blok
- 14 Conclusion: Implementation of Responsible Research and Innovation by Social Labs. Lessons from the Micro-, Meso- and Macro Perspective** 273
 Erich Griessler and Vincent Blok

About the Editor

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Chapter 1

Introduction



Vincent Blok  and Lucien von Schomberg

After a period in which Responsible Research and Innovation (RRI) stood as a cross-cutting issue under the Eighth European Union Framework Programme for Research and Innovation (R & I), Horizon 2020, its further development and implementation has reached a crossroad. It turned out that there is a lack of consistent integration of RRI in Europe's R & I practices (Novitzky et al. 2020), and dedicated funding for RRI is almost entirely absent in the Ninth European Union Framework Programme for R & I, Horizon Europe. At the same time, global challenges like climate change become increasingly more urgent and thus continue to call for collective efforts of scientific research and industry, policy makers and civil society. Further, the emergence of disruptive technologies like synthetic biology, artificial intelligence and robotics raises several new societal concerns. Finally, the growing disbelief in science, as shown during the Corona pandemic, demonstrates the importance of aligning R & I policy and societal values all the more. For reasons as these, the disinvestment in a dedicated *Science With and For Society* programme line for RRI in Horizon Europe did not result in decreased academic attention for embedding science in society. On the contrary, a dedicated research community emerged that engages in the academic discourse of RRI and tries to contribute to projects on topics such as *responsible* data governance, *responsible* AI, and *responsible* agroecology within the Horizon Europe framework programme, sometimes even without the use of the frame RRI.

If RRI is to have a future in the European Commission's Open Science Agenda and Horizon Europe Programme, it is important to focus on the *implementation*, *institutionalization* and *management* of responsibility in R & I practices. One of the

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weaknesses of the current academic discourse of RRI is its focus on conceptual and theoretical analysis. A variety of theories and approaches emerged under the heading of RRI, ranging from Value Sensitive Design to the six keys of RRI, all having their own ideals and barriers to reaching those ideals (Timmermans and Blok 2018). This makes the implementation and management of RRI an enormous challenge, leaving a discrepancy between the promoted ambitions of RRI and their realization in practice (Novitzky et al. 2020). This is also the case at the broader policy level, where RRI faces structural tensions with other policy goals, such as scientific excellence and economic value (Rodríguez 2019). Another weakness is that to this day the academic discourse of RRI is primarily focused on the RRI research community itself, rather than on, for instance, the engineers and scientists who are actually working in the area of disruptive technologies. A final weakness is that the RRI research community mainly focusses on public research practices, while a significant amount of innovation practices take place in the private sector facing its own challenges and opportunities (Blok and Lemmens 2015). As long as the private sector context of R & I is not taken into account, the implementation and management of RRI will be difficult to align with the three goals for European R & I policy - Open science, open innovation, open to the world – to increase responsiveness of science to society (DGRI 2016).

The aim of this volume is to build on the great work that is already done by the RRI research community, and to engage professionals, practitioners and policy-makers working outside the RRI research community to implement, institutionalize and manage responsibility in their R & I practices. We were able to engage this wider audience, including people working in science and industry, because the authors of this volume were involved in a large European Coordination and Support Action project that aimed to engage the European R & I community in the promotion and acceptance of RRI in all programme lines of Horizon 2020; Excellence in Science and Innovation for Europe by adopting the concept of Responsible Research and Innovation (NewHoRRIZon). After a diagnosis of the uptake of RRI in the various programme lines of Horizon 2020 (Novitzky et al. 2020), the project worked out the conceptual and operational basis to fully integrate RRI into European and national (R & I) practice and funding. In order to accomplish this goal, the project established 18 Social Labs as inclusive methodology to implement and study RRI in all programme lines of H2020 (Timmermans et al. 2020). Together with a wide-ranging group of R & I stakeholders, these Social Labs co-created tailor-made pilot actions that stimulate an increase in the use and acceptance of RRI across H2020 and each of its programme lines. These pilot actions address a variety of R & I actors such as academia, business, non-university research institutes, research funding organisations, policy-makers on European, Member State and global level, civil society organisations (CSOs) and the general and specific public(s) as they arise from technological controversies. Using the social lab methodology, the authors contributing to this volume were able to benefit from the practical experience of this wider audience as a basis for further conceptual development and effective implementation of RRI in European and global R & I practices. Such a broad overview of evidence-based practices and experiences has not been employed in connection

with RRI yet. The book highlights the potential of and opportunity in R & I to conduct R & I in a societally responsible way.

1.1 Synopsis and Overview of the Chapters

The book consists of three parts. The first part – Chaps. 2, 3, 4, 5, and 6 – focusses on RRI as European policy concept, and how we can derive policy recommendations based on its current implementation, both at the EU level and the institutional level. The second part – Chaps. 7, 8, 9, and 10 – focusses on public engagement practices for RRI and pays particular attention to its operationalization in the social lab methodology. The third part – Chaps. 11, 12, and 13 – focusses on the governance of RRI, also in the setting of industrial research and innovation.

In Chap. 2, Erich Griessler, Robert Braun, Magdalena Wicher, and Merve Yorulmaz kick off with a general reflection on the ups and downs of the implementation of RRI in the EU. The chapter addresses the question of why RRI was facing problems in the European Commission to succeed as a policy concept for R & I, despite the Commission's 20 years history of addressing science and society relations within its Framework Programmes. They highlight four interrelated elements that contribute to the instability of RRI as policy concept, namely conceptual, legal, financial, and institutional fragility. Based on Sabatier's advocacy coalition approach, they explain how these elements of fragility developed and how the ups and downs of RRI as policy concept played out. They identify three advocacy coalitions with regard to RRI and analyse their belief systems and resources.

In Chap. 3, Stephanie Daimer, Hendrik Berghäuser, and Ralf Lindner zoom in on the failure of mainstreaming RRI in EU policies for funding R & I. In order to better understand the reasons for the limited success of mainstreaming RRI, they draw on the concept of Deep Institutionalisation (DI) and adapt it to analyse institutionalisation processes related to policy practice and implementation. They analyse recent findings from RRI research with the help of an adapted DI concept. The results suggest that key preconditions for the successful institutionalisation of RRI policies were not fulfilled. Specifically, broader policy debates reaching beyond the confines of a small policy arena within the European Commission, a lack of experimental embedding allowing for adjustment to different contexts, and the development of ownership were not achieved. Building on the cornerstones of the DI concept, the authors conclude that attempts to mainstream RRI in H2020 have been premature.

In the Chap. 4 of part I, Joshua Cohen and Robert Gianni take the limited implementation of RRI in EU R & I practices as a basis to reflect on the normative potential of RRI. In their chapter, RRI is approached as a matter of collective democratic experimentation. They propose a pragmatist conceptualization inspired by John Dewey and show how his interest in social inquiring publics provide a particularly apt foothold from which to operationalize collective democratic experimentation with RRI. The utility of this approach is subsequently illustrated with the social labs methodology to experiment with RRI. Chapter 4 provides a conceptual argument

and heuristic as to how the current RRI implementation deadlock can be overcome. The reconceptualization of RRI in this chapter paves the way for the empirical chapters in the second part of the book.

After the first two chapters that focus on RRI as EU policy concept in general and the reconceptualization of RRI in Chap. 4, the next two chapters zoom in on two particular aspects. Chapter 5 concerns the involvement of new member states in Framework Programmes for R & I, and with this, their involvement in RRI projects. Chapter 6 concerns the institutionalization of RRI in national R & I funding agencies.

In Chap. 5, Raúl Tabarés Gutiérrez and Antonia Bierwirth consider the inclusion policies of new member states in R & I policies. They analyse the “innovation divide” between member states with high and with low participation rates in the European R & I Framework Programmes. This problem exists since the origins of the European Union but is especially pressing for the group of countries that entered the Union after 2004. Several initiatives have been implemented by the EU to encourage the participation of these countries in Framework Programmes for R & I, trying to maximize and extend the benefits of a knowledge economy across the EU. The authors explore how these instruments have been deployed in the Horizon 2020 Work Programme and focus on the origins of “Spreading Excellence and Widening Participation”. They identify specific weaknesses and pitfalls and argue that the innovation divide is not only a matter of adequate funding and provide recommendations for future implementation strategies.

In Chap. 6, Ulrich Schoisswohl, Ulrike Wunderle, Luboš Studený, Lieke Michiels van Kessenich, and Pia Weinlinger provide three case studies of two funding and one innovation agencies involved in RRI: the Netherlands Enterprise Agency (RVO), the Austrian Promotion Agency (FFG), and the Technology Agency of the Czech Republic (TA CR). As part of the author team is working at these agencies, they are able to provide an in depth inside perspective on the matter of RRI implementation. They analyse how these funding and innovation agencies are already responding to the grand challenge-oriented R & I approach, how their activities can be linked to RRI and what additional insights could be gained from introducing RRI to agency practitioners. Their contribution provides insights in *de facto* RRI and the role of experimenting with RRI in funding agencies. Based on their findings, recommendations are provided on how the potential benefits of RRI at the EU level can be extended to the national funding and innovation agencies and their specific national R & I landscape.

Part II of this volume presents empirical evidence regarding the social lab methodology that is used to engage a wider audience of stakeholders in RRI. The chapters of part two move from more general accounts of stakeholder engagement and the social lab methodology to specific contributions on sectors like health and industry.

In Chap. 7, Philine Warnke, Tanja Bratan, and Ulrike Wunderle analyse public engagement in the tradition of participatory approaches. They investigate how the public engagement dimension of RRI could benefit from different research and practice traditions on participation in research and innovation that do not directly

frame themselves as RRI. Based on an analysis of the participation literature, they identify four areas of theory and practice with major linkages to public engagement in RRI: Co-design, user-led innovation, participatory research, and systemic R & I policy instruments. They confront the specific contributions of these traditions with cases of RRI requirements in two specific fields: healthcare and environment. In this way, they explore barriers and challenges to public engagement and promising practices. This analysis is continued in Chap. 8. In this chapter, Ilse Marschalek, Lisa Marie Seebacher, Elisabeth Unterfrauner, Katharina Handler, and Margit Hofer explore the social lab methodology to operationalise public engagement for RRI and to mitigate some of the pitfalls of traditional public engagement formats. By using practical case studies, the authors show how social labs provide a fertile ground for the circular nature of public engagement within the context of RRI.

In Chap. 9, Merve Yorulmaz, and Susanne Bühner zoom in on the particular notion of diversity in the social lab methodology for RRI. They investigate the relationship between participants' diversity and the manifold outcomes produced in a social lab. Drawing on social network and critical mass theory, they show that social labs with greater diversity face more friction but produce more original, novel and innovative outcomes than more homogeneous groups. Based on quantitative data about the characteristics of social lab participants and outcomes, as well as qualitative information about group dynamics to describe the links between group diversity, their dynamics and outcomes, the authors show that the level of diversity does influence group behavior and the type of outcome that is to be expected. They also show that diversity requires conscious and deliberate management.

In Chap. 11, Elisabeth Frankus and Helmut Hönigsmayer explore how the social lab methodology can substantiate stakeholder engagement for RRI. They explore a single case study in the EURATOM research area to answer the question how the social lab methodology helps to integrate RRI and stakeholder engagement into the European R & I process.

Part III of this volume presents findings regarding the governance of RRI. In Chap. 11, Anne Loeber, Michael Bernstein and Mika Nieminen use another aspect of the social lab methodology. They concentrate on the use of pilot actions as social experiments with the implementation of RRI, reflect on how RRI was put into practice, and draw lessons about policy implementation in such complex governance settings. Social lab participants were invited to deliberate on the RRI policy goals, and to design and execute pilot actions to implement the policy in their context and related research (funding) practices. They consider these findings in light of the policy implementation literature and show how the policy goal of RRI, and its attendant normative orientation, exists in tension with the substantive focus (science governance) and administrative setting (the science funding system) of European Commission's R & I. Finally, they reflect on alternative normative orientations and decentralized efforts to implement RRI.

In Chap. 12, Robert Braun and Johannes Starkbaum consider public engagement for RRI in light of recent developments in stakeholder theory in the strategic business context. It reflects on political Corporate Social Responsibility (pCSR) as conceptualization of responsible governance and develops a model for stakeholder

engagement in RRI on the basis of this material. The potential of the model is explored in two cases of co-creation exercises in which several stakeholders are involved. They draw conclusions regarding the operationalization of the normative ideals and social legitimation in R & I practices. With this perspective, the chapter also provides a bridge to Chap. 12 in which the industrial perspective on RRI is focused on.

Chapter 13 completely focuses on the industrial context of RRI. Thomas Long and Vincent Blok take the limited effect of EU R & I policies to implement RRI as point of departure to ask how responsible innovation can be pursued within industry settings. They explore how start-up firms manage the dual responsibilities of ‘doing good’ and ‘avoiding harm’. To this end, they collected data within the context of smart farming innovations that seek to tackle agri-food system challenges and identify several mechanisms to manage firm’s dual responsibilities.

In the final chapter, we draw conclusion by addressing the question what Social Labs can contribute to the implementation of RRI at a micro-, meso- and macro-level, and by reflecting on the role of RRI, and by reflecting on the progressive contribution RRI can make in contemporary debates on mission oriented research and innovation.

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Part I
Responsible Research & Innovation
as EU Policy

Chapter 2

The Drama of Responsible Research and Innovation: The Ups and Downs of a Policy Concept



Erich Griessler , Robert Braun, Magdalena Wicher, and Merve Yorulmaz

Abstract This contribution addresses the question why Responsible Research and Innovation (RRI) is facing problems to succeed as concept for research and innovation policy in the European Commission, despite the EC’s 20 years of history of funding research activities and coordination and support actions that address science and society relations. Our analysis highlights four interrelated elements that contribute to the instability of RRI as policy concept, i.e. semantic, legal, financial and institutional fragility. We use Sabatier’s advocacy coalition approach (1998) to explain how these elements of fragility developed and how the ups and downs of RRI as policy concept played out. We identify three opposing advocacy coalitions with regards to RRI and analyze their belief systems and resources.

2.1 Introduction

The European Union (EU) has been emphasizing for more than two decades the importance of citizen involvement in policy making (Commission of the European Communities 2001). The call for stronger citizen involvement extended also to research and innovation (R & I) policies. As a consequence, since the late 1990s the European Commission (EC) has supported in its successive “Framework Programmes for Research and Technological Development” (FP) research-, innovation- and coordination activities that address the better alignment of science and society. The Commission promoted such activities already in FP5 (1998–2002) with the funding line “Ethical Legal and Social Aspects” (ELSA) of research (Zwart et al. 2014) and continued to do so between 2002 and 2006 in FP6 and from 2007 to 2013 in FP7 with the successive funding lines “Science in Society” and “Science

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and Society” (Owen et al. 2012). In the years from 2014 to 2020 the Commission operated in the FP Horizon 2020 (H2020) the funding line “Science in and with Society” (SwafS) and based its activities on the umbrella concept and cross cutting issue “Responsible Research and Innovation” (RRI). Despite this long tradition of funding activities to promote the alignment of science and society, the institutionalization of RRI in the EU is far from linear. On the contrary, in the current FP, Horizon Europe (HEU), which is planned to run from 2021 to 2028, the policy concept RRI is no longer mentioned as cross cutting issue and disappeared almost entirely from foundational legal texts (Meier and Byland 2020). Moreover, in contrast to H2020, a standalone programme for the promotion of RRI and a separate policy unit for its implementation ceased to exist.

In this chapter, we focus on the question why RRI struggled to become a widely accepted policy concept in EU R & I policies. Looking for answers we sketch the history of RRI in the EU R & I funding and explain the development of RRI by analyzing the conceptual, legal, financial and institutional status of RRI in the EC policy context. Outlining the essentials of Sabatier’s (1998) Advocacy Coalition Framework (ACF) relevant for our analysis we create a typology of three differing Advocacy Coalitions (AC). We analyse their composition, belief systems and resources to describe a fourfold fragility of RRI within the EC. We argue that the “Pro RRI” AC was divided and unable to establish RRI as a long-lasting policy concept and failed to prevail against the disapproval or indifference of competing ACs who either rejected RRI altogether or favored alternative concepts. We also describe a series of compromises the “Pro RRI” AC in the EC have struck to accommodate internal and external critics. At the end of the chapter, we briefly reflect on openings and potential strategies to rescue RRI as a formative and implementable policy concept within the EC funding framework.

For this contribution we mainly use peer reviewed publications, grey literature and policy documents on the history and development of the RRI concept. In this respect, we distinguish several strands of work. A substantial part of the literature and documents focuses on the genesis and development of RRI as an academic concept (e.g., Rip 2014; Felt 2018; Timmermans and Blok 2018; Owen and Pansera 2019a, b). In addition, there is literature on “de-facto-RRI” (e.g., Randles 2017). This concept indicates initiatives which sail under different flags than RRI – e.g., gender equality, bioethics, corporate social responsibility, (participatory) technology assessment – but cover overlapping territories. Another corpus of literature relates to predecessors of the SwafS programme (e.g., Zwart et al. 2014), the research projects they supported (European Commission 2020), the uptake of RRI in H2020 as cross cutting issue (Novitzky et al. 2020) and RRI policies and practices in EU Member States (Mejlgaard et al. 2019; Christensen et al. 2020). A small section of the literature deals with the question of how RRI was institutionalized as a policy concept; in other words, with the politicking and struggles in European bureaucracy (Rip 2014, 2016; Owen et al. 2012; Macq et al. 2020; Meier and Byland 2020; Strand and Spaapen 2021). For this article we combined the aforementioned strands of literature to better understand the challenges “institutional entrepreneurs” (Randles 2017: 16) encountered within and outside the EC when they tried to institutionalize RRI in the

European FP. We complement this literature with our reflections and experiences gained from participating in many RRI project since 2014.¹

2.2 Short History of RRI

Within the EC, the policy concept of RRI and its predecessors is a response to a legitimization crisis of R & I policy making in the aftermath of major public controversies about, e.g., genetically modified organisms and mad cow disease (Macq et al. 2020). First foundations for RRI as a concept were laid early in the millennium with the White Paper on European Governance (Commission of the European Communities 2001). This document called for a “scientific reference system” in order to support policy making by “structured and open networks” (ibid. 19) through participation and access to reliable information. The paper strongly advocated public participation in policy making and stated that the “[L]egitimacy [of the EU] today depends on involvement and participation” (ibid. 19). In 2001, the EC set up the Science and Society Action Plan (EC 2002), in which the connection between science and citizens was key and active participation was seen as two-way communication. This was meant to not only informing people, but also letting them actively take part and express their views. As a consequence, in 2002, the funding programme “Science and Society” (SaS) was introduced in the FP6.

In this line of reasoning, participation is key for policy making. In 2003, a report on governance within the EU emphasized the powerful role of citizen participation and how to include them in governance and in offering policy recommendations. The rationale was to strengthen the interface between science and policy making and encourage active participation of society at large in policy making (Banthien et al. 2003). It was not only the idea of a responsible R & I system, but there were general debates within the EU about changing governance and policy as well as the legal system towards increasing the rights of and creating more openness towards citizens. So, the needs of bringing research closer to society, understanding and shaping governance in a way that policy decisions are more connected to societal needs and to making research and the applications of science and technology more democratic and responsible, were the main attempts that constituted the basic ideas of RRI.

A step towards citizen inclusion in policy making was the Lisbon Treaty – signed in 2007 and entered into force in 2009 – which contained ideas of the aforementioned White Paper. Article 8 places citizen participation, engagement, transparency and involvement at the core of participatory democracy (Official Journal of the European Union 2007). These principles were integrated in FP7, in which the

¹Erich Griessler was involved in the FP7 projects Res-AGorA and SATORI and participated in the H2020 projects HEIRRI, JERRI, ENERI, NewHoRRIzon, RiConfigure and SuperMoRRI. He was also involved in the MoRRI project. Robert Braun participated in the FP7 project SATORI and H2020 projects ENERI, NewHoRRIzon and RiConfigure; Magdalena Wicher in FoTRRIS, JERRI and SuperMoRRI, Merve Yorulmaz in JERRI and NewHoRRIzon.

“Science and Society” programme was renamed to “Science in Society”. However, within the Commission these ideas were not met with undivided agreement. In 2010, the appointment of a new Director General in the Directorate General Research and Innovation (DG RTD) and pursuant changes led to marginalization of science and society activities. “The dedicated Science and Society Directorate was cut, the number of policy officers working on science-society issues was downsized to 40 staff members (...) and regrouped in a unit named “Ethics and Gender” (...): there was no longer a directorate or even a unit specifically dedicated to science-society issues. Finally, the Science in Society Programme was not renewed in the Commission’s proposal for Horizon 2020” (Macq et al. 2020).

The changeful history of the term RRI proper begins in this context as a “survival strategy” (ibid.) for science-society activities. One policy officer recalls the situation: “You have to remember that it all happened in a period of downsizing. (...) So, we had to refocus on our core objectives. (...) How was it possible to transform what we had learned in the Science-Society programme in a more politically relevant action? (...) In a day-long brainstorming meeting gathering in all the staff members, we happened to coin the expression RRI” (Macq et al. 2020: 502).

There were also meetings about RRI at the European Commission’s Directorate General (DG) Research in Brussels and at the French Embassy in London. There, experts from academia and policy tried to come to a common understanding of the concept (Owen et al. 2012) and René von Schomberg, a civil servant from DG Research, circulated a paper which captured his basic idea of RRI. It defined RRI as “transparent, interactive process by which societal actors and innovators become mutually responsive to each other with a view on the (ethical) acceptability, sustainability and societal desirability of the innovation process and its marketable products (in order to allow a proper embedding of scientific and technological advances in our society)” (von Schomberg 2011: 9).

The process of policy development for more democratic research and innovation was taken forward by Gilles Laroche, head of the “Science in Society” Funding Programme. He created a number of funding instruments to assist research and coordination on RRI in FP7 and established an expert group to advise the EC on issues of developing appropriate governance frameworks to mainstream RRI. He also sought an opinion from the European Group of Ethics, the expert group providing the Commission with high quality and independent opinion on ethical aspects of science and new technologies in connection with EU legislation or policies (Owen et al. 2012).

A statement that EU Commissioner Máire Geoghegan-Quinn made in 2012 at one of the follow-up meetings on Science in Society in Europe, marked the first tangible, high-level support for the concept of RRI (ibid.). She stated that “Research and innovation must respond to the needs and ambitions of society, reflect its values and be responsible [...] our duty as policy makers [is] to shape a governance framework that encourages responsible research and innovation” (Geoghegan-Quinn 2012, quoted in Timmermans 2021).

FP7 was already in operation and for the remaining period the EC was willing to fund a programme (a research and coordination action) on RRI (Owen et al. 2012).

The actors within the EC who promoted RRI were able to position RRI and its topics in H2020. RRI received a prominent place as a cross cutting issue in H2020 and a dedicated SwafS Programme with a separate administrative unit. Thus, SwafS was able to fund RRI activities, albeit with what a 2017 expert commission considered a “relatively low budget” (European Commission 2017: 173).

The SwafS programme pursued the overarching goal to stimulate the research on and application of an operative and mutually beneficial cooperation of science and society, thereby promoting an understanding of science that is aligned with the values, needs and expectations of society. At its core, it was based on the rationale that European societies’ ability to develop in a positive and sustainable way depends largely on their innovation capacity and ability to create and exploit knowledge in a socially inclusive and democratic manner. The SwafS programme was key for the conceptual development of RRI and raising awareness for RRI. One of its main aims was to help embed RRI as cross-cutting issue in H2020. As such, the SwafS programme and the EC’s interpretation of RRI as “five keys” of (1) gender equality, (2) public engagement, (3) science education, (4) open access/open data, (5) ethics governance are practically inseparable.

In November 2014, RRI as a policy concept reached its normative zenith in the EC with the “Rome Declaration on Responsible Research and Innovation in Europe”. In this document, the organizers and participants of the conference “Science, Innovation and Society: achieving Responsible Research and Innovation” called for action to promote RRI within European Institutions, Member States, regional authorities and research and innovation funding organizations. The idea was to build capacity for RRI, review and adapt metrics and narratives for research and innovation and implement institutional changes that foster RRI (European Commission 2014).

A major disruptive moment in the development of RRI happened in a June 2015 speech in Brussels when Carlos Moedas, the incoming EU Commissioner for R & I, set three new goals for EU R & I policy which he summarized as “Open Innovation, Open Science and Open to the World” (Moedas 2015). From this moment, RRI had to align with this new competing policy concept (Rip 2016), which shares commonalities with RRI but also important differences (Shelley-Egan et al. 2020).

As already mentioned, science and society activities continuously faced also opposition from within the Commission. The Commission’s proposal for H2020 originally did not include the concept of RRI. SwafS and RRI were only included after the European Parliament requested amendments of the FP (Macq et al. 2020). By 2014, “the policy winds inside DG RTD were again blowing away from and event against RRI” (Strand and Spaapen 2021: 6). Onlookers observe that “listening to policy-makers in Brussels, or reading the research policies at the entry into the Ninth framework programme for research and innovation (...), RRI seems to be a sinking ship, if not already at the bottom of the Atlantic Ocean” (ibid.: 9). Again, the Commissions’ proposal for the next FP, Horizon Europe, did not foresee a specific SwafS Programme. This time however, petitions (Sis.Net 2018) and contributions by advocates of science and society activities to official public consultations for Horizon Europe (Schoisswohl 2019; Pathway Declaration 2019) that called for

continued attention and funding of RRI were only duly noticed (European Commission 2019) but remained without much effect (Meier and Byland 2020).

So, why did RRI not emerge and continue as an influential policy concept, despite two decades of practice in addressing science-society interrelations with EC funding?

2.3 RRI as a Fragile Policy Concept

In this section we argue that RRI suffers from fragility as a policy concept in several dimensions, i.e., Conceptual, financial, legal and institutional. By fragility we mean that the actors championing RRI were not able to stabilize and sustain over the period of the 8th Framework Programme, Horizon 2020, (1) a clear and accepted definition of RRI, (2) the legal foundation necessary to fund a separate RRI programme, formerly called “Science with and for Society” (SwafS), as well as (3) the financial and (4) institutional resources they were able to secure in Horizon 2020.

2.3.1 Conceptual Fragility

In Table 2.1 we put together several subsequent definitions the European Commission used to explain the concept of RRI between the years 2011 and 2021. It shows that during that time the definition was in a constant flux and adapted to different circumstances.

Table 2.1 Selected definitions of RRI by the European Commission (2011–2021)

RRI is a “transparent, interactive process by which societal actors and innovators become mutually responsive to each other with a view on the (ethical) acceptability, sustainability and societal desirability of the innovation process and its marketable products (in order to allow a proper embedding of scientific and technological advances in our society)” (von Schomberg 2011: 9)

“Responsible research and innovation is a process for better aligning R & I with the values, needs and expectations of society. It implies close cooperation between all stakeholders in various strands comprising: science education, definition of research agendas, access to research results and the application of new knowledge in full compliance with gender and ethics considerations” (Competitiveness Council 4-5 December 2014, quoted in European Commission 2016: 17)

“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. In practice, RRI is implemented as a package that includes multi-actor and public engagement in research and innovation, enabling easier access to scientific results, the take up of gender and ethics in the research and innovation content and process, and formal and informal science education” (EC 2021)

Von Schomberg's initial RRI definition in 2011 highlights interaction with "societal actors" and, as policy process, indicates the partners in dialogue, i.e. societal actors and innovators. He explicates the goals of the dialogue as "(ethical) acceptability, sustainability and societal desirability of the innovation process and its marketable products" (72).

The definition from 2014 repeats the policy process-oriented character of RRI and the idea of aligning R & I with "values needs and expectations of society" (European Commission 2016). It stresses cooperation and adds specific areas, i.e. "science education, definition of research agendas, access to research results and the application of new knowledge in full compliance with gender and ethics considerations" (ibid.). These areas resemble the six keys of RRI. However, the number of keys does not remain stable and changes over time; it is reduced from six to five (Rip 2016), combining ethics and governance.

The 2021 RRI definition adds the ideas of anticipation and assessment of "potential implication and societal expectations with regard to research and innovation", advocated by academic researchers of RRI, to the concept, however by using language such as RRI being an "approach" that "implies" the alignment of research and innovation with "the values, needs and expectations of society" it blurs the line between the political expectation and policy implementation (cf. Novitzky et al. 2020). Instead of policy or policy principle it talks about RRI as "package" – a composite resembling the five keys – that cover multi-actor and public engagement, open access, gender equality, research ethics and integrity as well as scientific training and science education (EC 2021).

2.3.2 *Financial Fragility*

Current American President Joe Biden, making critical remarks on his political opponent's commitments in 2008, had quoted his father frequently saying: "Don't tell me what you value, show me your budget, and I'll tell you what you value" (Biden 2008). The same reference could be made of the normative commitments to creating a more responsible research and innovation policy in the European Commission in the Horizon Europe funding programme. The budget dedicated to programmes related to science society relationships has consistently increased since FP6. In F6 the "Science and Society" funding line was allocated 88 Mio Euro; in the following FP7, "Science and Society" was equipped with 280 Mio Euro. In H2020, the SwafS Programme had a budget of 462 Mio Euro (Meier and Byland 2020). However, the steady budgetary increase stopped with H2020. In Horizon Europe, funding for activities that relate to RRI activities have been reduced. The Funding Programme "Reforming and enhancing the EU Research and Innovation system" has a budget of altogether 400 Mio Euro, which will be distributed across 14 action lines (ibid.).

2.3.3 *Legal Fragility*

RRI as a funding line also turned out to be fragile in its legal foundation. In H2020, RRI was explicitly mentioned in the legal basis of the European FP. As already mentioned, RRI was implemented firstly through the establishment of a dedicated SwafS Programme and secondly, as a cross-cutting issue under Article 14 a, “RRI including gender”. In Horizon Europe, this is no longer the case. The new FP does not foresee “SwafS”-like activities and science and society activities as subsumed under the topic of “Widening and Enhancing the European Research Area ERA”.

The legal texts of Horizon Europe mention RRI only marginally. In Art. 2(2)c promoting RRI by “taking into account the precautionary principle” is one of the operational objectives of the Specific Programme. However, gender, ethics, open science and the link between science and society are mentioned elsewhere. These, as opposed to the application of the precautionary principle another related but not similar concept, are not legally binding but guidance for interpretation. Recital 51, a legally non-operationalized policy principle, says that “With the aim of deepening the relationship between science and society and maximising the benefits of their interactions, the Programme should engage and involve all societal actors, such as citizens and civil society organisations, in co-designing and co-creating responsible research and innovation (RRI) agendas, content and throughout processes that address citizens’ and civil society’s concerns, needs and expectations, promoting science education, making scientific knowledge publicly accessible, and facilitating participation by citizens and civil society organisations in its activities. This should be done across the Programme and through dedicated activities in the part ‘Widening Participation and Strengthening the ERA’” (Official Journal of the European Union 2021).

2.3.4 *Institutional Fragility*

The institutional stability, i.e., the standing within the DG, the temporal continuity, autonomy and number of staff members, of the administrative unit that is responsible for RRI within DG RTD reflects in several ways the status of RRI within the EC policy implementation framework. In this respect, the unit over the years had its ups and downs and ultimately over time became more institutionally fragile.

Looking back to 2001 when a “Science and Society” Directorate was installed within DG Research, the status as Directorate – rather than a “subaltern ‘unit’ or ‘programme’ – was an important step in institutionalizing citizen participation in the EC” (Macq et al. 2020). The Directorate was composed of several units dedicated to governance, ethics, gender equality, and raising awareness of young people about science. In 2014, there was a separate SwafS unit (B7) which was responsible for the Programme and supported by Unit B of the European Research Executive Agency. In addition, there were two sub-units for Gender and RRI. Ethics and Open Access were addressed in separate units.

In 2019 the institutional status of the SwafS unit was downgraded. The SwafS unit was dissolved, and its parts were integrated in the new Unit “Open Science” (G.4). In FP7, the Directorate had a staff of 140 (Macq et al. 2020). This number was now reduced to 40 people.

2.4 Advocacy Coalitions in Responsible Research and Innovation

2.4.1 *Sabatier’s Advocacy Coalition Approach*

In this section we will use the Advocacy Coalition framework (ACF, Sabatier 1998) to explain how the abovementioned elements of fragility came about. The ACF is particularly well suited to explain policy developments over years because it focusses on heterogenous advocacy networks and the role of beliefs in policy making (Weible et al. 2009).

Sabatier developed the ACF over several years beginning in the early 1980ies (Sabatier 1988), later developing and adapting the concept. The most important key premises for our paper are that Sabatier, in order to explain policy processes, focuses on (1) policy subsystems, (2) the struggle of heterogenous advocacy coalitions within such subsystems and (3) the importance of belief systems.

Sabatier holds that “the most useful unit of analysis for understanding the overall policy process in modern industrial societies is not any specific governmental organization or program but rather a policy subsystem or domain. A subsystem consists of actors from a variety of public and private organizations who are actively concerned with a policy problem or issue [...] and who regularly seek to influence public policy in that domain” (ibid. 99). An advocacy coalition contains “people from a variety of positions (elected and agency officials, interest group leaders, researchers) who share a particular belief system” and “who show a non-trivial degree of coordinated activity over time” (Cairney 2015).

Most importantly, he points out that the theories, the programs and public policy “involve value priorities, perceptions of important causal relationships [and] perceptions of world states [...]” (ibid.). Sabatier maintains that beliefs play an important role in politics; people engage in politics to translate their beliefs into action. In this respect he distinguishes between “core beliefs”, “policy core” beliefs and “secondary aspects”. “Core” beliefs are fundamental beliefs, unlikely to change (like a ‘religious conversion’) but too broad to guide detailed policy (such as one’s views on human nature). ‘Policy core’ are more specific (such as the proper balance between government and market or how to achieve optimum research and innovation) but still unlikely to change. ‘Secondary Aspects’ relate to the implementation of policy. These are the most likely to change, as people learn about the effects of, say, regulations versus economic incentives.

In the R & I policy subsystem we detect three main ACs i.e., the “Pro RRI AC”, the AC “RRI critics and actors unaware of RRI” and the AC “De-facto RRI”. ACs are

heterogeneous in their composition and comprise of policy makers, academics, representatives from industry, research funding organizations (RFOs) as well as civil society organizations (CSOs). The Pro RRI AC disagrees on secondary aspects of RRI and is therefore further internally divided into two sub-groups. The struggle between, and within, these three ACs explain the difficulties of institutionalizing RRI within the EC.

2.4.2 “Pro RRI” AC

The “Pro RRI” AC consists of actors from research (Sudolska et al. 2019), research funding, policy making, and civil society that support RRI at a European and national level. However, the AC is internally divided into two interlinked sub-groups. Klaasen et al. (2019) call these groups “policy concept of RRI” and “academic RRI”. We will name them, drawing on a distinction originally coined by Steve Fuller and recently revived by Dani Shanley (2020), the “high” and “low church” of RRI. Steve Fuller distinguished between two strands of Science Technology and Society (STS) studies advocates: a “more academic oriented” group and another one that is “more closely related to practitioners (...) in policy-making, education or civil society”. RRI is a “legacy of the more explicitly political, responsive strand of STS, in terms of its more explicit normative commitments, as well as its relationship to policy-making, education and civil society” (ibid.). However, the RRI community also continues and re-enacts the division in STS with internal debates about how to conceive of, ground and conceptualize, as well as promote a R & I system that is more in accord with societal needs.

We adopt the distinction between high and low church in order to differentiate sub-groups within the Pro RRI AC. The two sub-groups share intellectual roots and a core belief and thus belong to the same scientific/intellectual movement. However, high and low church disagree on several issues of policy beliefs and secondary aspects. The high church focuses on “theory and concept formation” (ibid.) and comprises of academics, national policy makers and RFOs that develop or use contesting or overlapping concepts of science society relationship. The low church focuses on “practice and policy” and includes national and European policy makers and RFOs – the latter mainly from the SwafS – and its preceding and subsequent administrative units that advocate the previously mentioned ‘five keys’ of RRI.

Advocates of the more theoretically founded concept of responsible innovation (RI) and critics of a solely policy-oriented application of RRI from the high church acknowledge the common roots of RRI and RI. For example, Owen and Pansera state that “RRI emerged in parallel with the academic discourse of RI and they overlap in some areas” (Owen and Pansera 2019b: 4). They also agree with von Schomberg’s initial definition and concede that “some useful and insightful research and a community of scholars (...) emerged” from RRI. Owen and Pansera acknowledge that the RRI concept was “leaning on ethics and technology assessment traditions” (2019a: 35) which they consider as one of the roots of RI (ibid. 28). Yet, they repeatedly and strictly insist to demarcate RI and RRI, and claim that they are not “the same things” (Owen and Pansera 2019a: 27). However, this claim of a clear-cut

distinction between the two strands is difficult to uphold given the manifold connections between RRI and RI.

RRI and RI are not only linked by common intellectual traditions but also by actors that cooperate to advocate the concepts. René von Schomberg, e.g., one of the key promoters of RRI within the EC, is a civil servant and holds a PhD in philosophy and STS and regularly contributes to theoretical discussions on RI and RRI. Other members of the former SwafS staff are trained in STS as well. In addition, STS scholars repeatedly contributed to RRI policy development with policy papers (Felt et al. 2007), participating in the European Advisory Group that advised on SwafS Work Programmes (Rip 2016) and suggesting indicators for RRI (Strand et al. 2015).

Actors of the low church depend on inspiration and advice from the high church about the concept and implementation of responsibility in R & I (Macq et al. 2020). However, policy makers from the low church are not necessarily willing or able to heed advice from the high church. In policy discussions it is also argued that debates over the theoretical foundations within the RI discourse, advocated by the high church hinder the translation and implementation of the normative idea into policy implementation and action while also unnerving policy makers.

Actors from the high church, in turn, depend on funding from the low church (e.g., via the SwafS Programme). However, these high church members are not necessarily convinced about the underlying five keys the EC promotes, and repeatedly try to work around them. Beneficiaries of SwafS projects carefully tried to maneuver between the five keys required by the low church and the ARRI framework, something they considered “in line with the original rationale” of the intellectual tradition from which RRI originated. Strand and Spaapen (2021) describe how researchers carefully try to split between the requirements of the low church and their own scientific conviction: “What developed was a sort of subversive humanism, usually the mildest sort, in which the formal deliverable of FP7 and Horizon 2020 RRI projects complied with the 5 or 6 keys approach and delivered results on them, while the academic outputs – written and oral – took a freer stance towards the keys. Sometimes the subversive humanism also included attempts at simultaneously embracing the key approach and the philosophical origin of RRI and somehow integrate them or expand the former with the latter.” (ibid. 3)

2.4.3 *Belief System*

For “core beliefs” of the Pro RRI AC we draw on Timmermans and Blok (2018) who adapted Kuhn’s paradigm concept and analyzed the assumptions on which different concepts of RRI are based and contrasted them with the “dominant innovation paradigm”. They understand paradigm as normative “worldview held by a particular community, in a particular context and at a particular point in time” (Timmermans and Blok 2018). In this way, the concept of paradigm overlaps with Sabatier’s core beliefs of the ACF, a term that we use in this chapter.

As regards core beliefs, the Pro RRI AC perceives innovation overall as positive. However, it also sees potential negative consequences, which have to be avoided. It

understands innovation primarily as technological innovation, although some strands of RRI include service and process innovation as well. In their perspective, innovation is an economic phenomenon aimed at producing marketable goods and profit. However, RRI sometimes includes societal and/or ethical dimension, which is either complementary or partly replacing a narrow market-oriented mission perspective of the dominant innovation paradigm. RRI perceives research and/or science and innovation as connected. It introduces in the innovation process moral knowledge, societal values, interests and implications of R & I as new types of knowledge. For societal reasons it also adds citizens to innovation as new actors e.g., in co-construction. RRI believes in increased steerability of innovation towards societal desirability and ethical acceptability. Respective governance processes should either happen in politics or the innovation process itself. Innovation should be transparent and/or open. RRI is basically committed to consequentialist ethics, however, broadens ethical evaluation of R & I to moral values and/or societal values. It adds gender, inclusiveness and rights as ends in themselves to the evaluation of R & I (Timmermans and Blok 2018).

The high church claims the academic heritage of STS and emphasizes the rich and diverse tradition of ELSA, ethics, STS and technology assessment (Klassen et al. 2019). It emphasizes the importance of analytical and conceptual rigor and is less concerned with political and institutional viability in a concrete organizational environment such as the EC. It criticizes RRI because of its origins in EC policies, its conceptual foundation in the five keys and its approach towards implementation. RRI, from this perspective, is only a “policy artefact” (Owen and Pansera 2019b: 3) and “policy-driven discourse” (Owen and Pansera 2019a: 26) that originates from the EC and the “Science in Society” Programme. They argue that the “RRI keys have more to do with the bureaucracy of maintaining the SwafS/RRI as a cross-cutting theme than with the conceptual foundations of RRI” (Rip 2016: 292). The high church considers the five keys as analytically weak and claims that they, and the translation of RRI into a cross cutting policy agenda, turned RRI into “a somewhat disparate set of activities and agendas” (Owen and Pansera 2019a). Proponents of RI suggest a competing concept to RRI. Jack Stilgoe and others define RI as “taking care of the future through collective stewardship of science and innovation in the present” (Stilgoe et al. 2013: 1570). As opposed to the normative, policy oriented ‘keys’ they emphasize four process dimensions: Anticipation, Inclusion, Reflexivity and Responsiveness (AIRR, *ibid.*).

In contrast to the high church, the low church is more concerned with political viability than conceptual accuracy. It considers the academic theorization of RRI as vague and fuzzy, hard to communicate and to put into practice in an agonistic political environment. It believes that RRI, in order to succeed in R & I politics, must provide an easily understandable und communicable concept that connects well with already implemented and accepted policies.

High and low church are also divided in secondary aspects of their belief system, their approach towards implementation and impact assessment of RRI, in Sabatier’s terms the secondary aspects of their belief system.

As already mentioned, the low church must prove the value of RRI in a policy environment. Thus, it strives to measure input, output and, particularly, impact and

benefit of RRI with indicators that should be “specific, measurable, attainable, relevant and timely” (SMART) (Strand and Spaapen 2021: 3).

The high church has different ideas about evaluation than SMART indicators, as the “Expert Group on Policy Indicators for Responsible Research and Innovation” case exemplifies (Strand et al. 2015). The European Commission tasked this group to “help identify existing indicators and to propose new indicators that can measure impacts of RRI activities in qualitative and quantitative terms” (Strand and Spaapen 2021: 3). Focusing on the RRI keys, the indicators were to follow the aforementioned SMART concept. Thus, as one member of the expert group recalled, the mandate was “quite far from von Schomberg’s vision of philosophically informed self-governance among researchers who sought reflection and deliberation in civil society” (ibid.). Yet, the expert group applied “the same mild brand of subversive humanisms” (ibid.) and proposed mostly qualitative indicators that gave researchers the freedom to choose the ones most appropriate for their line of research, thus not fitting to the idea of SMART criteria requested by DG RTD.

In contrast to this qualitative, open and flexible approach towards evaluation, the MoRRI project, which was funded thereafter by DG RTD from 2014 to 2018, was intended to be more aligned with the needs of the low church to produce “measurable indicators that apparently could work in a command-and-control type of governance system” (ibid. 4).

As concerns implementation, the high church is critical of RRI because of the emphasis on isolated keys and the lack of a “coherent discourse” failing to engage with innovation systems and therefore offering “little prospect for systemic, transformational change” (Owen and Pansera 2019a: 27). As an alternative, the high church claims that RI endeavors towards “deeper institutional and systemic transformation (...), striving for innovation (and science aimed at this) that is more anticipatory, more reflexive, more inclusive, deliberative, open and, in total more responsive” (ibid.).

2.4.4 Resources

The Pro-RRI AC controls symbolic, but little financial, legal and institutional resources. Both churches are on the margin of their respective fields (Timmermans and Blok 2018). The high church was able to muster a strong academic tradition, but they are outsiders in innovation and innovation studies. In addition, their symbolic capital was hard to convert into action because of the division within the AC about RRI definitions and about how to evaluate impact and benefits.

As concerns financial resources, the low church was able to allocate some H2020 funding for the SwafS programme. The SwafS unit also possessed the legal resource of being tasked with the establishment of RRI as cross-cutting issue in H2020. However, in fact, it ran into implementation problems when translating the concept of RRI into actual work programmes, calls and projects outside SwafS (Novitzky et al. 2020). In terms of institutional resources, the SwafS unit increasingly lost backing within DG RTD. Supportive senior staff were replaced by rather skeptical superiors and the supporters of RRI within the EC had difficulties gathering

sufficient political and academic backing outside the Commission to push through their RRI agenda. Staff in the SwafS unit were reduced and finally the separate unit disappeared altogether. In addition, FP negotiations are an opaque process between EC, Member States, the Parliament and strong stakeholders. RRI supporters from within the EC were marginalized and their external supporters lacked knowledge about, and access to, deliberative fora where Horizon Europe was negotiated. Moreover, academics had difficulties acting jointly because of a lack of organization for day to day lobbying. When they did make joint efforts to impact RRI policies the Commission duly noted their concerns but their activities had little impact on actual policies.

2.4.5 AC “RRI Critics and Actors Unaware of RRI”

The AC “RRI critics and actors unaware of RRI” consists of national and European policy makers and RFOs, as well as stakeholders from research and industry who are critical or ignorant of the concept of RRI.

2.4.6 Belief System

Again, we draw on Timmermans and Blok (2018) to characterize the core beliefs of this AC. Proponents of this AC have a positive perspective on innovation, which creates social benefit and contributes to tackling societal challenges. They perceive innovation as mainly technological and as economic phenomenon aimed at producing marketable goods and profit. In this perspective, science, research and innovation are separate. Stakeholders are basically involved in innovation for economic reasons. Steering innovation is limited to the marketability of innovation within constraints set by legal and regulatory frameworks. Innovation processes are not open and transparent but kept clandestine to protect the innovator’s competitive advantage and exclusive access. The AC follows consequentialist ethics, which considers only benefits and technical risk in the evaluation of technology. As Roger Strand summarizes poignantly, this group “sees science and technology as *the locomotive force of a knowledge economy that is on tracks, going in the right direction and being (our only?) promise of job creation and economic growth. The problem (...) is not that the train is going too fast and out of control; rather, it is being slowed down by the insufficient participation of citizens and civil society. Distrustful and ungrateful citizens are (sometimes) protesting in the middle of railroad and more often just not being supportive and helpful*” (Strand 2020, emphasis in original).

Ideas like RRI directly challenge this AC’s core belief of “how science, innovation and society relationships (...) are organized and configured” (Owen and Pansera 2019b: 5). From this perspective RRI is potentially damaging to R & I in specific, and the economy and society in general. RI, and also RRI, “runs headlong into

political imperatives based largely on economic growth and productivity; vested interests; and engrained institutional norms, cultures, behaviors and organizational practices” (Owen and Pansera 2019b: 27). In addition, “it may be seen to challenge the principle both of market governance and scientific autonomy. It can be perceived as introducing an additional burden of responsibility for at least some who may feel their independence to be infringed and who, to be blunt, feel they have better things to do with their precious time” (Owen and Pansera 2019b: 6).

Macq et al. (2020: 497) quote an EC officer involved in science policy who recollects his/her colleagues’ attitudes towards science society relationships. They had, “a very positivist vision of science. They (had) what I call the ‘old physicist’ syndrome (...) They say ‘hey, how can we make young people like science’”. As one interviewee states, the Director General of DG RTD was also very critical of RRI. He “does not like [science and society issues], this is why in 2012 he reduced all the services that were working for them. (...) His mindset is, above all, to get back to the good old face to face where research is the business of the academia and the industry. So, to get back to this face to face without the complications brought by this third actor [civil society]”.

As concerns policy core beliefs and secondary aspects, critics of RRI in this coalition point out that the concept is hard to understand, and its results are hard to measure. RRI critics from basic research point to the importance of curiosity-driven research and the autonomy of science and see RRI as a centralized governance framework that limits independence and contradicts the political system advocated by believers of the Republic of Science (Polanyi 1962; cf. critically Braun & Griessler 2018). This said, the majority of practicing researchers have not heard of RRI, nor as normative concept or implemented policy in research funding and governance. For this group, when mentioning RRI and its component elements, they do not reflect on it as an integrated process but as individual and mostly voluntary or tick-box humanistic activities addressing the respective parts that are covered by the separate ‘keys’.

2.4.7 Resources

This AC’s most important and powerful resource is its ability to hold and appoint influential key positions in politics and civil service, enabling it to control legal, institutional and financial resources and to use these resources to sustain the AC’s core beliefs which then are expressed in policies. The ups and downs of RRI and public engagement in the FP are connected with changing political and administrative key personnel (Macq et al. 2020). When Commissioner Phillipe Busquin held office, public participation in science started to mean more than information of the public but also public participation in decision-making. In 2010, Commissioner Máire Geogegan-Quinn came into office and supported RRI. However, in 2015 the new Commissioner, Carlos Moedas, branded the three O’s as new policy goals for EU R & I policies. Yet, it is not only politicians who are key for policy development.

Senior civil servants are central actors as well. When the new Directorate General of DG-RTD who was not supportive of science and society issues was appointed, science and society activities were cut back and the Directorate for Science and Society was discontinued; its staff seriously reduced, re-organized and dispersed. There is a constant pressure on the European Union to dedicate its resources to further the economic competitiveness agenda of the EC and RRI, as discussed above, does not sit well with this aim. Also, believers of the Republic of Science who would like to see science as a positivist enterprise that works well in a Triple Helix constellation between policy, academia and industry (Leydesdorff 2010) see the emergence of RRI as a hindrance to both their effectiveness agenda and the resources required to archive their economic mission.

2.4.8 AC “*de facto rri*”

The term “de-facto-rri” delineates bottom-up processes of experimentation and describes “what actors already do, in collective fora, in order to embed institutionalized interpretations of what it means to be responsible; these interpretations are then translated into practices, processes and organizational structures, and outcomes of research and innovation” (Randles 2017: 20).

The “de facto RRI” AC is a very loose assembly of separate communities that include actors from research performing and funding organisations, civil society organisations, and businesses which work with concepts that overlap or partly compete with RRI. Since the latter is an umbrella concept with many different predecessors inside and outside academia, there exist many communities which have performed de facto rri activities for many years. Communities who strive to increase anticipation and reflexivity in R & I have been developing methods of expert based and participatory technology assessment for decades (Grunwald 2011, 2014). There is also a strong community that promotes public engagement in R & I, e.g., via action research, citizen- and open science. Another community exists which has been devoted to science communication and research education for many years. The issue of gender equality has a very long tradition and a strong community inside and outside academia. The same is true for research ethics which has a particularly rich tradition of bioethics (Beauchamp and Childress 2001) ethics committees (e.g., AREC 2013; Shelley-Egan et al. 2015), bioethics conventions (e.g. Oviedo Convention, Nuremberg code), ELSA research (Zwart et al. 2014) and institutions trying to safeguard research integrity (ESF and ALLEA 2017). RRI and concepts like Sustainable Development Goals, sustainability, inter- and transdisciplinarity, as well attempts to better integrate Social Sciences and Humanities (SSH) into natural and engineering sciences (STEM) all have overlapping goals. In business, Corporate Social Responsibility (CSR), which overlaps but also differs from RRI, has been practiced for many years (Blok et al. 2015; Iatridis and Schroeder 2016; Lubberink et al. 2015; Braun 2019).

The loose assembly of different communities is united in the core belief that R & I must change by taking up the respective value of the particular community. Although the separate communities might sympathise with RRI in general, they emphasize the differences between their own concept and RRI and are more concerned with advancing their own concept than joining forces with the RRI community. As indicated, this group does not possess a unified belief system, and not a set of institutional or financial resources. Being critical of and on the margins of traditional positivist science and solely economic output focused innovation, they are struggling to secure their institutional position and the resources required within the ecosystem of the European research arena. This makes this group unreliable allies of the RRI cause as, even if members agree with some or many ambitions of the RRI belief system they do not want to see their hard-fought positions jeopardized and do not see RRI as an overall policy or political frame that could be useful to support what they consider important.

2.5 Conclusions

In this paper we explain the development of RRI as policy concept within EC policy making by having identified a conceptual, legal, financial and institutional fragility of RRI in the EC policy context. We adopted the ACF to explain the dimensions of fragility. In doing so, we focused primarily on the two ACs, the “Pro RRI AC” and the AC “RRI critics and actors unaware of RRI”, which are most important for answering our question. We mapped their actors, belief systems and resources. We also sketched a third AC, a loose assembly of different communities dealing with ‘de facto rri’ in different kinds of organizations and areas.

Analysis of literature and documents showed that the definition of RRI is unstable over time. This does not only result from conceptual differences, but also as a “discursive strateg(y)” to be able to promote RRI in the specific EC context” (Randles 2017: 23 ff.). It results from a succession of compromises the promoters of RRI in the EC have struck to accommodate internal and external critics. A first compromise concerned RRI and the dominant innovation paradigm that perceives R & I as an engine for jobs and economic growth. Von Schomberg’s definition of RRI (2011) tries to accommodate this tension and shifts the discourse around societal actors and innovators towards “the innovation process and marketable products”. This creates a tension with more radical proponents of the STS tradition. A second, administrative compromise was coining RRI as keys and as an umbrella concept. The keys were an attempt to link RRI to the institutional history and practices within the EC by bringing together already existing policy strands. This created tensions with those who would like to see RRI as a more radical change in R & I policy and understood the emerging policy concept of the keys as doing more ‘business as usual’. A third compromise concerned the manifold conceptual disagreements about the definition of RRI between advocates of RRI within the EC and leading academics outside the Commission. Proponents of RRI within the EC repeatedly

had to reconcile various disagreements about RRI which shows in the ever-changing definition of RRI by its proponents resulted in those sympathetic to the cause within the EC to attempt to reconcile the various disagreements. These included trying to place RRI within the dominant R & I paradigm of economic growth, linking RRI with existing EC funding traditions, and taking up criticism from the academic RI communities by borrowing their notion of anticipation and reflection.

Owen and Pansera observe that “by adopting RRI the Science in Society programme successfully secured a home (and budget) for itself in the transition to Horizon 2020, where innovation, set in the context of the European knowledge economy, was now a key driver. In doing so RRI was a convenient umbrella term under which to repackage a set activities and action lines that had previously been focused more on science and society, extending these to (it was hoped) include innovation, in particular aimed at supporting societal (‘grand’) challenges facing Europe” (Owen and Pansera 2019b: 4).

Strand and Spaapen (2021: 3) arrive at the same conclusion, only formulated slightly different. They observe that the EC adopted RRI with little regard to “constructivist philosophy” but “translated the intellectual traditions that formed the basis of RRI into operational tasks, or ‘keys’ (...) that could be verified by a box-ticking exercise”.

Loeber et al. (2022) observe, that the, however, in their perspective, unwanted conceptual unclarity of the policy concept of RRI, provided space for bottom-up experimentation and New Public Governance in policy implementation.

However, we argue with Randles (2017), that the ambiguous and flexible use of RRI in different EC contexts came with costs. It prevented RRI from becoming a coherent, strong and convincing narrative that could be considered the remedy to problems which multiple audiences would see as legitimate and pressing. In addition, because of “the fragmentation into the five keys” RRI does not “appear to provide a coherent anchor which might otherwise provide an effective policy instrument” (Randles 2017: 25).

Our analysis showed how the Pro RRI AC was divided into a low and high church based on different definitions of RRI. As a consequence, the AC was not united; high and low church struggled against one another (Timmermans and Blok 2018). The ongoing conceptual struggle within the AC created confusion inside and outside of the AC and made it hard to send a clear and unified message or talk with one voice to policy makers. No united and strong “policy broker” discourse emerged to promote the embedding of RRI in EC funding. The division on concept, implementation and measurement weakened the key AC vis-a-vis an opposing and indifferent AC and provided arguments to delegitimize RRI. In addition, the AC increasingly lost institutional, legal, financial resources because of resistance from the opposing AC as well as many indifferent or adversary groups advocating (mainly neoliberal, economic) agendas that were seen as incompatible with an RRI orientation. RRI faced a strong opposition from the AC of “RRI critics”. Their belief system is identical to the dominant innovation paradigm (Timmermans and Blok 2018) and contradicts almost everything that RRI stands for. This is the most powerful AC which holds top position in policy making, administration and industry and thus controls

institutional, legal, and financial resources. The communities of the “de-facto RRI” AC share elements of the belief system of the “Pro RRI” AC. However, it has its own agenda according to the subject matter and does not align with the Pro RRI AC.

Given this analysis, RRI advocates should, instead of primarily focusing on the right definition, develop a strong and unified policy message and “build networks and mobilize resources, within and across the boundaries between academia, policy and civil society” (Shanley 2020). They should find key policy brokers in and outside the EC and effectively connect RRI to current changes in socioeconomic conditions (sustainability, climate change, responsibility, mistrust in science, etc.). Further research as well as policy advocacy is required to find appropriate and effective ways, grounded in a theoretically sound STS tradition, how to achieve this.

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Chapter 3

The Institutionalisation of a New Paradigm at Policy Level



Stephanie Daimer, Hendrik Berghäuser, and Ralf Lindner

Abstract The concept of Responsible Research and Innovation (RRI) has experienced a remarkable career within the European Union’s policies for funding research and innovation, culminating in the embedding of RRI as a cross-cutting issue in the Horizon 2020 (H2020) framework programme. However, despite favourable conditions, empirical evidence shows that efforts to mainstream RRI at the level of policy practice and implementation by and large failed. With the aim of better understanding the reasons for the limited success of mainstreaming RRI, the authors draw on the concept of Deep Institutionalisation (DI) and adapt it to the analysis of institutionalisation processes related to policy practice and implementation. The adapted DI concept is applied to H2020 by using recent findings from RRI research to provide empirical illustration. The results suggest that key preconditions for the successful institutionalisation of RRI policies were not fulfilled. Specifically, broader policy debates reaching beyond the confines of a small policy arena within the European Commission, a lack of experimental embedding allowing for adjustment to different contexts, and the development of ownership in particular were not achieved. Building on the cornerstones of the DI concept, the authors conclude that attempts to mainstream RRI in H2020 have been premature.

3.1 Introduction

The debate on Responsible Research and Innovation (RRI) has undergone a dynamic evolution since the term’s early conception more than two decades ago (see for a more detailed history the chapter by Griessler et al., Chap. 2, in this volume). Beginning with debates primarily related to the responsible development of nanotechnologies in the early 2000s, RRI has achieved remarkable attention in the academic discourse on the governance of science and innovation (Rip 2014). Most

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notably, RRI (or more precisely, a particular conception of it developed by the European Commission) was taken up by the European Union and actively promoted in its framework programmes. The high point of this policy journey thus far came with the establishment of RRI as a cross-cutting theme in the EU's Horizon 2020 framework programme (2014–2020) and with its broad embedding within the Science with and for Society (SwafS) funding scheme (Lindner and Kuhlmann 2016; Macnaghten 2020). The rise of RRI as a concept providing novel normative guidance in the governance of science, technology and innovation (STI) is closely intertwined with the emergence of a new and highly influential policy paradigm in the field of STI policy: instead of solely targeting the improved performance of research and innovation systems in order to increase economic growth and competitiveness, the new paradigm is primarily concerned with addressing so-called grand societal challenges. This strategic reorientation represents a “normative turn” (Daimer et al. 2012) in STI policy, as it entails the articulation and growing importance of the *directions* research and innovation should take (Lindner et al. 2016; Edler and Boon 2018; Breitingner et al. 2021). While not replacing the STI paradigm focused on economic objectives, the new paradigm has clearly exercised a significant impact on the STI strategies of the EU and of many individual countries, and is currently being pursued through the concept of mission-oriented innovation policy (Kuittinen et al. 2018).

In many ways, RRI complements the quest for directionality (or solution-orientation) in STI as it targets societally desirable long-term impacts. The concept attempts to better align STI processes and outcomes with the needs and expectations of society. It offers a set of operational, practical and process interventions for STI and addresses both institutional transformations and the behavioural change of researchers and innovators by promoting specific virtues such as reflectivity, inclusion, anticipation and responsiveness. RRI promotes a set of interventions for STI processes and provides guidance on how research and innovation processes and practices need to be transformed in order to reach high levels of directionality consistent with societal needs and values. As such, it can be defined as a new policy paradigm *per se*.

Yet, despite favourable conditions at the level of the broader policy landscape for RRI becoming firmly institutionalised within the European Union (EU) research and innovation funding system, particularly in the framework programmes, it may be concluded that the attempt to mainstream RRI has by and large not succeeded (Novitzky et al. 2020). This chapter aims to shed light on the reasons for this incomplete institutionalisation of the RRI paradigm. What are the relevant mechanisms and supporting and hindering factors that help to explain the limited success of RRI mainstreaming? To this end, we draw on and adapt the conceptual framework of Deep Institutionalisation (DI), originally developed to study organisational change, with the aim of developing a better understanding of the complex processes for interpreting, translating, contextualising and ultimately concretising the RRI paradigm into policy practice (Randles et al. 2014, 2016; Randles 2017). While established frameworks such as multiple streams (Béland and Howlett 2016) or the advocacy coalitions approach (Sabatier 1998; see chapter by Griessler et al., Chap.

2, in this volume) are instrumental in explaining policy (paradigm) change, they fall short of unlocking the black box on how a newly established policy paradigm becomes firmly embedded in actual policy practice and implementation. It is here that the institutionalisation perspective appears particularly promising, as it provides an analytical lens for uncovering how, between the high-level EU regulation on H2020 and its implementation at the level of funding research and innovation projects, RRI policy has spread, unfolded and been put into practice. In addition to identifying explanations for past unsuccessful RRI mainstreaming, this chapter's findings will also provide suggestions on how mainstreaming or institutionalisation of policy paradigms can be supported.

In the following, the concept of DI is introduced after a brief overview of the relevant literature on institutionalisation. In order to make the concept applicable to the context of policy practice and implementation, the key elements of DI are systematically adapted, thereby drawing on suitable concepts from policy analysis and implementation literature. The adapted DI concept is then applied to the efforts to mainstream RRI in the context of the H2020 European Framework Programme. We did not collect our own primary data for this. Instead, we draw on the rich evidence generated by NewHoRRizon and other relevant projects. The chapter closes with concluding remarks.

3.2 Literature Review

3.2.1 *Institutions, Institutionalisation, and Deep Institutionalisation*

In the literature on political science, “institutions” is understood as an umbrella term for different concepts and mechanisms which shape the behaviour of actors and their interactions: norms (formal and informal), (political) processes, organisational structures (hierarchies), etc. According to neo-institutionalism, the whole of society is seen as a structure made up of multiple institutions.

Institutions reduce complexity and insecurity by providing a certain order to everyday life and establishing guidelines for social interaction. As a result, institutions have a regulating effect with a simultaneous critical undertone. They are perceived as predetermined and regulate interaction without consideration for individual preference, thereby somewhat restricting the individual's freedom of action. Non-compliance with behaviour-regulating norms is often sanctioned; compliance is demanded or rewarded (Scott 1994, 203).

Institutionalisation refers to the process of the formation of institutions. It initially takes place when experienced actions are reciprocally typified. Customs, routines and habits are thus internalised through processes of socialisation and develop into institutions (Berger and Luckmann 1967, 53). Institutional development can be described as continuity and change within an institutional form. While

reinstitutionalisation represents the change from one institutional form to another, deinstitutionalisation may take place, for example, by means of regulatory change such as legislative amendments, as well as through normative and cognitive changes (Jepperson 1991, 152). Deinstitutionalisation, then, occurs when social support for certain institutions decreases and the foundations for objectification and sedimentation start to erode (Tolbert and Zucker 1996, 181). Usually, institutional change comprises simultaneous institutionalisation and deinstitutionalisation processes (Randles and Laasch 2016, 60).

According to organisational theory, institutionalised structures, techniques, policies, and programmes sometimes function as myths, and many complex organisations adopt them ceremonially, even if they conflict with efficient criteria or with de facto organisational action (Meyer and Rowan 1977, 340). Organisations build up these formal structures to conform to the institutional environment and to gain legitimacy. These structures subsequently have little connection to the organisation's core activities and mainly serve as a facade created for stakeholders outside the organisation (Boxenbaum and Jonsson 2008, 78). In contrast, DI is the opposite of what neo-institutionalists call shallow institutionalisation or window dressing. The concept of DI was developed by Randles et al. (2014, 2016; Randles 2017) to better analyse processes of institutional change in organisations, their barriers, and their drivers. Randles et al. (2016) applied this concept to analysing forms of the deep institutionalisation of Responsible Research and Innovation (RRI). Here, DI is characterised by its long-term and resilient nature, including tendencies towards socio-technical lock-in and irreversibility. DI has an interdependent, systemic nature, comprising integrated and mutually supporting infrastructures of social norms and routines, governance tools, and economic and ideological logics. It can be defined as the internalisation of normative orientation and a collectively shared value system expressed in practical demonstrations (Randles et al. 2014, 32). Randles et al. therefore developed a framework of four elements to analyse the DI of responsibility in research and innovation:

1. Evolution of dominant narratives: new understandings of responsibility sediment over existing ones. Dominant narratives correspond to different dominant institutional logics, thus theorising a small and distinctively different number of “ideal types” with distinctive characteristics and profiles. In reality, these ideal types coexist and structurally overlap.
2. Maturation process: the maturation process involves gradual embedding into the routines, everyday practices, systematised techniques, methodologies, procedures, and incentive structures and performance metrics of actors. It can be evaluated according to different levels of graduation – “emergence”, “maturity” and “resilience”.
3. Systemic consolidation: systemic consolidation refers to a situation in which mature practices and forms of responsibility are not merely localised experiments within the organisation, but instead widely shared routinised techniques, norms, standards, governance and regulatory instruments as well as structures, organising practices and inter-organisational exchanges. Forms of responsibility

are mutually accepted and understood, and shared by different professional groups within the organisation. Randles further describes the systemic “overflowing” character of “deep institutionalised” forms of responsibility as a set of virtues that characterise the ecosystem in which an organisation operates, i.e. a mutual understanding that characterises partnerships (Randles 2017, 29).

4. Vertical multilevel alignment: this fourth element of DI considers the coherence of the organisation’s activities with its external environment and with different levels of governance, bearing in mind that powerful organisations have the scope to influence and shape their own external environment.

Randles et al. (2016) developed this concept to study value-based organisational change and organisational transformation processes. The effectiveness of transformation towards particular normative goals can rarely be evaluated *ex ante*. One has to wait and look back with the benefit of hindsight to make an *ex post* evaluation of “success”. The concept has been used to study the institutionalisation of RRI in research-performing organisations (Randles 2017; Berghäuser and Daimer 2018). These first empirical applications suggest that DI is a long-term process, taking several years if not decades. It is also non-linear in the sense that, instead of new institutions gradually and smoothly replacing existing ones, there is a process of back and forth, where new normative claims and new practices challenge existing ones, and where “battles” between conservators of the status quo and change-oriented institutional entrepreneurs lead to an iterative and experimental developmental process. Moreover, empirical observations point to a temporal dimension to these layers, meaning that one might first expect change at the level of narratives and discourse, followed by (initially experimental) changes in practices based on this, and subsequent systemic consolidation and proliferation.

3.2.2 Deep Institutionalisation: An Attempt to Apply the Approach to Analysis of the Policy Level

In this chapter, we seek to use the DI concept to disentangle the multiple layers of RRI institutionalisation at the level of policy practice and implementation. Since the concept was originally developed for studying organisational change, it requires a degree of adaptation for application to policy analysis. We argue that the concept can indeed be utilised in this way and provide support for the four elements of institutionalisation with concepts from policy analysis literature.

1. Evolution of dominant narratives: in policy theory, the concept of discursive institutionalism encapsulates the axis of questioning existing narratives and creating new counter-narratives. Discursive institutionalism represents a dynamic approach to policy change in which change is possible through ideational processes and policy discourse (Kangas et al. 2014, 73–74). Discursive institutionalism “simultaneously treats institutions as given (as the context within which

agents think, speak, and act) and as contingent (as the results of agents' thoughts, words, and actions). These institutions are therefore internal to the actors, serving both as structures that constrain actors and as constructs created and changed by those actors." (Schmidt 2008, 314). Agents are seen as using background ideational abilities and foreground discursive abilities. "[...] Discursive abilities represent the logic of communication, which enables agents to think, speak, and act outside their institutions even as they are inside them, to deliberate about institutional rules even as they use them, and to persuade one another to change those institutions or to maintain them." (Schmidt 2008, 314).

2. Maturation process: the mechanisms of maturation described for organisations may be equated to policy learning. Among the various conceptions in the literature, we follow the structure provided by Bennett and Howlett (1992) which differentiates between three levels: *government learning* by state officials learning about processes in policymaking and generating organisational change; *lesson-drawing* by policy networks learning about policy instruments and generating policy programme change; and *social learning* by policy communities learning about ideas and generating policy paradigm shifts (Bennett and Howlett 1992, 289; Borrás 2011, 727). While social learning is defined along similar lines of argumentation as discursive institutionalism, the aspect of lesson-drawing might be an interesting one to focus on in the context of our analysis.

Furthermore, the literature on policy experimentation has discussed mechanisms which also follow the logic of maturation processes in the DI concept. Policy experimentation has been defined as "the process of iterative adaption to new circumstances and experiences that entails a certain idea of progress and improvement but no teleological endpoint," (Huitema et al. 2018, 146) and "a temporary, controlled field-trial of a policy-relevant innovation that produces evidence for subsequent policy decisions" (McFadgen and Huitema 2018, 164). Policy experiments can allow for different facets of learning. For example, "experiments can be one way to deal with the uncertainty and ignorance about transformation dynamics and effects of intervention" (Voß and Kemp 2006, 18). Second, experiments can change expectations about what is normal, build capacities, and affect coalition formation (Bernstein and Hoffmann 2018).

3. Systemic consolidation: in the policy context, and particularly in the context of the EUs Framework Programme for Research and Innovation, the systemic consolidation of a new policy priority would mean either the implementation of new instruments or the operationalisation of new policy guidelines of a horizontal nature as cross-cutting issues. Literature on policy implementation is broad and in fact often focuses on new instruments and the issues that might arise for specialised implementation agencies and authorities in the context of implementation. Thematic foci in the implementation literature are knowledge, learning and capacity in implementation, the processes of implementation, the role of actors and agents in implementation, and bureaucratic discretion in implementation (Schofield 2001, 253). In connection with the horizontal nature of RRI, the literature on "whole-of-government" approaches (WGAs) provides some additional insights. WGAs were first introduced in the UK (under the term "joined-up

government”) as a reaction to the “pillarisation” of the public sector following New Public Management reforms (Ross et al. 2011, 134). “Whole-of-government denotes public services agencies working across portfolio boundaries to achieve a shared goal and an integrated government response to particular issues. Approaches can be formal or informal. They can focus on policy development, programme management, and service delivery” (Christensen and Lægheid 2007, 1060). Authors also stress the need for cultural change: a focus more on building a strong and unified sense of values, trust, value-based management, and collaboration; on team building; on involving participating organisations; and on improving the training and self-development of public servants (Ling 2002).

4. Vertical multilevel alignment: at the policy level, the fourth element of DI is excellently captured in the concepts of policy transfer and policy diffusion. Policy transfer has been defined as the “process in which knowledge about policies, administrative arrangements, institutions and ideas in one political setting (past or present) is used in the development of policies, administrative arrangements, institutions and ideas in another political setting” (Dolowitz and Marsh 2000, 5). Policy diffusion has been characterised by the following elements: a process by which a (policy) innovation is communicated through certain channels over time among the members of a social system (Zito and Schout 2009, 1108, citing Rogers 1983, 10). Marsh and Sharman (2009, 270) have specified the difference between the two in the following way: “work on diffusion tends to emphasize structure while those writing on transfer tend to privilege agency”, highlighting the fact that in the end both elements are relevant foci of analysis. Moreover, if one follows neofunctionalism as the most classical theory of European integration, one can expect policy spillovers from the European to the national and regional levels. Proliferation of the RRI concept to the national level may best be characterised by spillover of the cultivated kind: “cultivated spillover, finally, relates to supranational institutions acting as the agents furthering integration, not only as mediators of national or group interests. In this case, supranational institutions pursue a supranational agenda even where MS are reluctant to integrate further” (Scholten and Scholten 2017, 927).

3.3 Empirical Illustration

In this section, we summarise the elements of the DI concept and how we think they can be used for policy-level analysis as outlined in the previous section. We apply this concept to the policy practice and implementation of the European Framework Programmes (FPs), with a focus on Horizon 2020, operational from 2013 to 2020.

The empirical question we want to answer focuses on the relevant mechanisms and supporting and hindering factors that help explain the limited success of RRI mainstreaming in Horizon 2020. We have argued that translating the DI concept to the policy level promises to add value when it comes to questions of policy practice and implementation, thus complementing studies which seek to explain policy

change or the rise of new policy paradigms. Consequently, we aim to understand whether the mainstreaming of RRI across all parts of the Horizon 2020 programme followed the logic provided by the third element of Randles' DI model, "systemic consolidation" (Randles 2017). Given our understanding of the DI concept as a sequential model, where new narratives are first manifested and new practices subsequently experimented with before consolidation or mainstreaming take place, we attempt to trace these elements empirically, too. We additionally provide empirical insights into the fourth element – vertical multilevel alignment – and how this may have evolved despite the observation that RRI mainstreaming in H2020 by and large failed.

Empirically, we approach the four DI elements on an illustrative basis with each of the four elements supported by different sources. Thus, we do not perform any primary data collection or secondary data analysis. We cite existing empirical work that can be used to illustrate the various DI elements.

There are two major empirical studies that we use for illustration purposes: the NewHoRRizon project and the MoRRI study. In the NewHoRRizon project, so-called Social Labs are at the core of the work. Their goal is to provide a socially based, experimental and systematic approach for addressing complex social challenges related to RRI. Each Social Lab is dedicated to a different section of Horizon 2020. For every section of H2020, different stakeholders gathered in a Social Lab to define the social challenges at stake and develop social experiments (= pilot actions and activities) to overcome them. The Social Lab process was prepared following diagnosis of the state of RRI in each programme section after three years of H2020 (at the end of 2017). Cross-sectional analysis of the diagnostic reports has been conducted to provide a broad picture of the state of RRI implementation within H2020 (Novitzky et al. 2020). The MoRRI (Monitoring the evolution and benefits of Responsible Research and Innovation in Europe) study programme began with an initial scoping of the RRI dimensions (gender equality, public engagement, science literacy and science education, open access, ethics, and the overarching dimension of governance). A data collection at the European Union Member State level included more than 36 indicators. Testing the data results for robustness and significance led to identification of core indicators and a clustering of EU countries.

While the NewHoRRizon diagnosis will serve to illustrate the third DI element (systemic consolidation), the MoRRI study provides information on the fourth element (vertical multilevel alignment). For the first axis of the paradigm shift, we present a summary of the current academic debate for illustrative purposes. There is no significant research available on policy experimentation in the context of RRI or Horizon 2020, which may point to a potential shortfall in policy practice. Hence, for the section on maturation, there is little material to be discussed.

The following table provides an overview of the conceptual and empirical application of DI to RRI policy practice and implementation within Horizon 2020 (Table 3.1).

The following section presents results and a discussion and is structured along these four elements of DI. Applying the DI concept, we have formulated

Table 3.1 DI elements at the policy level and empirical illustrations of RRI within Horizon 2020

| Expectation regarding DI of RRI at the policy level | Empirical illustration of RRI in Horizon 2020 |
|---|---|
| <p>The evolution of dominant narratives regarding RRI which do not replace but gradually sediment over existing ones.</p> <p><i>Expectations:</i> presence of normative claims calling for the RRI approach in the funding programme; coexistence of existing and new narratives; explanation of relation of new normative claims to existing ones.</p> | <p>Relevant arena of discourse: contributions by European-level actors, in particular the Commission as owner of the programme; contributions by stakeholders of the programme, e.g. (potential) beneficiaries, members of the advisory groups and programme committees, evaluators etc.</p> <p><i>Empirical sources:</i> among others: Timmermans and Blok (2018) on four concepts of responsible innovation (RI) and their relation to the dominant techno-economic innovation paradigm</p> |
| <p>Maturation processes regarding RRI, involving gradual embedding into the routines, everyday practices, systematised techniques, methodologies, procedures, incentive structures and performance metrics of actors.</p> <p><i>Expectations:</i> experimental embedding into funding schemes, KPIs etc. of the programme (trying out new practices, incentive structures for certain parts of the programme, etc.); policy learning (lesson-learning) about the programme.</p> | <p><i>Empirical sources:</i> no major studies available. We are also not aware of policy experiments related to RRI in the framework programme.</p> <p>The small number of RRI projects in H2020s predecessor programme FP7 (Science in Society work programme) can be seen as very limited experimentation.</p> |
| <p>Systemic consolidation of RRI, describing a situation where mature practices are not merely localised experiments, but instead are extensively shared by different professional groups, as well as “systemic overflowing”, meaning that projects are built on a mutual understanding based on the newly emerged values.</p> <p><i>Expectations:</i> mainstreaming into programme (e.g. implies moving from ad hoc localised experiments to extensively shared routinised techniques, practices, standards, norms and governance, regulatory instruments); formal and informal approaches by the implementing agencies towards developing an integrated response; training of public servants.</p> | <p><i>Empirical sources:</i> NewHoRRizon diagnosis of the implementation of RRI within the 19 programmes (Novitzky et al. 2020).</p> |
| <p>Vertical multilevel alignment of RRI.</p> <p><i>Expectations:</i> mechanisms of policy transfer and policy diffusion to the national, subnational and global level.</p> | <p><i>Empirical sources:</i> MoRRI study on the adoption of RRI in EU member states (European Commission 2018) and evidence from projects funded under the SwafS programme.</p> |

expectations for the institutionalisation of RRI at the policy level for each element which will be analysed and discussed in the next section.

3.4 Results and Discussion

3.4.1 *The Evolution of Dominant Narratives*

Several authors have either contributed to the discourse on RRI (von Schomberg 2012; Stilgoe et al. 2013; Owen and Pansera 2019) or have analysed it (e.g. Timmermans and Blok 2018; Strand 2019). On the one hand, they find RRI being rooted in the classic techno-economic or techno-fix paradigm, meaning that technology is seen as a means to generate jobs and growth, and that technology as such brings huge benefits for society. Within this logic, RRI offers certain tools or practices to mitigate the unintended consequences of technological progress. This is represented by the concepts put forward by the European Commission and to some extent also by von Schomberg (2012).

On the other hand, analysts of the discourse have distinguished separate emerging narratives related to RRI. One narrative, for example, builds on the need to enhance the performance of research and innovation by putting forward a systemic argument (Strand 2019): increasing specialisation in knowledge production has intensified the emergence of silo structures and thinking. Networks and boundary-spanning are increasingly needed to address the multifaceted global environmental and social challenges of our times. Here, engagement is central, and RRI can be seen as one of the various means to introducing boundary-spanning interdisciplinarity and the integration of new perspectives (non-academic, user, societal).

Others have formulated this narrative of RRI far more radically by setting it in contrast to the narratives of the freedom of science and of excellence. Freedom of science, or, “what Michael Polanyi called the ‘republic of science’ makes it easy for scientists to offload responsibility. Polanyi’s science is self-organising and devoted to the pure pursuit of knowledge” (Stilgoe 2014; see also Randles et al. 2016). This in turn leads to a bias towards valuing disciplinary research and defining excellence within disciplinary boundaries (Rafols et al. 2012). Thus, while scientific and technological advancements achievable in mono-disciplinary academic approaches blossom in the republic of science, “wicked” social problems that would require transdisciplinary approaches to address them are systematically discouraged as mediocre. Furthermore, von Schomberg (2019, 21) criticises competitive science as a closed context, whereas addressing social problems would require open research systems.

Another emerging RRI narrative challenging this also has very radical potential, since it sets out to deinstitutionalise not only established research and innovation practices, but also the way in which research is measured. In particular, the directional element of steering STI towards addressing the “grand challenges” of our

time has a very radical potential, as it calls for RRI interventions that support “upstream” modulation as well as anticipation, reflexivity and shared priorities (Owen et al. 2013; Stilgoe et al. 2013; Owen and Pansera 2019). The DI concept suggests that institutionalisation of RRI at the policy level cannot work well if there is no normative discussion, i.e. no narrative of change offered. The above shows that the normative discourse on RRI has been and still is very intense. The discourse is characterised by the radicality of the RRI narratives offered and by the at times dogmatic way in which they are presented by critics of the EU approach. The European Commission’s five (six) RRI keys’ approach has been criticised as being too shallow, risking serving as mere window dressing with no real shift in policy paradigms achieved. However, the proponents of the more radical RRI narratives themselves barely engage in explaining how their own RRI approach connects to the existing excellence, growth and techno-fix paradigms, something which is left to academic analysis, as Timmermans and Blok (2018) have shown.

3.4.2 Maturation by Way of Experimental Embedding

Experimental embedding of a new paradigm at the policy level would mean testing new elements in funding practice by integrating these new elements into selected parts of a funding programme, e.g. a subprogramme or a specific call for proposals. One would further expect mechanisms that foster policy learning to arise from this experimentation.

RRI has become a cross-cutting issue in Horizon 2020. Cross-cutting issues are meant to promote linkages and interfaces between the specific priorities of Horizon 2020.¹ The programme provides incentives for actions that address cross-cutting issues (e.g. EU Science & Innovation 2014).

Inclusion as a cross-cutting issue in H2020 does not mean experimental or gradual implementation. Instead, it means full roll-out across the programme, a top-down one-size-fits-all approach. No efforts have been undertaken to develop practices within individual parts of the programme that are adapted to the specific characteristics of the parts and incorporate knowledge from practitioners.

Under the Science with and for Society (SwafS) programme, several projects were funded to expand the knowledge base for mainstreaming RRI. SwafS could therefore have been the experimentation arena for furthering full mainstreaming. In point of fact, SwafS projects were funded in parallel, and their results came too late for the vast majority of H2020 calls. Experiments like the New HoRRIZon Social Labs in particular could have helped generate practice-oriented experimental knowledge across all programme lines if the project had taken place before RRI was

¹Regulation (EU) No 1291/2013 of the European Parliament and of the Council of 11 December 2013 establishing Horizon 2020 – the Framework Programme for Research and Innovation (2014–2020) and repealing Decision No 1982/2006/EC Text with EEA relevance. *OJ L 347, 20.12.2013, 104–173.*

rolled out to the whole funding programme. The NewHoRRIZon project set up these so-called Social Labs in order to create spaces for bottom-up experimentation with RRI and adaptation to the needs of the individual H2020 programme parts.

Earlier RRI studies funded under H2020s predecessor FP7 or the MoRRI study might have been able to deliver initial insights at an experimental level about the implementation of RRI in the funding schemes of the EU's framework programme, but were not treated as such. The MoRRI study was cited in H2020 calls as a reference framework for expected impacts, without taking into account the fact that the MoRRI indicators were developed at a national not project level.

Furthermore, the ex post evaluation of FP7 concluded that the time was not ripe to integrate RRI as a guiding principle throughout H2020. This observation included a more general criticism of the approach to cross-cutting issues in the framework programmes in general, which in many cases does not allow for an effective embedding into the calls and proposal templates (European Commission 2015, 70), and is thus not well suited to fostering systemic consolidation (see next section). For certain elements of RRI, in particular gender equality, there were about 20 years of experimentation and fostering of action in the framework programmes, which in turn led to an integration of gender equality aspects as a cross-cutting issue in Horizon 2020. However, in contrast to other cross-cutting issues, gender became an integral part of the excellence section in the proposal template, which is seen as a more successful move from experimental embedding to systemic consolidation. Nevertheless, this does not alter our observation that while there has been at least a partial maturation process of some elements of the RRI concept (in particular gender equality), the whole concept as a package has not been tested in an experimental way that would have allowed for maturation.

3.4.3 Systemic Consolidation: Mainstreaming

In order to assess the degree and quality of the institutionalisation processes of a policy paradigm, it is essential not only to study the level of codified policies and their depiction in relevant documents. While the inclusion of the policy objectives and the interventions to reach these objectives are a necessary condition for policy institutionalisation, the declaratory level of strategic policy needs to be sufficiently followed-up by and translated into the processes of implementation (Peters et al. 2018; Kroll 2019). The systemic consolidation of a policy paradigm thus unfolds in at least two main dimensions: (1) the extent to which the substance, the purpose and the intervention logic of a policy are in fact broadly shared and represented across all relevant policy subdomains. With regard to H2020, this "mainstreaming" of a policy is indicated by the extent to which the ambitions and goals of RRI are firmly embedded in the policy documents of the 19 thematic funding schemes of the framework programme. Empirically, this embedding should be observable in the respective work programmes and call texts of the funding schemes. (2) The second important dimension of systemic consolidation relates to the actual implementation

of the policy. How and to what extent are the intentions and prescriptions of policy meaningfully translated into the practices of governance? Have shared understandings, routines, norms, and standards emerged on the part of those implementing the policy that are conducive to policy intentions? In the context of the European framework programmes, if we wish to assess the translation of policies codified in the work programmes, we can examine the information provided to potential applicants, the call texts and proposal templates, changes in the criteria by which proposals are evaluated, the training of the evaluators of proposals and external experts reviewing ongoing projects. Finally, the way *ex post* evaluations of H2020 funding schemes are designed can also be an important signifier of the extent to which systemic consolidation has been achieved.

Analysis of RRI mainstreaming in H2020 suggests that efforts have fallen short of achieving satisfactory results (Novitzky et al. 2020). At the level of the Horizon 2020 legislation RRI is defined as a cross-cutting issue, granting RRI a high priority in all 19 of the H2020 funding schemes. However, even at the level of the 19 sub-themes, RRI elements are only well represented in a few of the work programmes. In most cases, references to RRI are superficial at best. Between the declaratory policy level of the H2020 legislation, where RRI is well established, and the individual work programmes a notable discrepancy becomes apparent. Thus, right from the first dimension of systemic consolidation of a policy paradigm, a rather patchy and shallow embedding of the new paradigm in the relevant policy subdomains has been identified. Turning to the second dimension of systemic consolidation of a policy paradigm – the translation of policy objectives into implementation and practices – the findings suggest an even greater translation failure than in the first dimension. Judging from the empirical data available, RRI was not systematically integrated into call texts and was largely absent in proposal templates and evaluation criteria for proposals.

The incomplete systemic consolidation of RRI as a policy paradigm within H2020 can be ascribed to insufficient translation both at the level of the policy subdomains and at the level of policy implementation. Arguably, the translation appears to have failed because the programme owners and policy officers of most of the 19 funding schemes continue to align their policy formulation and implementation actions with normative orientations that are largely not part of the RRI paradigm. This suggests that insufficient care was taken by the promoters of RRI at the strategic policy level to establish processes and conditions that are conducive to embedding of the RRI narratives at the level of the policy subdomains (Braun et al. 2019). Given the high degree of heterogeneity of the 19 subdomains of H2020 in terms of funding objectives, addressees, funding mechanisms, disciplinary cultures etc., a procedural and discursive approach allowing for the modulation of RRI aspirations according to the needs of the respective policy subdomains would most likely have been more promising for creating the necessary broad ownership.

Moreover, the Research Executive Agency of the European Commission itself, responsible for the management of H2020 programs, has pointed to weaknesses of the programme's "cross-cutting issues" as an instrument for systemic embedding, since the way in which they feature in the programme varies. Only a few of them

were consistently translated into all the work programs, into the calls and then on into the proposal template and evaluation criteria (European Commission 2020, 21ff).

3.4.4 *Vertical Multilevel Alignment*

Assuming that European-level discourses have the power to affect national policy debates and policy practice, it is worthwhile briefly reflecting on national R&I strategies and operational policies. Furthermore, since the SwafS programme funded organisational change aimed at embedding RRI practices, one might expect to observe experimentation with RRI-type approaches in research-performing and research-funding organisations within and outside the EU.

In the MoRRI project (Monitoring the evolution and benefits of Responsible Research and Innovation in Europe), various analytical steps were taken to facilitate measurement or monitoring of RRI at the country level. In a cluster analysis, four country clusters were identified based on country scores for eleven retained factors or empirically founded dimensions of RRI out of a total of 36 RRI-indicators.²

In a second step, the characteristics of the four clusters were analysed. The radar plot below shows how well each of the four groups of countries have embraced the eleven RRI dimensions used for the cluster analysis. For ease of presentation, each RRI subdimension is normalised to a value from 0 to 1, representing the full range from minimum to maximum possible effort, attention or performance within the respective areas (Fig. 3.1).

The results of the cluster analysis demonstrate a significant diversity across the European landscape regarding RRI. Efforts, attention, and priority-giving across the 11 RRI-related subdimensions are unequally distributed across the countries. The roots of this diversity are not discernible from the graphics and require a better understanding of country-specific historical development of the science-society relationship, research and innovation policy approaches, as well as long-standing civic and political culture.

At the operational level of actual R&I policies and instruments, some countries have been found to “experiment” with RRI (Mejlgaard et al. 2018). In the UK, the Engineering and Physical Sciences Research Council (EPSRC) became the first agency to adopt an RRI framework in 2013. Analysing the proliferation of RRI in twelve European and non-European countries, the RRI-Practice project concludes that some countries have now adopted RRI in principle for their national R&I policies (Owen et al. 2017). Within the UK Research Council, for example, other agencies have followed the EPSRC’s lead. The Dutch Research Council (NWO) operates a funding initiative and platform for RRI, and the Research Council of Norway also

²For closer information about the methodological approach and the data used for the cluster analysis, see European Commission (2018).

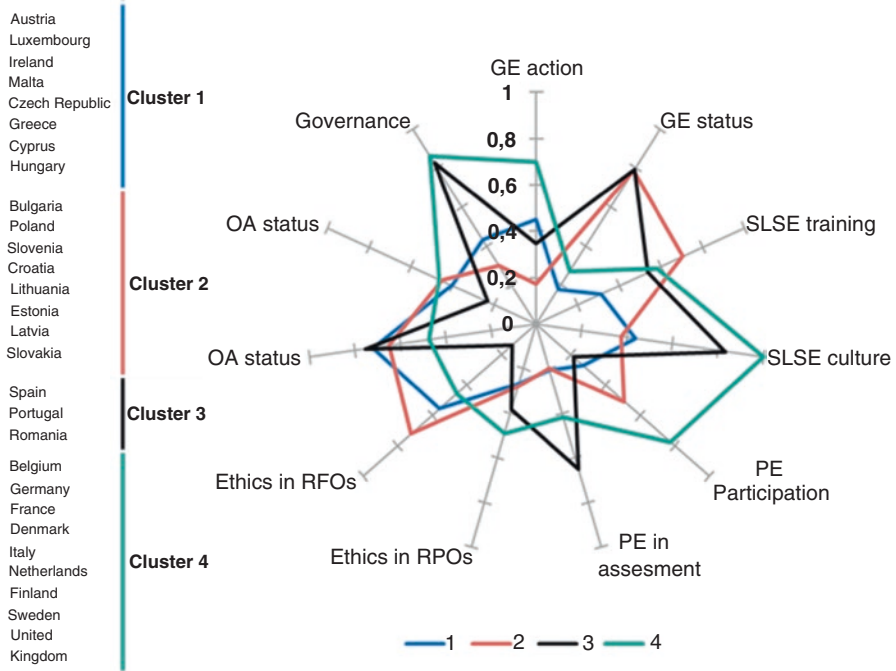


Fig. 3.1 Radar plot showing the characteristics of the four country clusters. (Source: European Commission, 2018, 28)

engages intensively with the RRI concept. A major investment is the RRI Hub approach with its strategic initiative for digital life.

With reference to the DI framework, these embeddings into national funding represent policy spillovers or vertical multilevel alignment. However, in most EU member states RRI is not deeply institutionalised or entrenched as a guiding principle or core value in the governance and practice of national research and innovation policies.

The European Commission has planted further seeds to encourage this, with H2020s SwafS programme funding a number of projects that foster the embedding of RRI into national research-funding and research-performing organisations (RFO and RPO). SwafS has also aimed for similar impacts at the level of its beneficiaries. According to a recent inventory of SwafS achievements, at least 238 documented institutional changes were achieved among organisations who were either recipients of SwafS funding or the focus of organisational change projects under its auspices (European Commission 2020, 84). Within the framework of DI, the categories assembled under the headline of institutional changes appear to be a mixture of experiments with new practices and of systemic embeddings into organisational routines or structures. It is too early to assess whether these institutional changes will eventually lead to a DI of RRI. Finally, there are developments outside Europe sometimes explicitly referring to the European approach (e.g. in China or Australia)

and sometimes building on other, similar bases (e.g. ELSA approaches in the US). Once again, SwafS programme funding has supported this proliferation³, but it remains to be seen whether these efforts develop into self-sustaining practices once the funding has ended.

3.5 Conclusion

In this chapter, we argued that the concept of DI, originally developed to explain the embedding of RRI and similar approaches within organisations, can also be applied to explaining the institutionalisation of a new policy paradigm. Further, we argued that the value of this approach is demonstrated in explaining paradigmatic shifts in policy practice and implementation, while complementing other concepts explaining policy change and policy paradigm change per se. Our research question was to identify the relevant mechanisms and supporting and hindering factors that help to account for the limited success of RRI mainstreaming in Horizon 2020. To this end, we revisited existing evidence from RRI research in light of the DI concept. Based on the assumption within the DI concept that its four characteristics represent different degrees of institutionalisation and that there is also a temporal dimension to these processes – where “primary” layers of institutionalisation (narratives, gradual experimentation) come first, before systemic consolidation and vertical multilevel alignment – we examined the current state of institutionalisation of RRI at the level of policy practice and implementation.

In short, we have observed an intense policy and academic discourse about RRI at the European level, where at least three policy *narratives* have emerged over the course of the past twenty years that challenge existing R&I policy paradigms. What the discourse still lacks is a more pragmatic approach that paves the way for a broader paradigm shift within the European Commission and the R&I community. Here, the role of agency and institutional entrepreneurship in paradigm shifts comes into play, something that we did not consider in this analysis, since we believe it is better covered by analytical approaches examining policy (paradigm) change in more detail (see e.g. the chapter by Braun et al. in this volume).

One very problematic finding from the perspective of the DI concept is that there has been no phase of *experimental embedding* into funding practices. Horizon 2020 defined RRI as a cross-cutting issue, aiming for its implementation across all programmes without having tested the application of the concept as a whole to the funding practice of the different programmes. Experimenting with RRI in a limited number of calls or programme parts would have made it possible to operationalise the strategic objectives of the cross-cutting themes by integrating programme-specific bottom-up knowledge. This could have included developing new practices

³E.g. compare the H2020 projects RRI Practice, NULEUS, RRING, and SUPER MoRRI.

in the form of guidelines or training for agency staff, evaluators, and applicants, as well as mechanisms for learning and cross-fertilisation with other programmes.

Consequently, given the shortcomings in initiating a broader discourse across EC directorates and experimenting with embedding RRI into funding practices, the pre-conditions for the *systemic consolidation* of RRI within the European framework programme were, in our view, not satisfied. The owners of the individual work programmes were not prepared to implement RRI in a meaningful way, and the instrument of cross-cutting themes has generally proven not to be well suited to advancing institutionalisation at the level of policy practice and implementation.

As for *vertical multilevel alignment*, we see in the UK, Norway, and the Netherlands a small number of particularly interesting instances where RRI is manifested in national R&I funding, despite the fact that the mainstreaming of the concept experienced setbacks within Horizon 2020. This observation suggests that national RRI initiatives seem to be rather loosely coupled to the associated EU policies and are thus less dependent upon successful systemic consolidation at the supranational level. Nevertheless, the DI concept does not strongly suggest a firm conditional relationship here. It seems that it is the (new) policy paradigm that is crucial for the transfer or diffusion of a policy idea and not the policy practice or implementation.

Interestingly, while RRI policy practice and implementation at the European level largely failed, the British, Norwegian, and Dutch approaches provide examples to learn from: these countries have taken very different approaches to adopting RRI into the evaluation and funding of research. However, what these countries have in common is that they have all taken experimental steps prior to broader implementation and have all chosen pathways of systemic embedding that require researchers to comply with the concept, but also offer practical guidance on how to do this. Overall, our work on the identified levers and barriers to the institutionalisation of RRI at the European level supports others who have argued that the problem does not lie with the RRI concept as such, but in the way it has been implemented (e.g. Novitzky et al. 2020). Moreover, the application of the DI concept has shed light on the important aspects of policy discourse and, in particular, experimental embedding. Our conclusion from this analysis to promote deep institutionalisation of RRI is that the experience of the setbacks in implementing RRI within Horizon 2020 are an important source for policy learning. The next framework programme, Horizon Europe, should be seen as a chance to experiment with RRI in the different parts of the programme, all the more as the mission orientation of Horizon Europe is seen as to further manifest the paradigmatic shift to challenge-orientation. It is not yet fully clear how much of the ambition of Horizon Europe to orientate research and innovation differently, will manifest in actually doing things differently. This ultimately could mean to (re)activate practices of RRI, implying also a potential further systemic consolidation of the concept and thus a further institutionalisation.

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Chapter 4

Democratic Experimentation with Responsibility: A Pragmatist Approach to Responsible Research and Innovation



Joshua B. Cohen and Robert Gianni

Abstract Disruptive societal changes following from emerging science and technology have recently led to a growing interest in developing ethical frameworks. Responsible Research and Innovation (RRI) is such a framework that aims to improve the relationship between science and society. Now a decade after its conceptualization, it still seems to suffer from conceptual unclarity and lack of implementation. Since responsibility in research and innovation practice remains as important as ever, we propose to revive the normative potential of RRI by approaching it as a matter of collective democratic experimentation. To further develop this approach, we propose a pragmatist conceptualization inspired by John Dewey, his work on democracy as an ethical way of life and his attention to the contextual nature of responsibility. Furthermore, we show how his interest in social inquiring publics provides a particularly apt foothold from which to operationalize collective democratic experimentation with RRI. We will illustrate the utility of this approach, with specific attention to the social, experimental and public character of social inquiry, by connecting it to the recent call to use social labs methodology to experiment with RRI. From this we draw lessons for future collective democratic experimentation with responsibility in research and innovation practice.

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4.1 Introduction

Socio-technical innovations and new and emerging technologies constantly generate new challenges and opportunities for our societies. From Artificial Intelligence (AI) to robotics and from mobile devices to smart cities, the growing development and broader impact of science and technology on society require measures to make sure that its resulting processes and products are ethically acceptable, socially desirable and sustainable. The recently adopted European framework of Responsible Research and Innovation (RRI) aims at offering a framework to address these challenges and thus improve the relationship between science and society.

However, there is a growing understanding that RRI suffers from a lack of conceptual clarity, that it misses real-world implementation (Ribeiro et al. 2017), and that it lacks in terms of institutionalization and mainstreaming (Christensen et al. 2020; Novitzky et al. 2020). This combination has arguably led to a waning policy relevance (Fisher 2020). Against the grain of these developments, authors have recently suggested exploring a different approach to RRI. Notably, Nordmann (2019) has argued for treating RRI as a collective experimentation strategy with attention to how the framework may inform experimental processes of social learning around responsibility in concrete research and innovation practices. Timmermans and others (2020) have proposed to use a social lab methodology to experiment with bringing RRI into practice. Treating RRI as a collective experimentation strategy may increase its prospects for practical implementation and thereby provide a practice-oriented pathway out of the current conceptual-, implementation- and policy deadlock.

Even though said authors provide us with some guidance in terms of salvaging RRI from its own shortcomings, it is unclear how especially the *democratic* character of experimentation with RRI may be further philosophically grounded and operationalized for concrete research and innovation practice. In this chapter, we will argue that the pragmatism of John Dewey can provide the necessary philosophical and conceptual grounding for collective democratic experimentation with RRI. The aim of this chapter is thus to provide a normative and conceptual contribution for readers interested in democratic experimentation with RRI by answering the following research question:

What is, from a pragmatist perspective, a proper way to conceptualize and understand collective democratic experimentation with RRI in social labs?

We will start the chapter by highlighting the challenges of research and innovation and the frameworks that have been introduced in response to this, including RRI. We will describe some current shortcomings of RRI and the formulation of RRI as a collective experimentation strategy as a promising solution to these issues. We will argue that the significance of this strategy for a responsible approach to research and innovation especially lies in its implicit democratic character. Furthermore, we will argue that particularly the pragmatism of John Dewey and his understanding of democracy as an ethical way of life together with the central role of social inquiry

provides a fruitful way forward in further conceptualizing and operationalizing RRI as a collective democratic experimentation strategy. Finally, we will connect these insights to the recent call to use social labs methodology to bring RRI into practice (Timmermans et al. 2020). To conclude, we will end our analysis with some insights on future democratic experimentation with RRI and other related concepts.

4.2 Complex and Disruptive Changes

It would be difficult to deny and hazardous to underestimate the growing influence that research and innovation and resulting technological developments exert on our societies and their functioning.¹ Although the increasing impact of technique (technology) has been a recurring topic of philosophical debate for a long time (Heidegger 1977; Marcuse 2003; Feenberg 1991) it seems evident that its influence is accelerating more than ever.

For one, newly emerging information and communication technologies are redrawing communicative relationships between humans and communities (Florida 2014). Innovation in the digital age is leading to radical changes in societal relationships including those between labor and capital (Stiegler 2016). On a more radical plane, technology is redrawing individuals' relationships with the material dimensions of existence. To be precise, debates on AI, robotics and human enhancement are questioning main ontological and anthropological assumptions underlying the relationship between humans and nature. Such radical developments entail an enormous impact not only on individuals as laborers, end-users or consumers, but also as citizens of modern society (Schradié 2018; Sunstein 2017).

From a moral perspective, the effects that innovative products and technologies can have on society in terms of inequalities and potential threats to individual freedom call for an integration of broader values and accompanying criteria of assessment into research and innovation practices (Davis and Laas 2014; Jasanoff 2016). From an epistemic point of view, the complex impact that these processes generate for individuals' lives and broader society requires an understanding and competence that is challenging for any single actor. The profound questions raised by certain innovations like AI and their permeability to different sectors, suggests that potential answers will not be easily found in a single domains' technical expertise. Rather, they are bound to emerge from newer forms of interaction between different spheres of society. This may include attention to the role of values at earlier stages of scientific and technological design (Van den Hoven 2013).

From a political point of view finally, the above developments require better institutional frameworks to deal with questions of who gets what, when and how

¹We will use here indistinctly the terms science, technology, research and innovation although we are aware of their differences. The scope of the chapter is to highlight the politics of science, which invests all these different domains despite their supposed different logic. Therefore, we do not see an evident issue in not distinguishing them adequately for the purposes of this chapter.

(Lasswell 1936) through research and innovation in a democratic and accountable way. There is a growing acknowledgement that the complex and disruptive nature of changes resulting from science and technology, together with their increasing impact, requires a multilevel framework which is able to adequately consider the above moral, epistemic and political dimensions. Accordingly, the governance of research and innovation should acknowledge the inherent complexity of socio-technical changes and implement holistic measures to address the uncertainty (Nowotny 2015) or indeterminacy (Gorgoni 2018) stemming from research and innovation and its technological products.

4.3 Ethical Assessment Frameworks and RRI

If different countries in Europe had started to implement ethical assessment schemes since the 1970s (Jasanoff 2016), it is mainly with the beginning of the twenty-first century that we encounter concrete institutional measures adopted at the European level. With the inauguration of the European research and innovation investment Framework Program 5 (FP5), the European Commission (EC) has introduced the question of stakeholder involvement and societal acceptability in research. In the early 2000s (EC 2001), the EC started to solicit the engagement of civil society in the design of research processes, opening the path to more concrete measures. Since then we have seen Framework Programs with a special focus on Science in Society (FP6), Science with Society (FP7), and Science with and for Society (FP8, also known as Horizon 2020).

Furthermore, since 2011 the notion of RRI has been gaining momentum in academic and policy circles (Stilgoe et al. 2013; Owen et al. 2012; Wickson and Carew 2014; Von Schomberg 2013; Sutcliffe 2011). One of the first broadly cited definitions of RRI was given by Von Schomberg who sees it as “*A transparent, interactive process by which societal actors and innovators become mutually responsive to each other with a view to the (ethical) acceptability, sustainability and societal desirability of the innovation process and its marketable products (in order to allow a proper embedding of scientific and technological advances in our society)*” (Von Schomberg 2011, p. 9). Others have focused more on the process dimensions interpreting that “*Responsible innovation means taking care of the future through collective stewardship of science and innovation in the present*” with attention to dimensions of anticipation, reflexivity, inclusion and responsiveness in research and innovation processes (Stilgoe et al. 2013, p. 1571; cp. Burget et al. 2017, pp. 9–13).²

The fact that the EU has adopted RRI as a cross-cutting issue for Horizon 2020 (H2020), can be seen as the result of an increasing awareness about changes and

²We recognize that Responsible Research and Innovation and Responsible Innovation can be seen as separate but interlinked discourses with specific antecedents (Owen and Pansera 2019). As the scope of this chapter is to provide a pragmatist perspective on (R)RI we will from now on use the abbreviation of RRI to refer to both.

challenges resulting from science and technology even at the European policy level (EC 2012). Exemplary of this attention is the uptake of six keys that are meant to operationalize RRI: public engagement, gender equality, open access, science education, ethics and governance.³

Surely there has not been a shortage of attempts to bring the possible impacts of research, technology and innovation within the grasp of governance arrangements. In order to evaluate its novelty and peculiarities, many commentators have compared the current adoption of RRI to previous or concomitant frameworks and approaches. Several scholars have noted the continuity and discontinuity with (Participatory and/or Constructive) Technology Assessment (PTA/CTA) (Grunwald 2011; Rip 2014), the Ethical, Legal and Social Aspects (ELSA) approach (Salvini et al. 2019; Zwart et al. 2014) and Corporate Social Responsibility (CSR) (Pavie et al. 2014). Others have noted the family resemblance to concepts like Bioethics, Risk Analysis, the Precautionary principle, Vision assessment, Co-design, Value Sensitive Design, Backcasting, Foresight exercises, Futuring, Socio-Technical Integration approaches and Anticipatory governance (Burget et al. 2017).

Although it might be difficult to do justice to the different models and their implementation in different contexts, the main differences in all these frameworks stands in the lower or greater extent of societal inclusion that they propose (Jasanoff 2016). Accordingly, we understand that RRI can be conceived as one of the latest moments of a process of inclusionary transition of innovation management in Europe, which passed from a clear division of roles to being “inclusively contingent” (Eizagirre et al. 2017).

4.4 Reframing RRI as a Strategy for Collective Democratic Experimentation

Despite the amount of resources invested in the last 10 years, RRI has not yet found a clear conceptualization that is broadly accepted by all those involved with it and affected by it. It might be argued that amongst all the different understandings of RRI, it is possible to identify a common agreement only with regard to its encouragement to engage a broader public in the development of research and innovation. Other than that, debates are bogged down into divisions about the right framing, the procedures to be followed (Klaassen et al. 2018) and the relationship of RRI to other concepts such as social justice and sustainability (Spaapen et al. 2015; Von Schomberg 2013).

On the practical side of things, some authors have highlighted that operationalization of the RRI concept is still under development (Ribeiro et al. 2017, p. 12). Notably, recent reports on real-world experiences that do exist, paint a stark picture on the actual implementation of RRI. For example, a recent diagnosis of the

³For an exhaustive overview of EC expenditures in this sense, together with the development of RRI, see <https://newhorizon.eu/wp-content/uploads/2019/02/D-1.3-Current-Status-of-RRI-.pdf>

H2020 Framework Programme has shown that the integration of RRI and implementation in European research funding and practice is lacking in terms of consistency and depth (Novitzky et al. 2020). Many research and innovation actors still seem unfamiliar with RRI and there is a general sparseness of institutionalization in research organizations (Christensen et al. 2020). In the private sector, evidence shows even less of an interest in issues of responsibility (Lubberink et al. 2017). Finally, this combination of persistent misalignment of conceptual debates, different proposals and suggestions to implement RRI and a lack of integration in practice has most probably contributed to a loss of relevance at the European policy level (Fisher 2020).

Despite the apparent loss of policy relevance, responsibility in research and innovation practice remains unequivocally important. Therefore, in response to the above issues several authors from different backgrounds are meticulously working on “*recalibrating both the broader framings that underpin responsible innovation and the practical understandings that will guide its implementation*” (Fisher 2020, p. 2). Strikingly, Nordmann has recently suggested that we should start to embrace RRI more as a collective experimentation strategy (Nordmann 2019) with specific attention to using RRI to instigate experimental processes of social learning in practice. Similarly, Timmermans and others (2020) have recently argued for the relevance of bringing RRI into practice through experimental action research by means of a social lab methodology. The perspectives adopted by these authors have the advantage to defend RRI as a more open-ended experimental framework from instrumental, conservative and often technocratic stances (Klaassen et al. 2018).

Beyond the valuable call to experimentation, we argue that its greatest potential lies in refocusing the attention to RRI’s underlying *democratic* agenda for inquiry into responsibility in research and innovation (cp. Owen et al. 2012, p. 754). Building on the above developments, we therefore argue that in particular a *collective democratic experimentation* perspective may provide a promising way out of the current problematic situation of the lacking integration and implementation of responsibility in research and innovation practice. We claim that there is still untapped potential in RRI in that it may provide a diversity of individuals and groups the possibility to exercise their personal freedom and responsibility in a democratic and participatory process of experimentation and learning. We will argue that integrating all kinds of actors, including citizens, in such a process will not only improve the robustness of the adopted strategy but can also contribute to the empowerment of individuals as social agents by allowing them to develop and give life to their own conceptualizations of responsibility in practice.

Even though Nordmann, Timmermans and others provide us with an interesting conceptualization and operationalization of RRI as a collective experimentation strategy, it remains unclear how its *democratic* character could both be philosophically grounded and operationalized in concrete research and innovation contexts. To fill this gap, we propose that we can make good use of the conceptual and

methodological tools developed by the American pragmatists. We argue that the work of John Dewey in particular provides a fruitful way to further think of the public operationalization of the project of RRI through strategies of collective democratic experimentation, since the core of his work revolves around creating more productive links between ethics, science and democracy. In the following sections, we will show that especially his understanding of democracy as an ethical way of life, his attention to the contextual nature of responsibility, together with his focus on publics and social inquiry provide a fruitful way to further conceptualize and operationalize the collective democratic experimentation agenda for RRI.

4.5 Learning from Pragmatism and Democracy as a Way of Life

To understand what is meant by democracy as a way of life, we first need to understand a bit more about the central ideas of American pragmatism. In short, American pragmatism is an action-oriented philosophy that is interested in concrete progressive change in the lives of people. The fundamental idea of pragmatism, as Dewey writes is that “*action and opportunity justify themselves only to the degree in which they render life more reasonable and increase its value*” (Dewey 1990, LW 2, p. 19).

Despite some differences in their philosophies, the American pragmatists are united in that they more or less share an interest in the following six interconnected themes. First of all, pragmatists share an *anti-foundationalist* understanding of knowledge, in which knowledge develops from experience, preferably through an iterative process of inquiry “*as a self-correcting enterprise that has no fixed absolute beginning or absolute end point*” (Bernstein 2015, p. 31). Second, pragmatists embrace the *fallible* nature of inquiry by supporting the thought that everything can be questioned and that what we conceive to be true now can change tomorrow. Third, to still provide inquirers with a foothold from which to organize inquiry, pragmatists put the *community of inquirers* and *sociality of practices* in center focus (Bernstein 2015, p. 32). Through the intersubjective and the social character of the latter two can we work towards knowledge, understanding and action that increases the substantive value of the lives of the community. Fourth, a logical consequence of this posture is that pragmatist philosophers recognize the *necessary existence of a pluralism of perspectives*. This requires an openness to listen to diverse viewpoints so as “*to cultivate those habits and virtues that can prepare us for unexpected contingencies and conflicts*” (idem, p.34). Fifth, following from this is the idea that we need to embrace the *perspective of agents* and work with both *theory and practice* meaning that knowledge should be gained through “*active experimentation and problem solving*” in conjunction with other inquirers in practice (idem).

Finally, informed by all previous themes, pragmatists, and John Dewey in particular, have an interest in *democracy as an experimental process of social inquiry* in itself. Dewey sees democracy not as a particular form of parliamentary government or as a collection of historically grown practices and institutions but as an “*ethical way of life [...] in which all contribute and participate*” (idem, p. 35). Instead of reducing democracy to elections once every couple of years, Dewey sees it as a cooperative experiment (Campbell 1995, p. 200) which provides human beings the room to meaningfully engage with one another and continuously participate in different social fields to contribute to the formation of values that regulate their lives (Dewey 1990, LW 11, p. 217). Accordingly, Dewey interprets democracy from a moral perspective describing it as “*the idea of community life itself*” (Dewey 1990, LW 2, p. 328).

For him, the fundamental principle of democracy, is that “*the ends of freedom and individuality for all can be attained only by the means which accord with those ends*” (Dewey 1990, LW 11, p. 298). All citizens should in other words be encouraged to actively partake in social associations and collectively exercise their powers of communication, deliberation and experimentation to further their individual growth and therewith the growth of society. An accompanying introduction of forms of democratic experimental inquiry in daily practices would improve the cooperative capacities and awareness of societal issues of the individual experts and citizens involved (Dewey 1991). This could in turn generate a greater circular movement that would bolster the democratization of particular practices and institutions allowing more members of society to participate, to develop themselves and to exercise their own responsibility as members of a social community.

4.6 Sociality of Practices and Contextual Nature of Responsibility

These insights are tightly related to two other aspects of Dewey’s pragmatist thought that are of high relevance to our discussion on RRI: the ontological understanding of the social embeddedness of individuals in practices and the relationship to the contextual nature of responsibility. Let us start with a discussion of the former.

Individuals, in Dewey’s understanding, are never given but always “*created under the influences of associated life*” (Dewey 1983, MW 12, p. 193), mediated by the sociality of practices. Basing himself on insights from sociology and evolutionary biology and aware of the physical embodiment of human beings as living organisms in a particular environment, Dewey notes that “*association in the sense of connection and combination is a ‘law’ of everything known to exist*” (Dewey 1990, LW 2, p. 250). However, he notes that there is a crucial difference between

biological forms of association and the social conscious sharing of practices.⁴ This difference resides in the fact that the latter also requires shared action and communication to develop shared values and act accordingly in tackling particular societal ills (Campbell 1995, pp. 174–175).

If the social and the individual are intricately connected to one another, we could say that Dewey uses responsibility as a principle that expresses their interdependence. Already in the 1920s, he recurrently analyzed the concept of responsibility as a crucial guidance for action. He was well aware of the existing skepticism around moral responsibility as it is often reduced to judgement on individual action and in terms of moral blame (Dewey 1983, MW 14, p. 220). Dewey too loathed archaic, moralistic responses because he thought that they would form an obstacle to the development of competent methods for collectively dealing with social subject matter (Dewey 1990, LW 12, p. 489) and adequate social responses to new situations (Campbell 1995, p. 156). He lamented how such a fixed posture does not open the possibilities for inquiry, but rather closes them (Dewey 1983, MW 12, p. 188).

Instead, Dewey thinks that principles and concepts must always be revised, adapted, expanded and altered when new conditions emerge so that certain principles will be more effective instruments in judging new cases (Dewey 1983, MW 14, p. 165). In other words, pragmatists like Dewey emphasize “*the importance of novel constructs and hypotheses with which emergent problems can be tackled*” (Keulartz et al. 2004, p. 18). The idea of responsibility and particular operationalizations are then to be regarded as a hypothesis “*to be employed in observation and ordering of phenomena, and hence to be tested by the consequences produced by acting upon them*” and not “*as truths already established and therefore unquestionable*” (Dewey 1990, LW 12, p. 499). A reconstruction (Campbell 1995, p. 151) of our conceptualization of responsibility may thus inform the reconstruction of people’s practices and institutions (Campbell 1995, pp. 184–192).

Rather than focusing on the justification of absolute moral principles, Dewey is more interested in active inquiry into morally problematic situations (Kupper and De Cock Buning 2011, p. 435). From an action-oriented perspective, this signifies that morality for Dewey “*is a continuing process and not a fixed achievement*” (Dewey 1983, MW 14, p. 194) meaning that ethical values, just like empirical facts, can be the subject of ongoing inquiry (Norton 1999). Instead of artificially attempting to separate questions on social ills, science and values, he is convinced that the method of inquiry could also be applied to matters of moral valuation and societal issues so as to increase the problem-solving capacity of a society.

Moreover, what is becoming clear throughout Dewey’s work, is that the adoption of new conceptualizations, practices and institutions of responsibility with better

⁴In prose that one does not find often in contemporary scientific analyses, he notes that “*assemblies of electrons, unions of trees in forests, swarms of insects, herds of sheep, and constellations of stars*” (Dewey 1990, LW 2, p. 250) are both marvels and important facts of life but that “*the social, in its human sense, is the richest, fullest and most delicately subtle of any mode [of association] actually experienced*” (Dewey 1990, LW 3, p. 44).

consequences for those involved and affected, is only possible when a corresponding freedom of cooperative experimentation is guaranteed and promoted in social practices (cp. Gianni 2016). Without this freedom of cooperative experimentation “*moral progress can occur only accidentally and by stealth*” (Dewey 1990, LW 7, p. 231). This positive⁵ freedom to participate (Campbell 1995, p. 169) then, can be truly exerted only if individuals are provided with the conditions and means to cooperate with others in future-oriented (Dewey 1983, MW 14, p.215), experimental processes of participation. In other words, without providing the appropriate practical and institutional conditions for participation, individuals cannot grow and therefore cannot realize their full capacity for intelligent judgement and action on which a democratic society thrives (Dewey 1990, LW 14, p. 227). Social responsibility can therefore only be understood and exercised appropriately if individuals are provided with the right conditions so that they can take part in the “*experimental and personal participation in common affairs*” (Dewey 1983, MW 11, p. 57).

This Deweyan take on responsibility forms an interesting contrast with current approaches to RRI. Until now, the academic and policy debate on RRI often focus on soliciting responsible approaches by individual researchers and innovators and/or attempts to mainstream the earlier mentioned substantive or procedural ethical frameworks. However, once such frameworks hit the shop floors of research and innovation, individual researchers and innovators find themselves uncertain on how to act responsibly in their existing daily practices and institutions (Sigl et al. 2020). Confronted by this problem, they then may choose to accommodate RRI policies rather than really engage with their spirit in practice (Åm 2019). The risk is that calls to act more responsibly in research and innovation will then amount to nothing more than a mere slogan (Gianni et al. 2018) continuing the interrelated issue of conceptual unclarity and lack of implementation in practice.

Following Dewey, such problems and risks may be overcome by reconceptualizing RRI as a collective *democratic* experimentation strategy that has the potential to bring democracy as an ethical way of life into research and innovation practices. To achieve this, individuals should be provided with the space to democratically experiment with new conceptualizations of responsibility in diverse social practices. From a pragmatist perspective, this aspect is crucial for an ethical and democratic development of responsibility in research and innovation and can only be attained as long as we create the necessary conditions in practice.

⁵ It is important to underline that the kind of freedom Dewey refers to goes beyond negative, liberal perceptions of freedom that conceive it as individual protection from hindrances (Frega 2019; cf. Berlin 1969). For Dewey it is more about the distribution of power in a particular time and society (Dewey 1990, LW 11, pp. 361–61). Put differently, his goal is no less than the creation of the right conditions in which “*the power of individuals shall not be merely released from mechanical external constraint but shall be fed, sustained and directed*” (Dewey 1990, LW 11, p. 25).

4.7 Publics and Democratic Experimentation Through Social Inquiry

Noting the necessity of collective democratic experimentation with RRI is one thing, but operationalizing it in practice is another. In other words: how can scholars and practitioners operationalize such processes of democratic experimental inquiry in complex modern societies? Who should be involved, what are the required steps and their most important qualities to attend to? For an answer to these questions, we argue that the Dewey's understanding of publics and social inquiry provides a helpful framework. Let us start with the former.

Dewey's most thought-provoking contributions to democratic theory, first summarized in *The Public and its Problems*, came in 1927 as an answer to some of his contemporaries, skeptical about the will and capacity of the public to participate in modern, highly complex societies (Lippmann 1993). The “*omnicompetent citizen*”, capable and willing to engage in any process was considered to be diverging from actual reality, not to say simply utopian. Like Lippmann, Dewey too recognized the growing complexity of modern societies (Dewey 1991, p. 165). He noted how the indirect consequences of modern inventions instituted a multitude of new publics (Dewey 1991, pp. 15–16/41).⁶ He also recognized that political or institutional forms did not automatically co-evolve with fast-paced developments in science and technology and that new publics indeed had a hard time taking care of new issues following such developments.⁷ However, whereas a realist philosopher like Lippmann believed in a more technocratic (Dewey 1990, LW 7, p. 353) control over a growingly complex society, Dewey believes that “*the cure of ailments of democracy is more democracy*” (Dewey 1991, p. 147).

To him, the increasing role of science and technology and the growing complexity of our societies actually requires active experimentation with more refined instruments of democracy. Not merely for the sake of experimentation as such, but to support the fruitful emergence and participation of a diversity of publics. He wants to achieve this through a double movement, by making democracy more like science (as a form of inquiry) while democratizing science itself (by making the

⁶He noticed how in determining indirect consequences, these inventions instituted what he called “*publics with different interests*” (idem, p. 44). He defined these publics as consisting “*of all those who are affected by the indirect consequences of transactions to such an extent that it is deemed necessary to have those consequences systematically cared for*” (Dewey 1991, pp. 15–16).

⁷This led to the problematic situation that such newly emerging publics could not inherit political agencies (Dewey 1991, p. 31) and adequately take care of their issues. What is more, the technological transformations led to an eclipse of the public which meant that members of publics affected by the new machine age did not even recognize themselves as such (Dewey 1991, p. 126). Dewey saw this as a problem because in a functioning democratic society, those publics and their individual members and representatives would be the ones who should participate in the formation of society and attend to the growth of its members. If publics were eclipsed and could not recognize themselves as such, they could not effectively participate and therefore not efficiently take care of the consequences of technology and innovation for society.

techniques of science available to all kinds of publics) (Bohman 1999). Recognizing the intrinsic kinship between democracy and scientific experimental methods (Dewey 1990, LW 15, pp. 254/274) he advocates for the spread of the laboratory culture of inquiry into society to encourage the creation of new forms of communication and participation (Sabel 2012, p. 38).

In his later works he further operationalizes this democratic experimentalist agenda by calling for the active organization of cooperative processes of social inquiry (Dewey 1990, LW 12, p. 481). For him, *social inquiry* is the application of a process of transformation to complex social problems.⁸ Just like all forms of inquiry, it takes place inside a cultural matrix of existing practices (Campbell 1995, p. 194) and consists of the following five steps.⁹ The first step always starts with a situation of perplexity or confusion in which we are *confronted with an indeterminate situation* which makes us stand still and question our usual habits. Things are not working as they should and we are taken aback because our usual practices and routines do not suffice. Existing institutions cannot seem to accommodate the newly emerging issue (Marres 2007, p. 769). On the level of social inquiry, it means that certain social problems are recognized by multiple people and publics form around these issues. The result is a situation of indeterminacy and uncertainty: what do we do now?

The second step in an inquiry is that a public needs to work through this doubt and slowly but surely *transform the situation into a problem statement*. This means it needs to think the situation through and reflect. Social inquiring publics may confront themselves: “what could be the cause of this social ill?” This requires a suspense of immediate judgement and the cognitive ability to entertain multiple problem statements at once before selecting one. Without such an understanding “*there is a blind groping in the dark*” (Dewey 1990, LW 12, p. 112).

The third step consists of the *formulation of ideas and the postulation of hypotheses about possible solutions to the problem*. Such solutions are of course shaped by the diagnosis of the problem (Dewey 1990, LW 8, p.203) and may be elaborated with support of forecasting, backcasting, and imagining the future consequences of a particular line of action (cp. Krabbenborg 2016, p. 910). To find a solution to experienced social problems, publics may propose a new pilot, policy agenda and/or the reconstruction of existing practices and institutions.

Fourth, a public then needs to *reason about these solutions* so as to sharpen them in the mind. How detailed and elaborate such analyses may be depends on personal and social resources: past experience and education, the contemporary culture and level of technology (Campbell 1995, p. 50). Finally, the public needs to *test*

⁸Inquiry, Dewey defines as “*the controlled or directed transformation of an indeterminate situation in one that is so determinate in its constituent distinctions and relations as to convert the elements of the original situation in a unified whole*” (Dewey 1990, LW 12, p. 108). With an indeterminate situation he means a situation which is deemed problematic by the observer.

⁹Or four phases if one sees the confrontation with an indeterminate situation as a separate occasion (Krabbenborg 2016, p. 910).

hypotheses in real life i.e. implementing pilots, changing practices or institutional set-ups and subsequently *collectively evaluate the consequences of the actions* that follow from this.

Moreover, for democratic experimentation through social inquiry and following solutions, the quality hangs tightly together with their *social, experimental* and *public* character. Starting with the *social*, Dewey recognizes that the rationality of solutions depends on whether all those who are affected are actively involved in the research process (Honneth 1998, p. 775). The willingness to listen to diverse viewpoints is therefore central in its success (Campbell 1995, p. 199). Experts are not disregarded as they can provide useful epistemic guidance to map the terms of a problem and lay-out possible alternatives. However, Dewey believed that to construct a path towards situated solutions, a cooperative judgment should also attend to the ideas and narratives of publics affected by the social problem and subsequent social inquiry. This in turn requires communication and deliberation between experts and citizens from different backgrounds to evaluate the different perspectives, to integrate potential conflict (Follett 2003), to enrich the available epistemic toolbox and prevent absolutism. Furthermore, one should pay crucial attention to the perspective of ‘minorities’ (Frega 2015).

Second, the value of social inquiry lies in its inherently *experimental* nature. To be sure, to experiment is not about “*just messing around nor doing a little of this and a little of that in the hope that things will improve*” (Dewey 1990, LW 11, pp. 292–93; cp. Dewey 1990, LW 8, p. 206). Neither is it based on a positivistic, verificationist idea of a randomized controlled experiment (Ansell 2012) in which one tries to control the environment as much as possible. No, the experimental character lies in the idea that hypotheses are methodically formulated and tested and evaluated on their results in concrete practices. In other words, the experimental aspect refers to the fact that social inquiry is about trying out different ideas with reference to real life social contexts. Thus, social inquiry, when appropriately and methodically applied, can invite participants to learn from failure so as to lead to better insights into the problematic state and/or future improved hypotheses and solutions for societal problems in reality.

Third, just as in ideal scientific inquiry, the *public* character of the democratic experiment is of prime importance (Campbell 1995, p. 103). This means that both the process as well as the results of social inquiry should be made as public and intelligible as possible, including for those who did not directly participate in the process (Dewey 1991, pp. 176–178). Dewey especially emphasizes the role of art and (local) communication in guaranteeing this aspect (Dewey 1991, p. 184). The resulting publicity could then help to assess the acceptability of the adopted solution on a larger scale and inspire further future social inquiries.

By following these different steps, and with specific attention to its experimental, social and public character, social inquiry can help publics to become more acquainted with an ‘intelligent’ democratic way of addressing problems in different fields. Thus citizens, as members of diverse publics, may become motivated to participate in the social and political formation of technological society and meaningfully take part in a process where their input is valued (Honneth 1998). As a result,

the process of social inquiry can then become a virtuous circle with experts, policy-makers and a diversity of publics ideally being able to establish recurrent democratic dialogue and action on societal problems. The “end in view” is then to make such processes of social inquiry a normative element in citizens’ habits (Honneth 1998) and institutions.

4.8 Towards Collective Democratic Experimentation with RRI in Social Labs

To show the concrete value of this Deweyan view on democratic experimentation for RRI through social inquiry, we will now finally connect above insights to the recent call to operationalize RRI through social labs (Timmermans et al. 2020).

In response to the dual issue of conceptual unclarity and lacking practical implementation of RRI, Timmermans and others recently proposed to use a social labs methodology (*idem*). Originally coined by Hassan, social labs are platforms that aim to address complex social challenges in a social, experimental and systemic fashion (Hassan 2014, p. 3). Timmermans and others (2020) have provided a further theoretical underpinning of social labs by (re)conceptualizing them as a form of participatory action research (Reason and Bradbury 2001, p. 1). They posit that social labs are well fit to experiment with RRI since they understand RRI as an emerging social phenomenon of which the properties gradually come into existence during and resulting from the interaction of different actors involved with theorizing and implementing RRI (Timmermans et al. 2020, p. 4).

Furthermore, in laying the connection between RRI and social labs and providing the necessary theoretical and methodological grounding, Timmermans and others discern six features of social labs. First, they point at their experimental nature, meaning that social labs provide room for concrete action and the development of prototypes and interventions. Second, they are intently part of the real world by developing and testing solutions in a particular social context (*idem*, p. 5). Third, they require the active participation of a wide range of societal stakeholders such as policymakers, businesses, government and civil society. Fourth, they involve experts from a wide range of expertise and backgrounds. Fifth, instead of merely focusing on the symptoms of certain social problems, they aim to achieve systemic change. Sixth and finally, they are an inherently iterative and agile approach. By making many iterations and closely monitoring the process, social labs can take in emerging information and work with unplanned events to allow the evolution of particular solutions to complex social challenges over time (*idem*, p. 6). To increase the relevance and uptake of this process, the empowerment of social lab participants through processes of experiential learning (Kolb 1984; Moon 2004) is deemed crucial.

Timmermans and others thus provide an interesting first grounding of the social lab methodology and its connection to RRI on which others can profitably build. It is clear that their understanding of social labs as socially embedded platforms that can experiment in real life may indeed provide a way of the current RRI deadlock.

Also, all six features seem to fit naturally with a Deweyan emphasis on building up knowledge through recurrent, experimental processes of social inquiry in particular contexts. However, if social lab organizers wish to use such platforms as a vehicle to promote collective *democratic* experimentation with responsibility in research and innovation practices, we think it is apt to emphasize that they pay attention to the following (complementary) Deweyan insights.

In line with Dewey's understanding of democracy as an ethical way of life, taking note of the inherent social embeddedness of individuals in practices and the contextual nature of responsibility, collective *democratic* experimentation with responsibility ought to be organized as a process of *social inquiry* with the involvement of diverse *publics*. Publics affected by and recognizing certain morally problematic situations around research and innovation should be allowed to democratically experiment with ways to deal with such issues. Concretely, this means social labs should provide support to diverse groups of people to use the principle of RRI to alleviate experienced problematic situations in concrete research and innovation practices and institutions.

This process requires specific attention to the social, experimental and public dimensions of social inquiry. Its *social* character should allow all those affected by the issues to deliberate and cooperate with experts. This includes listening to diverse viewpoints, including those of minorities in a certain context, since what may be experienced as responsible research and innovation by one stakeholder group in one context may differ from other experiences. By remaining open to different interpretations of responsibility as they arise from the midst of diverse stakeholders affected by an issue, social labs can thus provide a venue for them to co-create their own, new contextualized understandings of responsibility in research and innovation, fit for practice.

Its *experimental* and fallible nature should be guaranteed by testing the consequences of particular hypotheses in concrete practices and remaining open to learn from failure. In other words, experimentation with RRI in social labs should provide a way for diverse publics embedded in and affected by particular research and innovation practices to bring their own interpretations of responsibility into practice. This entails providing them with the right methodological support, for example by discussing a diagnosis of problematic situations related to their own research and innovation practices with them. Consequently, it should also provide them with the support and means to formulate concrete problem statements and possible responsible solutions as hypotheses through processes of backcasting and imagining future consequences of particular lines of action. They should be provided the support to test and evaluate such pilot solutions with reference to their concrete results in practice. This also means that space should be provided for specific normative outcomes per context.

Finally, the experimentation with RRI in social labs should be organized as *public* as possible. This last aspect is as yet relatively underexplored in the social labs literature, but crucial if one wants to realize the *democratic* potential of collective experimentation with RRI in social labs. Concretely, it means that social lab organizers should attend to the publicness of both the social lab process as well as the publicity of its outcomes. Organizing a public social lab process may entail

informing and involving (representatives of) diverse groups of actors affected by a certain RRI issue, preferably beyond those representing vested interests and from the start. One can particularly publicize the social lab process by connecting to existing (bottom-up) citizen communities and networks during the process. The important criterion to focus on is that it provides (representatives) of groups of people who can reasonably be expected to be affected by a certain issue of RRI in practice, the possibility to provide their input into the process and resulting solutions.

To further spur this development beyond the direct social lab process, social lab organizers can also attend to the publicity of the outcomes of the process. This means translating the findings and insights with an eye to re-usability and communicability. In particular, it is of interest to experiment with the creation of communicable narratives (Constant and Roberts 2017) about social lab experiences and outcomes to increase the chances that insights may find their way into existing practices and institutions. With the right attention to publicness and publicity during and after the process, collective democratic experimentation with RRI in social labs may thus inspire future iterative processes of social inquiry that can contribute to responsibility in research and innovation practice.

4.9 Conclusion

We started this chapter by highlighting the salient challenges of research and innovation and the frameworks that have been introduced in response to this, including RRI. Although we recognized some of the main current shortcomings of RRI, like conceptual unclarity, problems of implementation and institutionalization and accompanying waning policy relevance, we believe that it would be a mistake to dismiss the ethical and democratic spirit characterizing the RRI agenda. Therefore, we sided with Nordmann (2019) in his call to (re)conceptualize RRI as a collective experimentation strategy. As existing literature in the field does not seem to address sufficiently the implicit *democratic* character of such a reconceptualization of the project of RRI, we noted that John Dewey's pragmatist philosophy could provide those interested in collective democratic experimentation with RRI a fruitful toolkit and way forward. To explore this further on a conceptual and normative level, especially in connection to recent calls to use social labs for RRI, we asked the following research question:

What is, from a pragmatist perspective, a proper way to conceptualize and understand collective democratic experimentation with RRI in social labs?

To answer this question, we delved into the central tenets of the pragmatist philosophy. Specifically, we noted how Dewey understood democracy not as a particular governmental form, but rather conceived it as an ethical way of life in which members of communities are able to develop their potentiality through cooperative processes of experimental social inquiry embedded in social practices.

Basing ourselves on Dewey's insights, we suggested that democratic experimentation with RRI should be organized as a process of *social inquiry* involving a diversity of *publics*. Concretely, this entails that the concept of RRI and/or the principle of responsibility in research and innovation should be used to support the alleviation of problematic situations around research and innovation in concrete practices and institutions. This means it should support publics to formulate concrete problem statements and possible solutions as hypotheses to be tested and evaluated by reference to their concrete results in practice. Specifically, attention should be paid to guaranteeing the *social*, *experimental* and *public* nature of such a process by, respectively, involving citizens and experts in a cooperative process from the start, experimenting methodically and making both the process as well as the results as public as possible. The latter is deemed especially important to increase the chance that insights may find their way into existing practices and institutions and may in a circular fashion inspire future democratic and experimental forms of social inquiry in different contexts.

To further show the value of this pragmatist democratic experimentation agenda for RRI, we connected Dewey's ideas to the current call for experimentation with RRI through social labs. From this, we learned that experimentation with RRI in concrete practices by means of a social labs methodology provides a platform to integrate democracy as an ethical way of life into research and innovation practices. Especially with enough attention to the publicness of the process (i.e. by connecting to existing (bottom-up) citizen communities and networks), and publicity of the outcomes (i.e. by communicating the insights and outcomes in an accessible and engaging way), democratic experimentation with RRI in social labs may contribute to integration of RRI in practice.

Still, if we want to integrate RRI sustainably, we also need to pay further attention to the role of institutional conditions and to enlarging the room for maneuver (Krabbenborg 2016, p. 918) that participants possess in implementing RRI insights in existing institutions. Given their systemic ambition (Timmermans et al. 2020, p. 6), we believe that it would be fruitful to conduct further research into the role that action research platforms such as social labs and their respective publics can play in changing institutional conditions. Future research should specifically pay attention to further developing the conceptual and methodological toolkit and empirical arguments as to how such venues for social inquiry may transform existing institutions (cp. Van Oudheusden 2014) in the research and innovation system.

Furthermore, we believe that the democratic experimental reading of social inquiry through social labs could profitably be taken up by proponents of Open Science, Citizen Science, Open Innovation and co-creation paradigms to foster inclusion of a diversity of publics and aid the democratization of science and innovation. Such research should be open to learn from engaging with concrete practices, communities and their issues and challenges. For, in line with Dewey, we think it is better for research and philosophy "*to err in active participation in the living struggles and issues of its own age and times, than to maintain an immune monastic impeccability, without relevancy and bearing in the generating ideas of its contemporary present*" (Dewey 1983, MW 4, p. 142).

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Chapter 5

Cultural Particularities and Its Role in the “Innovation Divide”: A Closer Look at the Origins of “Spreading Excellence and Widening Participation”



Raúl Tabarés and Antonia Bierwirth

Abstract The “innovation divide” has been a common and persistent problem since the onset of Framework Programmes for Research and Innovation. Especially, for the group of countries that joined the European Union after 2004. Several initiatives have been implemented by the Union for encouraging the participation of these countries in these collaborative programmes, trying to maximize and extend the benefits of a knowledge economy across the EU. In this chapter, we explore how these instruments have been deployed paying special attention to the origins of “Spreading Excellence and Widening Participation” Horizon 2020 Work Programme. We explore its objectives and rationale, and we address some of its weaknesses and pitfalls. We argue that the “innovation divide” is not only a matter of providing adequate resources and encouraging participation for these countries and they cannot be treated as a homogeneous group. Particularly, in a moment of transition regarding innovation policies.

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5.1 Introduction

During the last decade, the European Union (EU or the Union) has tried to address the EU-13 countries also known as Low Performance Countries (LPC),¹ in dedicated strategies for meeting their participation gap in Framework Programmes (FP). Tackling the needs of new Member States for supporting its economic development throughout research and innovation has been at the core of the policy mix delivered by the Union since its origins. Despite the majority of these countries have demonstrated a relatively good performance and evolution in FPs through different programme evaluations (Puukka 2018; COWI 2017), its gap in FP participation is still a challenge for maximizing the benefits of a knowledge economy across the Union (Pazour et al. 2018). That is one of the reasons behind the rationale that put a bigger emphasis in these countries during the next FP9 also known as “*Horizon Europe*” (HE) (European Commission 2018a). This emphasis entails allocating a bigger number of funds and resources to a specific Work Programme (WP) initiated in “*Horizon 2020*” (H2020) named “*Spreading Excellence and Widening Participation*” (Widening).

But this gap cannot be simplistically explained only by economic factors and the lack of adequate funding for research and innovation. In the midst of an innovation policy transition towards societal challenges (Kuhlmann and Rip 2018; Schot and Steinmueller 2018; The Lund Declaration 2009), in this chapter we argue that there are many cultural particularities that can deter or favour the evolution of innovation ecosystems that can be found in this group of countries towards the ideals of research and innovation promoted by the Union. Here, we also highlight the “*Responsible Research and Innovation*” (RRI) paradigm as a tool that can facilitate this transition to a more participatory research and innovation in this group of EU-13 countries (Rip 2014; Owen et al. 2012; von Schomberg 2013).

In this chapter, we expose a historical analysis of the origins of Widening WP in H2020. We also introduce the current innovation policy transition and some of the cultural particularities observed in this group of countries and that can shape this transformation. The chapter is structured as follows: The next section provides an historic overview of the inception and development of the Widening WP; the third section exposes the current policy transition in research and innovation towards the “*Grand Challenges*”; the fourth section exposes the general problems that confront Widening WP, the fifth section stresses the role of cultural particularities in this transition and provides several recommendations for meeting the gap before providing the conclusions at the end of the chapter.

¹ Since 2004 there have been 13 new countries that joined the EU. These new members were Bulgaria, Croatia, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia and Slovenia. For a chronological detailed list see https://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:EU_enlargements

5.2 The Genesis of Widening in H2020

The EU has a long history of cooperation between its members around several domains of interest such as agriculture, fisheries, education, energy, health, industry, justice, or security among many others. In this long list, research and development have been one of the most important as this particular area has been considered by many Member States as a necessary backbone for promoting economic, social, and sustainable progress in the old continent (European Commission 2017a). This determination of the EU for encouraging cooperation in research and development as well as promoting scientific and technological advance is also enshrined in Article 3 of the consolidated treaty of the EU (European Union 2012; von Schomberg 2013). Originally, this article was introduced for the first time in the Treaty of Amsterdam,² enouncing this ambition with the following text in its third proposition:

3. The Union shall establish an internal market. It shall work for the sustainable development of Europe based on balanced economic growth and price stability, a highly competitive social market economy, aiming at full employment and social progress, and a high level of protection and improvement of the quality of the environment. It shall promote scientific and technological advance (European Union 2012, p. 3).

This aspiration to embed scientific and technological advance in the identity of the Union has been mainly manifested throughout the support of the European Research Area (ERA). A system composed by scientific research programs integrating the scientific resources of the EU.³ The main objective of ERA is to improve the competitiveness of European research institutions through the development of a common market in R & D and favouring the mobility of knowledge workers and cooperation between European institutions and other institutions overseas (European Commission 2000). The main instrument used to push forward ERA has been the Framework Programmes (FPs) for Research and Technological Development.⁴ Starting in 1984, FPs have implemented significant changes in their evolution towards a more ambitious research and innovation EU agenda, specially, from FP7 onwards. It is important to remark that FP6 and its precedents covered five-year periods and had much less resources than FP7. This version of the FPs was the first one which covered a seven-year period and with a significant rise in their budget allocation (see Fig. 5.1).

Despite FP7 introduced significant changes in the evolution of the FPS, its eight edition also known as H2020, proposed a new structure around three pillars (Excellent Science, Industrial Leadership and Societal Challenges) and two specific objectives (Spreading Excellence and Widening Participation and Science with and for Society) instead of the more traditional instruments. This new structure was

²For a chronological list of EU treaties see https://europa.eu/european-union/law/treaties_en

³For a full explanation about the objectives of ERA see https://ec.europa.eu/info/research-and-innovation/strategy/era_en

⁴For a full overview of funding programmes of the EC see https://ec.europa.eu/info/research-and-innovation/funding/funding-opportunities/funding-programmes-and-open-calls_en

| ID | Name | Period | Budget (in billions of euros) |
|-----|----------------|-----------|--|
| FP1 | First | 1984-1987 | 3.8 |
| FP2 | Second | 1987-1991 | 5.4 |
| FP3 | Third | 1990-1994 | 6.6 |
| FP4 | Fourth | 1994-1998 | 13.2 |
| FP5 | Fifth | 1998-2002 | 15 |
| FP6 | Sixth | 2002-2006 | 16.3 |
| FP7 | Seventh | 2007-2013 | 50.5 (plus 2.7 for EUROATOM over 5 years) |
| FP8 | Horizon 2020 | 2014-2020 | 77 |
| FP9 | Horizon Europe | 2021-2027 | 100 (expected budget before Covid-19 crisis) 79,9 (approved budget after Covid-19 crisis) |

Fig. 5.1 Budget overview of FP. Own elaboration upon public information from the EC website

focused on innovation whilst prior versions of FP were focused on technological research. This new focus pursued a general objective of “building a society and economy based on knowledge and innovation” and to consider “excellence as guiding principle and main evaluation and selection criterion” (European Commission, 2017a, b, p. 22). The next FP9, also known as HE, wants to push forward this idea with a significant increase in its budget⁵ and insisting on the three-pillar structure (Excellent Science, Global Challenges & European Industrial Competitiveness and Innovative Europe) (European Commission 2018a). The focus on innovation in this programme will be also present with a new umbrella fund called “InvestEU” oriented to allocate resources to individuals and companies of all sizes in a variety of forms such as grants, prizes, loans, subsidies or public contracts, for ensuring funding to innovative ideas that can be transferred to the market.⁶

However, as the Union has been extended through different versions of the treaty to new Member States, the participation in FPs by other countries has not followed

⁵Its initial budget was 100 million euros but after COVID-19 pandemic a new Multi Annual Financial Framework was agreed for 2021–2027 leading to a final budget for HE of 79,9 billion euros. See https://ec.europa.eu/info/sites/info/files/about_the_european_commission/eu_budget/mff_factsheet_agreement_en_web_20.11.pdf

⁶See https://europa.eu/investeu/how-we-invest_en

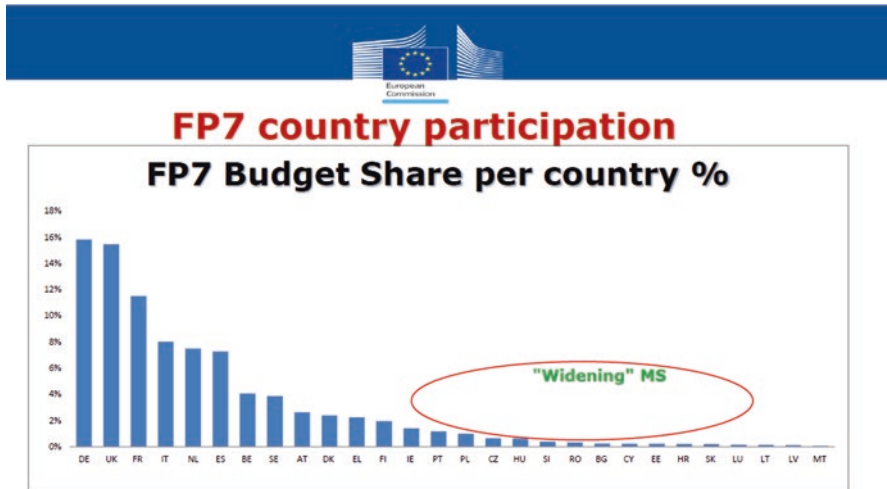


Fig. 5.2 FP7 budget share per country %. (Corpakis 2016)

a similar pattern. The reasons for this divide lie in the innovation gap that occurs between the different Member States. This was spotted in the interim evaluation of FP7 (Pazour et al. 2018) and affects a group of countries that are commonly known as EU-13. This group mainly includes countries that joined the Union after 2004: Bulgaria, Croatia, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia and Slovenia (Corpakis 2016) (see Fig. 5.2). After this evaluation and during the genesis of H2020, these countries demanded a specific programme that could mitigate this innovation gap. Previous experiences held in FP7 like Research Potential (REGPOT) WP were identified as an incipient seed for developing a new instrument oriented to meet this gap (Claude et al. 2011).

REGPOT WP allocated 370 million euros for funding 201 projects during the 2007–2013 period. Projects such as OPENGENE⁷ and STRONGER⁸ were recognized as significant initiatives to prevent brain-drain, lack of research infrastructure and access to finance in low-performing regions (Janssen 2014). REGPOT focused on exploiting research potential of “less advanced regions that are remotely situated from the European core of research and industrial development” for promoting “a strategy of inclusiveness that can potentially benefit the social fabric as well as the research community and the industry, locally and at the level of the European Research Area” (European Commission 2015).

REGPOT evaluation was highly successful and its results, in liaison with EU-13 countries demands, set the ground for a new WP in H2020 oriented to mitigate this innovation divide (European Commission 2014a). This new WP was “Spreading Excellence and Widening Participation” which “aims to address the causes of low

⁷ See <https://cordis.europa.eu/project/rcn/92957/factsheet/en>

⁸ See <https://cordis.europa.eu/project/rcn/100822/factsheet/en>

participation by fully exploiting the potential of Europe’s talent pool”, as well as “it ensures that the benefits of an innovation-led economy are both maximized and widely distributed across the European Union” (European Commission 2014c).

In this new WP several Member States are eligible like Bulgaria, Croatia, Cyprus, Czechia, Estonia, Hungary, Latvia, Lithuania, Luxembourg, Malta, Poland, Portugal, Romania, Slovakia, and Slovenia. Other Associated Countries can benefit also from Widening funding prior a valid association agreement of third countries with the H2020 program. These eligible countries are Albania, Armenia, Bosnia and Herzegovina, Faroe Islands, The Republic of North Macedonia, Georgia, Moldova, Montenegro, Serbia, Tunisia, Turkey, and Ukraine (see Fig. 5.3). For making this selection of eligible countries in this WP, a new kind of criteria was introduced known as “Composite Indicator for Research Excellence” (Hardeman et al. 2013). This measure was proposed because of several factors concerning the key role of excellence in the R & I system, the way that excellence is measured in several dimensions, eliminating country size and country population biases, taking into account innovation performance and acknowledging the correlation between excellence and FP7 budget share per country (Corpakis 2014).

This indicator was originally conceived by The Commission’s Directorate-General for Research and Innovation in liaison with the Joint Research Centre, as part of the Innovation Union Competitiveness report (European Commission 2014b). The indicator is aimed to measure the research excellence in Europe, taking into account the efforts of the different Member States and the EU towards the modernization of research institutions, their ecosystems and their outputs (Ferretti et al. 2018). This complex approach is also justified by the multidimensional and



Fig. 5.3 Member States and Associated Countries eligible for Widening WP. In blue Member States and in yellow Associated Countries. (European Commission 2014c)

increasing complex nature of economic structural change (Corpakis 2014). The proposed indicator is composed by four variables: (a) Highly cited publications of a country as a share of the top 10% most cited publications normalized by Gross Domestic Product (GDP). (b) Number of world-class universities and public research institutes in a country normalized by population in the world top 250 universities and research institutes. (c) Patent applications per million population and (d) Total value of ERC grants received divided by public R & D performed by the higher education and government sectors (Hardeman et al. 2013). The countries that have a score of 70% below the EU average are the ones that have been nominated as eligible for the Widening WP (European Commission 2013b; Adamiak 2019) (see Fig. 5.4). This indicator also created the distinction in the Union of Low Performance Countries (LPCs) in contrast to High Performance Countries (HPCs) that are above the aforementioned indicator (de Jong and Muhonen 2018). This standard of research excellence has been quite adopted in ERA despite many of the researchers involved in its conceptualization were not comfortable for measuring it through this set of indicators (Ferretti et al. 2018).

Widening WP is organized around three Coordinated and Support Actions (CSA): Teaming, Twinning and ERA Chairs (European Commission 2014c). Teaming aims to promote institutional building, funding projects oriented to create new or updating existing centres of excellence in eligible countries throughout a coupling process with a leading scientific institution in another Member State. Twinning is oriented to institutional networking throughout linking the eligible centre with at least two international leading counterparts in Europe. Last, ERA Chairs promotes excellence in eligible institutions bringing outstanding academics, with proven research excellence and management skills, to research institutions in Widening countries.

SWEP WP also establishes synergies with European Structural and Investment Funds (ESIF), trying to foster sustainability in these actions and aligning regional

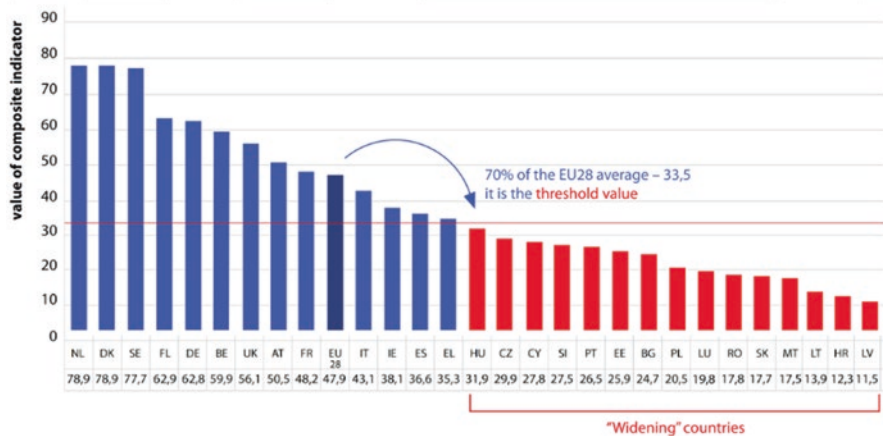


Fig. 5.4 Widening countries below the composite indicator. (Adamiak 2019)

Smart Specialization Strategies (SSSs) to meet strategic priorities in innovation ecosystems. Last, it is important to stress that Widening WP only funds CSA and not Research and Innovation Actions (RIA), nor Innovation Actions (IA). For this reason, the majority of the projects funded by this WP are focused on building alliances, networking activities, and/or dissemination activities.

5.3 Policy Transition Towards the “Grand Challenges”

H2020 meant a big change in FPs history. Not only by the budget increase but for the new three-pillar structure. H2020 also introduced a new approach to collaborative R & D projects focused on ‘societal challenges’ as the main drivers that must guide research and innovation (European Commission 2017a). This approach demanded to abandon rigid thematic approaches (‘The Lund Declaration’ 2009) and it will be also present in the next FP9 as the three-pillar structure will continue. In addition, a mission policy-oriented approach will be introduced across the FP (European Commission 2018a). This transformation must be understood in a context where the whole Science, Technology and Innovation (STI) policy paradigm is changing to meet new requirements that stem directly from society and where innovation policies are entering into a new era due to growing financial pressures and societal challenges (Schot and Steinmueller 2018). In this sense, ‘grand challenges’ are permeating and guiding different policy interventions (Kuhlmann and Rip 2018), in contrast to previous approaches that were based around the idea of national systems of innovation (Lundvall 1992) or innovation and growth (Bush 1945; Rosenberg 1982).

In addition, the current evolution of SSSs and Triple and Quadruple Helix models (Leydesdorff 2012; Etzkowitz and Leydesdorff 2000; Foray 2016) is favouring also the adoption of the grand challenges that are currently faced by society at the policy level (Thapa et al. 2019; Uyarra et al. 2019; Fitjar et al. 2019; Tabarés et al. 2020a, b). Societal challenges like climate change, inequality or gender equality have also been framed by the United Nations in their 17 Sustainable Development Goals (SDGs) highlighting its importance from a policy perspective.⁹ SSSs are of special importance in this matter as they have been the cornerstone of EU regional policy making since the last decade. These policy plans emerged all over Europe after the failure of the Lisbon strategy and as a response to the productivity gap observed between US and Europe due to the lack of technological linkages and spill over effects between sectors and regions (McCann and Ortega-Argilés 2015). SSSs are context specific and force to regional policy makers to pursue a prioritization of domains of specialization upon the capacities of the regions in terms of research, industry, and education capabilities. This selection of domains of specialization is a *sine qua non* condition to receive ESIF funds and the great majority of Member

⁹For a detailed description see <https://sustainabledevelopment.un.org/>

States regions have developed their own SSSs during the last decade.¹⁰ Sustainability is at the core of this policy strategy as investments from EU funds in research and innovation pursue to help regional industries to gain competitiveness in global markets.

This focus of the economic development agenda of the EC in competitiveness and sustainability is also driven by the paramount and increasing importance of innovation across FPs. In this sense, innovation is conceived as the instrument that stimulates economic growth, providing new business opportunities, creating high-value added jobs, facilitating start-up scaling, licensing patents and enabling other valuable returns that can maintain and extend the European social welfare model (Eizagirre et al. 2017). This “innovation imperative” that can be observed in the policy strategy of the Union is also been mainstreamed in other economic development policies worldwide due to the increasing importance of this concept in many policy agendas (Pfothenauer and Jasanoff 2017; Pfothenauer et al. 2018). Many times throughout different technological imaginaries such as Industry 4.0 (Gutiérrez and Ezponda 2019) or self-driving cars (Stilgoe 2017), policy strategies try to project the constant need of innovating for promoting economic development.

Moreover, increasing pressures that confront innovation ecosystems for providing valuable economic assets and persistent influence of linear models of innovation in current innovation policies deter the adoption of grand challenges as guiding principles for this policy transition (Schot and Steinmueller 2018). These pressures and factors also produce exclusions regarding spaces for discussion and deliberation and/or inhibiting them towards a common sacrifice in favour of efficiency and acceleration of daily routines in R & D. But these spaces are critical for providing a forum where public values at stake can be discussed, negotiated, and enhanced by different stakeholders affected by the outcomes of research and innovation. Innovations that have not incorporated socio-ethical aspects in their design, conceptualization are not adopted by society, wasting a significant amount of resources and funding (European Commission 2013a; von Schomberg 2011). The inclusion of socio-ethical aspects in STI policies demands new reconfigurations that can enhance more participatory approaches not only for informing citizens about how research and innovation is conducted, but also for involving them in the way that is produced (Bierwirth and Gutiérrez 2018; Owen et al. 2012; Zwart et al. 2014). This provides multiple positive effects such as the alignment of societal needs with research outputs, the diffusion of scientific culture, the discussion of public values in the design of technologies that can provoke socio-technical reconfigurations and the societal legitimization of funded research programmes among many others.

The new approach introduced by H2020 also takes into account the need of making room for these spaces mainly through the RRI paradigm, but also by the introduction of a societal impact criterion in evaluation procedures. Here, RRI emerged as a policy-driven concept promoted by the EC for facilitating this kind of research

¹⁰For a detailed description of Smart Specialization Strategies in Europe check <https://s3platform.jrc.ec.europa.eu/s3-platform-registered-regions>

impacts in society that can reconcile the aspirations and ambitions of EU citizens affected by research and innovation outcomes (Geoghegan-Quinn 2012; Owen et al. 2012; Owen and Pansera 2019; Rip 2014; von Schomberg 2013). The EC defines RRI as “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” (Geoghegan-Quinn 2012). This definition tries to emphasize how outputs of research and innovation can generate shortcomings or disadvantages not foreseen and how they can be anticipated by the help of some specific tools into research and innovation processes. The ultimate goal of this ambition seems to be better align R & D processes to fulfil EU societal expectations, and therefore, bridging the gap between the scientific community and society at large (von Schomberg 2011; Geoghegan-Quinn 2012).

Several challenges regarding the institutionalization and full implementation of the RRI paradigm have not been solved yet by H2020 (Novitzky et al. 2020; Tabarés et al. 2022) and it will remain to be at stake in the next FP (Gerber 2018). Here we found again that Widening countries are also not well engaged in the RRI concept as the recent experience of NewHoRRIZon has revealed (Griessler et al. 2018). Many projects funded by the Widening WP were not familiar with RRI and many stakeholders of this WP such as National Contact Points (NCPs) were completely unaware of it (Gutiérrez and Bierwirth 2019). This implies not only barriers for the dissemination of RRI, but also for being competitive in the next FP9 which will put more emphasis on citizen engagement and openness through an open science policy (European Commission 2018a). This particular challenge that awaits in coming years for Widening will be discussed during the next section.

5.4 Challenges for Transition in EU-13 Countries

Despite the efforts that the EC has pushed through the introduction of Widening WP in H2020, the low participation of these EU-13 countries in FPs is still a pending challenge in ERA. There are several problems that currently face this group of countries such as bureaucracy (and the need of associated management profiles to deal with), the development of particular skills to take part in research programmes and other difficulties more related with structural factors and an emergent divide between some EU-13 countries trying to catch up whilst others are lagging behind (Puukka 2018).

Nevertheless, the majority of these countries seem to have a relatively good performance in FPs as different evaluations of their participation have shown (Puukka 2018; Peck 2018; European Commission 2014a). This is one of the reasons that promoted the idea that allocating more funding to this WP in the next FP will contribute to mitigate the participation gap between Member States (European Commission 2018a). To date, there is a substantial commitment by the EC to secure a 3.3% of the total budget of HE for the next Widening WP. This huge expected increase means to at least double the previous budget allocated in H2020 to this WP

(European Commission 2018a). This and other measures are oriented towards the idea of having a real “Innovation Union”, where the mixture of their different Member States innovative performance contributes to the improvement of the Union in terms of economic development, employment, social welfare and solidarity. This idea has been expressed by different policy recommendations delivered by high-level expert groups (Lammy et al. 2017), but also by significant members of EC such as President Jean-Claude Juncker: “Europe must be a Union of equality and a Union of equals. Equality between its Members, big or small, East or West, North or South. Make no mistake, Europe extends from Vigo to Varna. From Spain to Bulgaria. East to West: Europe must breathe with both lungs. Otherwise our continent will struggle for air” (European Commission 2017b).

Besides the encyclical remembrance of the divide between Catholic and Orthodox Church in the famous discourse of Pope John Paul II (*Ut Unum Sint*), these calls for solidarity and cooperation between Member States are common in terms of R & D. As we are transitioning into a new innovation policy paradigm towards a mission policy orientation for facing societal challenges, the role of ecosystems and regions are of outmost importance for avoiding inequalities and divides between territories. Especially in the Union, where the North and South have experienced greater economic divides due to the Grand Recession (2008), and between West and East, mainly because of the Iron Curtain (1945–1991) where precisely most of the Widening countries are located (Veugelers 2016). An ambition to mitigate some externalities of innovation has been present to some extent in the policy mix delivered by the EU. Usually, trying to help those countries to keep up the pace with the EU rhythm whilst contributing to guarantee the competitiveness of the European economy and the extension of its social welfare state.¹¹ Collaboration, cooperation, investment in future ideas, involvement of different actors, open markets, participatory dynamics, research, technology development and many other ideas, values and attitudes towards innovation have been at the forefront since the very beginning of the Union as a way of promoting the EU ideals across the Union and out of it (European Commission 2014b, 2017a, b). These values are also aligned with the participatory dynamics that RRI aims to promote for aligning innovation outcomes with societal needs. But the embracement of RRI and more participatory research and innovation practices also demand to develop several skills and profiles that can facilitate societal engagement.

In this regard, it seems that Widening researchers and institutions are not adequately equipped. Some studies have inquired how societal impact criterion is managed by Social Sciences and Humanities (SSH) in these countries, where engagement seems to be more common, and the results confirm this lack of skills (de Jong and Muhonen 2018). Some of the reasons behind seem to point to a low tradition of stakeholder involvement in research projects, lack of public engagement, inadequate investment in R & D and some specific socio-economic context conditions in

¹¹ See <https://www.reuters.com/article/us-eu-juncker-easteurope/eus-juncker-offers-carrot-and-stick-to-eastern-states-idUSKCN1BO11A>

Widening countries that don't favour participatory approaches (Puukka 2018; Peck 2018).

Certainly, it is difficult to make generalizations for this group of EU-13 countries as the situation of them towards research and innovation can differ in many ways. As an example, countries like Estonia or Portugal¹² have demonstrated a nice performance (increasing participation in calls and projects, national programs for supporting, training and coaching H2020 candidates, rising international research collaboration throughout co-authored indexed publications) and evolution during the H2020 lifespan, but other countries like Bulgaria or Romania are still lagging behind (Puukka 2018; European Commission 2017a, 2018b; COWI 2017). The results delivered by the diagnosis carried out in the New HoRRizon project (Griessler et al. 2018; Gutiérrez and Bierwirth 2019) as well as the different activities carried out in the associated social lab¹³ (Tabarés et al. 2020a, b) seem to back up this argument.

In this sense, there is no 'one size fits all' solution for the diverse problematics that can be found in these countries. It is also of great difficulty to try to envision a program that can meet their different requirements. Too many economic developmental disparities can be found in this group of countries that cannot be explained only by a simple East-West division (Peck 2018). Countries that entered the Union after 2004 benefited from the access to the EU single market as well as ESIF funding. This provided an economic boost, extending their commercial relationships and establishing new alliances for future end emergent sectors that can be spurred by investments in STI. However, structural reforms are needed to convey in these countries for favouring "a particular way of doing R & D". Here, cultural particularities are of utmost importance in this transition to a more participatory research and innovation.

5.5 The Importance of Cultural Particularities Towards the Policy Transition

As it has been stressed, the EC embraced a very dedicated agenda towards the diffusion of RRI across the whole H2020 FP (Timmermans 2017; Geoghegan-Quinn 2012). This effort has also provoked an irregular and disparate diffusion of the topic among Member States and different subsections of FP (Mejgaard et al. 2018; Novitzky et al. 2020). Into the Union we find strong supporters such as The Netherlands¹⁴ or UK,¹⁵ that have developed their own national programmes to foster the embracement of RRI in their R & D ecosystems and facilitating a transition to

¹²The NCP Wide Network offers rich data about the three kinds of calls http://widening.viaa.gov.lv/twinning_summary.html

¹³See <https://newhorizon.eu/sl14/>

¹⁴<https://www.nwo.nl/en/research-and-results/programmes/responsible+innovation>

¹⁵<https://epsrc.ukri.org/index.cfm/research/framework/>

more participatory STI policies. But at the same time, this disparity has evidenced the uncertainties about to what extent the operationalization and institutionalization of RRI practices have gone mainstream across ERA (Gerber 2018). In this sense, Widening countries have not greatly benefited from this effort (Griessler et al. 2018; Gutiérrez and Bierwirth 2019). Socio-ethical, geo-economic disparities and cultural particularities that can be found in this group of countries seem to play a role in the participation gap that still exists in FPs.

These particularities can also deter or favour the embracement and expansion of RRI on their innovation ecosystems and therefore, to accelerate or to block the needed transformation of STI policy to meet the grand challenges (Kuhlmann and Rip 2018; The Lund Declaration, 2009). The adoption of RRI seems to be critical for this policy transition but it is also only a part of the problem. National structures, resources and mechanisms also play a major role towards this transition as they will need to adopt new reconfigurations, practices and relationships that can make room for new actors, but also to avoid established procedures in STI policy. Again, favouring “a particular way of doing R & D” In this sense, it is not useful to consider these countries as a uniform group from a geo-cultural perspective. Eastern Europe seems to be the main macro-region that represents a great number of countries in Widening, even though there are several socio-economic and geo-political differences that cannot reduce its complexity.

For instance, gender equality in Bulgaria is heavily misunderstood and it is commonly perceived as a concept that defies the basic values of its traditional society. That is why on the 27 July 2018, the Constitutional Court of Bulgaria ruled that the Istanbul Convention (Council of Europe 2011) is incompatible with the Bulgarian constitution. In a public statement, the court stressed that the convention definition of ‘gender’ as a social construct “relativizes the borderline between the two sexes (male and female) as biologically determined,” which can lead to the loss of the capacity of a society to distinguish between a man and a woman.¹⁶ Gender dimension is also mostly misunderstood in other Widening countries such as Romania and Serbia. It is common to observe that research institutions do not possess gender equality plans and it seems to be no awareness of this despite there are clear unbalances in management positions (Griessler et al. 2018).

This example illustrates how cultural particularities that can be found in EU-13 countries can deter the diffusion of the RRI keys. RRI can also entail a public contestation of societal values in these countries, like in the case of gender equality. Other keys associated to the RRI paradigm such as public engagement can also create conflicts as this can be misinterpreted as a loss of autonomy or a waste of time in some spheres. Centralized structures are still common in public research organizations in several East-European countries which are closely related with their research cultures and traditions of the legacy of the Iron Curtain. Centralization can

¹⁶More information about this issue at <https://balkaninsight.com/2018/07/27/bulgaria-s-constitutional-court-says-istanbul-convention-not-in-line-with-basic-law-07-27-2018/> and <https://ohrh.law.ox.ac.uk/promoting-gender-ideology-constitutional-court-of-bulgaria-declares-istanbul-convention-unconstitutional/>

be an obstacle for science-society interactions as deter or hinder spontaneous moves from research organizations towards open science or RRI (public engagement or citizen science activities among others) that can be carried out on an exploratory basis. This also explained why little awareness was found regarding “governance” RRI key in the New HoRRIZon project among Widening WP stakeholders (Griessler et al. 2018). New formed coalitions developed under tentative initiatives between research organizations and citizen associations can be also hindered by centralization. In addition, the context-sensitivity of SSSs and its focus on geographical decentralization also emphasizes values such as collaboration and cooperation between different regional stakeholders (McCann and Ortega-Argilés 2015). This can be also problematic under a centralized approach. Tracing some of the pre-existing values fostered by older regimes in these countries can clearly provide a barrier for adopting RRI and the policy transition to “Grand Challenges” (Lukovics et al. 2017).

Formal social capital also seems to play a role in this issue, as some studies have shown that it is structured in a substantial different way from western countries, where forms of collaboration with different R & D agents and different stakeholders are more stable (Pichler and Wallace 2007). This lack of formal social capital is usually substituted by informal social capital, but when dealing with research and innovation it can also hinder transparency in R & D processes as not many stakeholders are involved in them. Moreover, countries with a low tradition of participation are not well equipped to promote concertation of actors for meeting societal challenges (Kuhlmann and Rip 2018; Schot and Steinmueller 2018).

These cultural particularities that can be observed in EU-13 countries will demand RRI tools and capacities for facilitating and accommodating the transformation of STI policy. In this regard, synergies of RRI with SSSs seem to be relevant as these two policy-driven concepts can mutually benefit between them, but also because RRI can act over SSSs to facilitate this policy transition to a more participatory research and innovation oriented to societal challenges (Thapa et al. 2019; Uyarra et al. 2019). Taking into account the different cultural particularities that are at the core of R & D regional ecosystems will be of utmost importance for favouring the embracement of RRI in the EU-13 countries as a powerful tool for facilitating this policy transition.

To this extent, the expansion of the RRI paradigm across ERA should not be shaped or deterred by the own structure pushed by the FPs. The ideals behind RRI do not only pursue to strength the relationship between science & society, but also to reconfigure the way that research and innovation are conducted. Relying on the capacities of Member States to attract funding coming from FPs for disseminating RRI across the Union only reinforces a “winner takes it all” strategy whilst augmenting the “innovation divide”. EU commitment with R & D as the main driver of economic growth, social cohesion, and democracy enabler can be recognized in several policy documents (European Commission 2014b, 2017a ; European Union 2012). Here, what is at stake is not only “a particular way of doing R & D”, but how STI is shaped by EU ideals and extended across the EU territory. Principles of cooperation, solidarity, social cohesion, public engagement and democratic participation

must be embedded in innovations funded by the Union and extended across its Member States. Maximizing and extending the benefits of a knowledge economy to all Member States has been on the agenda of the Union since a long time ago, as innovation divides have been persistent at national level across the EU. In fact, the whole concept of ERA from its inception was spurred to address this innovation gap between Member States, for “bringing together the scientific communities, companies and researchers of Western and Eastern Europe” (European Commission 2000, p. 8), improving researchers capacities and integrating talent into the European scientific community. After several efforts, now it seems that some convergence in research and innovation performance have been achieved among Member States during the last decades, but significant innovation divides still remains without a clear explanation behind (Peck 2018).

No simple East-West or North-South divisions can be used for addressing the complexity of the problem, but of course these differences are playing a role. The sequels produced by the economic crisis of 2008 slashed R & D national budgets (Veugelers 2016). COVID-19 crisis will probably not dig into these cuts (these are two completely different crisis) but it will have other kind of economic negative effects. Several socio-economic inequalities between Member States are usually stressed, but cultural particularities seem to remain unveiled or not addressed properly at their full complexity. Insisting on treating these EU-13 countries that are the recipients of Widening actions as a uniform group remains to be a mistake. Increasing the budget of this WP in a significant manner for next FP is a right measure to facilitate an ‘Innovation Union’ (European Commission 2014b), but at the same time it denies the cultural and ethical particularities that are at the core of their regional innovation ecosystems. More dedicated and specialized approaches and measures are needed. Splitting this group of countries into several categories that can categorize their innovation performances, their strengths and capabilities as well as their weaknesses seems to be the first step to address this complexity. This is also important from a RRI perspective, as different meanings or visions of RRI can be allocated to the different particularities that can be found in this group of countries. Some RRI keys can be a public contestation of traditional values in these countries (like gender equality), but at the same time there are drivers for an axiological integration process of Member States. To date, the Union is mostly an economic union, but the increasing integration political processes that are being deployed will probably demand an international convergence of EU ideals and values. Something, that in the case of gender equality is also aligned with the Universal Declaration of Human Rights.

A second important step towards meeting this gap is taking stock of the knowledge produced by EU funded projects during this decade and mobilizing towards the right direction. The work deployed in projects such as New HoRRizon,¹⁷ RRI

¹⁷<https://newhorizon.eu/>

Practice¹⁸ or RRI Tools,¹⁹ to name a few, is quite comprehensive and useful enough for being extended across ERA. Widening countries seem to have cultural particularities that hamper the introduction of open, collaborative and sustainable approaches towards research and innovation. In this sense, the benefits of RRI should be extended across the Union and to be used as an agile tool to meet this gap. In this particular issue, ESIF funds can be also mobilized for meeting those gaps and developing research capabilities already demanded in the EU landscape. ESIF funds should be mobilized not only for overcoming economic shortcomings, but also for facilitating participatory research and innovation ecosystems. Development of deliberative approaches, accountability mechanisms, participatory dynamics and discussion spaces where society can be involved in a meaningful way into STI, are some of the pending issues that deter the diffusion and social appropriation of RRI at Widening countries. Promotion of ERA values across the EU should not follow the imitation of practices performed by innovation leaders. This may run the risk of promoting cultural uniformity and sacrificing cultural diversity for the sake of cohesion and integration. Here is where the role of RRI and its application to regional innovation ecosystems with the help of SSSs can create an opportunity to advance in the integration political processes whilst maintaining regional identities.

Last, the own structure of the Widening WP oriented to establish linkages between HPCs and LPCs (innovation leaders and followers), deters the development and facilitation of a community of practitioners around the WP. In many subsections of H2020 dedicated events such as brokerage activities, joint conferences and others help to establish a community of practice. Practitioners are interested in the themes of the WP and establish alliances and synergies, generating common knowledge, sharing experiences that usually provoke “spill over effects” in the regional ecosystems where they act.

5.6 Conclusion

As we have exposed in this chapter, the complexity of EU-13 countries cannot be reduced to a particular group of Member States that have an innovation performance below the average of the EU, according to an intricate indicator. This complexity of regional innovation ecosystems and research practices in EU-13 countries needs to be addressed in more sophisticated ways that can drive a real transformation towards the adoption of a policy transition oriented to the “Grand Challenges”. Throughout the text we have underlined how RRI can be a tool that can facilitate this transformation. However, the use of the RRI paradigm will demand from an intensive and tailored cultural integration into the different contexts that exist in these EU-13 countries. The existence of SSSs is a good steppingstone where RRI can be situated,

¹⁸<https://www.rri-practice.eu/>

¹⁹<https://rri-tools.eu/>

but it will demand active and context-sensitive specific efforts. If no specific measures are conducted in this regard, we may run the risk of aggravating the innovation divide instead of mitigating it as several cultural particularities joint to their different socio-economic differences are playing a significant role in the evolution of EU-13 countries with regard to research and innovation.

To meet this challenge, we stress the need of taking into account these cultural particularities in the future Widening WP, but also to extend these actions to other programs that are intimately associated to ESIF funds and other instruments for political integration in the EU. The Union as a political project is still in its infancy and R & I is probably one of these domains where economy and politics can generate conflicts with regional identities and values. In this sense, this is a domain where the Union needs to put a lot of efforts for not making the mistake of losing the diversity that it is at the core of the different territories that compose it. We encourage to social science researchers to take on this topic and to provide a more comprehensive picture of the diversified motivations and attitudes that can favour or deter the policy transition across different Member States. This will be one of the most important challenges that this group of countries will face in coming years for mitigating the innovation divide.

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Chapter 6

Joining Forces – Staying Unique: Adapting RRI to Different Research and Innovation Funding Agency Contexts



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6.1 Introduction

European and national research and innovation (R & I) policies are increasingly oriented towards the task to tackle the unprecedented challenges reflected especially in the United Nations 17 Sustainable Development Goals (SDGs) of the Agenda 2030 that societies face today. Following the need to produce adequate and viable solutions with a strong societal impact and aware of the fact that this impact will strongly affect and depend on the lifestyles, values and attitudes of citizens, there has been a rising attention for the need to better root science, research and innovation in society.

The challenge- or mission-oriented R & I approaches of the recent framework programmes (FP) launched by the European Commission paired with the programme lines of *Science in Society (SiS)* (FP7) and *Science with and for Society (SwafS)* (FP8 – Horizon 2020) reflect the rising attention to the science and society nexus, that is underpinned by Responsible Research and Innovation (RRI). The European Commission launched projects within FP8, such as the NewHoRRIzon

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project, to diagnose and analyse the implementation of RRI in R & I projects that have been funded by the Horizon 2020 framework programme and to experiment on ways to foster its uptake. One question of major concern has been how RRI can best develop its potential to establish the commitment and cooperation of the various actors in the R & I system in order to meet the new European challenge or mission-oriented R & I approach and at the same time contribute to the support of responsibility in R & I. This article highlights national funding and innovation agencies in this respect.

National funding and innovation agencies play an important role as pacesetters and enablers for R & I to independently address societal challenges and to implement new concepts in the R & I landscape and policy agenda. Rooted both in the national R & I systems as well as in the international exchange and European experience within EU Framework programmes and the ERA, agencies mediate between politics and the respective national R & I landscape: As contracting parties to the political authorities, the direction of action they take is mainly driven by the political entities they report to. Within this framework, funding and innovation agencies have a considerable amount of flexibility to define their own strategies in cooperation with their political partners. Translating policy into R & I programmes they can build on a profound experience in shaping R & I with the respective R & I communities. While there are similarities as far as their mediating role is concerned, they differ widely in their outlook, scope, size and budget, as well as in their mission, mandate and public accountability towards the state (Glennie and Bound 2016).

As far as the implementation of RRI is concerned, funding and innovation agencies take a crucial role within the research systems. Experimentation with different instruments in the funding and innovation landscape is necessary. New types of research and innovation funding and financing are needed that create incentives for funding grantees to responsibly foster innovation and research. There are some frontrunners that take RRI into R & I practice, such as the Responsible Innovation programme by the Dutch research council (NWO), the Research for innovation and sustainability Strategy of the Research Council of Norway (RCN) and the Framework for Responsible Innovation by the British Engineering and Physical Sciences Research Council (Owen 2014). Other funding and innovation agencies attentively consider whether, how and why RRI could benefit their work beyond the concepts and standards they already use and how it could be operationalized to be integrated into the agencies' day-to-day practices? These questions are addressed in more punctuated activities mainly of a lab-character within agencies to test and foster innovative approaches.

In this article the authors highlight the activities of two funding and one innovation agencies, looking at the Netherlands Enterprise Agency (RVO), the Austrian Promotion Agency (FFG) and the Technology Agency of the Czech Republic (TA CR) from an inside perspective. They consider how these funding and innovation agencies are already responding to the challenge-oriented R & I approach, how their activities can be linked to RRI and what additional insights could be gained from introducing RRI to agency practitioners.

This paper contributes an agency practitioners' perspective to the scientific discussion on implementing RRI, reporting on *de facto* RRI already practiced in the respective agencies as well as on the experience in experimenting with RRI on the workshop-level within the funding and innovation agencies, discussing the insights gained from the experience as well as potential benefits and obstacles, and finally formulating results and recommendations on the action needed to really open up the potential benefits of RRI to national funding and innovation agencies in their specific national R & I landscape.

6.2 The Wider Context: Challenges to the National R & I Landscape

The research and innovation landscape has changed significantly in recent years, resulting in new concepts and mission statements that help to address how science and technology can contribute to both the environment and society we want for future generations. For years, public funded R & I systems have been characterised by the adaptation to new circumstances and increased performance – in terms of jobs, growth and competitiveness. More recently, traditional thinking in R & I systems is being challenged, mainly because it does not give sufficient weight and attention to the fulfilment of societal needs through innovation (Geels 2004).

Established R & I systems are currently confronted with new challenges and interrelated problem constellations, which are intensified by the ambition to deliver desirable high-quality results for society. Within the R & I landscape such problem constellations become evident in particular through newly emerging and developing socio-technical systems, through the impact of innovations, through large-scale societal challenges (digitalisation, sustainability, climate change etc.), as well as through the perceived societal desirability of R & I. Socio-technical systems manifest themselves through a multitude of actors, technological artefacts, infrastructures, legislative elements and the numerous interdependencies between them. The fulfilment of societal functions becomes central when engaging with socio-technical systems, which means that it is not only about technological innovation, but also about its use and introduction into society (Geels 2004). With regard to the impact of research and innovation, there is a growing demand not only to consider the intended and unintended consequences of innovation, but also to include the consideration of purposes and motivations, the sense of why one does it, who benefits from it and who does not (Owen et al. 2012). There is also the need to guarantee the quality of science: Societal expectations of the quality of science are high, so the question arises concerning what needs to be done to ensure that science produces comprehensible, effective and verifiable results that meet the challenges of our contemporary society. The perceived societal desirability of R & I refers in particular to society's expectations of research and innovation activities, because especially the access to knowledge in our Western society enables large parts of society to

critically question and assess ongoing research and innovation activities (Lindner et al. 2016, p. 5). Indeed, there is a high demand to discuss the desirability of certain sensitive and societally relevant areas of applied R & I – e.g. genetically modified organisms, artificial intelligence or thermonuclear research.

R & I activities with the potential to address today's large-scale societal challenges will only have a chance to succeed if they assure the inclusion of a broad range of stakeholders from science, industry, public administration and civil society.¹ Today's R & I challenges should therefore be understood as fundamentally political in the sense of calling for the renegotiation of diverging interests, needs, concerns and even ethical values (Schroth et al. 2018). Given the large number of actors, institutions and relationships among them that need to be mobilised to address today's R & I challenges and problem constellations mentioned above, Daimer et al. state: *“From the point of view of innovation policy, it seems obvious that challenge oriented innovation requires different types of supporting instruments and therefore narrow types of demand articulation no longer seem adequate”* (Daimer et al. 2012, p. 223). This understanding calls for a new type of research and innovation projects and funding programmes and requires an understanding of how the current R & I system, its actors and the research and innovation it contains could support the overall system and benefit society.

Both national governments and the European Union (EU) have already responded to the challenges of the R & I system by giving R & I policy a new direction over the past few years. The mere promotion for the purpose of economic growth has been replaced by an R & I policy that aims to address major societal challenges as well as environmental issues addressed by a challenge-driven, mission-oriented policy approach (Daimer et al.). The European Research funding programme considered SwafS in FP7 and fostered answers to societal challenges such as climate action, energy, health or food in the third pillar of the European Framework Programme Horizon 2020 (Horizon 2020). Horizon Europe, the new EU Framework Programme for Research and Innovation for the period 2021–2027, aims, among other things, to guide the far-reaching impact of R & I on society, the environment and the economy through a mission-oriented policy approach. According to the European Research Area and Innovation Committee (ERAC), it is particularly important in the future to pay special attention to the principles of inclusivity, relevance, effectiveness and visibility in the European Research Area (ERA).

The inclusion of RRI as the key approach of SwafS and as a cross-cutting issue along all programme lines in Horizon 2020 had been a direct answer to make the European framework programme Horizon 2020 adept at facing societal challenges.

Conceptualisations of RRI and de facto RRI

Within scientific discourse and policy framing, there are several conceptualizations of RRI. The most prominent are the *six RRI keys* defined by the EU (European Commission 2014), comprising ethics, science education, gender equality, open

¹Reference to different approaches in: “Public engagement in the tradition of participatory approaches – an approximation” in this book.

access, governance and public engagement. Beyond these *RRI keys*, there are also the procedural heuristic of anticipation, inclusion, reflexivity and responsiveness, known as the *four RRI process dimensions* (Stilgoe et al. 2013; Owen et al. 2013). The framing of RRI in this paper is provided by the European Commission's eighth framework programme: "Responsible Research and Innovation (RRI) implies that societal actors (researchers, citizens, policy makers, business, third sector organisations, 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" (European Commission 2015). Fostering a shared responsibility and ownership between science, politics, industry and society as well as stimulating the cooperation of different social, academic, political and industrial actors, this framing of RRI would not only respond to societal needs but also create an "innovation-friendly climate" (Felt et al. 2018, p. 49). In recent years more efforts have been devoted to investigate what adopting RRI entails for research funding and research conducting organisations (Forsberg et al. 2018), as indeed RRI calls for a multi-disciplinary multi-level multi-stakeholder approach towards science, research and innovation. Due to their specific area of operation, this framing of RRI is most interesting for the participating agencies because its applicability clearly extends beyond science into research and innovation (Novitzky et al. 2020). In this paper, our reasoning hence revolves mostly around questions of how to introduce this reasoning into the agencies internal discourse and how to practically implement it in the context of challenge-oriented research and innovation.

A broader understanding of RRI applies only in the sections that present the current and ongoing activities of the agencies FFG, RVO and TA CR that can be classified as RRI or show distinct features of RRI. Here RRI encompasses diverse framings such as the *six RRI keys*, the *four RRI process dimensions*, *responsibility in research and innovation* but also activities that at least show some of the distinct features of the multi-disciplinary multi-level multi-stakeholder approach that is promoted by the EC via its SwafS programme. In this context also the term *de facto RRI* (Randels et al. 2016) often applies. Given the framework in which national agencies are operating and their individual size, scope and responsibilities, they respond to societal challenges of R & I at their pace and with their specific orientation. In this process, *de facto* RRI activities already underway in the agencies can be identified. Randles et al. (2016) use the term *de facto* together with RRI in case studies to understand how actors themselves embed *de facto* responsibility in research and innovation contexts, as well as in organisational settings and professional practice (Randles et al. 2016, p. 32). Since RRI is rather new and not yet fully established, the term RRI is still used rather rarely and there are no explicit references to it within the respective agency programmes or activities. However, there are many practices within the agencies, some of which have a long tradition (e.g. gender, involvement of stakeholders), that can be connected to RRI.

6.3 Methodology

The experiences and reflections presented in this article are mainly resulting from the joint work of the national funding and innovation agencies and the day-to-day work within the respective agency contexts. The three participating funding and innovation agencies – the Netherlands Enterprise Agency (RVO), Austrian Research Promotion Agency (FFG), and Technology Agency of the Czech Republic (TA CR) – have been part of the NewHoRRizon project. Within that project the participating funding and innovation agencies formed the *RRI-Network* together with further partners, such as the Archimedes Foundation in Estonia and the Federation of German Scientists bringing in experiences of societal inclusion in R & I from the perspective of a civil society organisation. The *RRI-Network* engaged in the task to open up to concept to the agencies involved, while they differ widely by scope and objective: RVO supports entrepreneurs, non-governmental organisations (NGOs), knowledge institutes and organisations. The agency aims to facilitate entrepreneurship, improve collaborations, strengthen positions and help realise national and international ambitions with funding, networking, know-how and compliance with laws and regulations. FFG is the national funding agency for industrial research and development in Austria. FFG funding schemes play an important role in generating new knowledge, developing new products and services, and enhancing competitiveness in the global marketplace. They make it easier, or possible, to finance research and innovation projects, and help to absorb the risks involved in research. The FFG supports international networking and encourages careers in science. TA CR is a national funding body on the level of an organisational unit of the state which focuses on support of research, experimental development and innovation. It prepares and realizes its own funding programmes and secures them for other governmental departments. It also provides communication support between research organizations and the private sector. Representatives of the three agencies embarked on experimenting with RRI within their organisations. As agency practitioners,

1. they collected information from within their organisation on RRI-relevant or RRI-like practices: Given the framework in which national agencies are operating and their individual size, scope and responsibilities, they respond to the exigencies of challenge-oriented R & I policy approaches and the demand of responsible R & I at their pace and with their specific orientation. It was to see how the agencies represented here support RRI with different incentives for grantees or specific programmes, without using the term RRI. Accordingly, the focus was on practices within the agencies, that can be connected to the concept of the 6 keys of RRI, and on criteria and processes inspired by RRI that could be identified in funding guidelines.
2. they initiated and implemented workshops with other agency staff as small-scale experiments: Two agencies, namely FFG and RVO, have set up a roadmap for RRI-workshops in the respective agencies to promote an understanding of RRI and to identify opportunities for its implementation. At RVO, a workshop on RRI took place on April 11, 2019. Participants were, in addition to the two

moderators – one from RVO and one from the University of Amsterdam – 7 female and 3 male employees at RVO who work on different themes such as: international CSR, internal strategy (Agenda2022), regulations for building/industry, innovation in energy sector, mission-driven research and innovation policy, SDGs. At FFG, a similar Workshop was set up with in total 15 employees (8 male and 7 female) participating in the workshop on May 2nd, 2019 in Vienna, Austria. Of these 15 participants, 4 were mid-level management, 1 a strategist, 3 European level experts (NCPs for H2020) and 7 national level innovation funding experts tasked with bottom-up funding or structural funding. The exchange with the participants was crucial to gain insights into their experience on the added value of RRI to their standard practices.

3. they experienced the practice of introducing RRI to their institution: This experience is of course closely linked to standing practices (in which they are involved on a day-to-day basis) and the exchange with both researchers and practitioners from European projects fostering RRI on the one hand and colleagues and participants of their small-scale experiments (internal workshops) on the other hand. Accordingly, these experiences are taken up together with the results from present standard practices (point 1) and small-scale experiments (point 2) into the results section.

6.4 RRI Within National Funding and Innovation Agencies

RVO

Working in a socially responsible way is not new, and like others, RVO is working to take responsibility within its procedures, subsidies, regulations and advices. RVO is currently undergoing a process of change from a task-oriented approach to a more challenge-oriented way of working. In 2018, a roadmap has been designed to accompany this change: The Agenda 2022. The cornerstones of the Agenda 2022 are challenge-oriented, talent-oriented and customer-oriented working. The idea of challenge-oriented working was examined from various stakeholder perspectives (customers, ministries as contractual partners, employees, organisations) and then developed into concrete action points. The aim of RVO is to bring together all knowledge, stakeholders, instruments, etc. regarding a social challenge in order to maximise the social impact. In particular, this way of collaborating with different stakeholders from the beginning of the development process of a regulation until the enactment of a regulation can be considered a *de facto RRI way of working*. Apart from that, RVO works together with stakeholders on SDG-oriented societal challenges. Awareness raising and agenda-setting are essential in this matter. In this light, RVO has recently developed an SDG mapping tool for regulations. With this SDG mapping tool, RVO raises awareness both internally and in cooperation with stakeholders and partners of RVO. In addition to the challenge-oriented way of working, two other pillars of Agenda 2022 are in the focus of attention: talent-oriented and customer-oriented working. RVO strives to promote the talents of its

employees. These diverse talents from across the organisation can then be linked to the challenges identified by RVO, so RVO gets the relevant talents in every collaboration. Secondly, the actual social impact is usually brought about by RVO's customers, e.g. entrepreneurs, who invest in innovation or sustainability. This implies that instead of working from the regulatory side of things, RVO is in the process of shifting to a customer needs approach.

In addition to the Agenda 2022, RVOs X Lab should be mentioned in connection with de facto RRI activities. X Lab is an innovation laboratory within RVO, which is mainly oriented as a strategic instrument for organisational change. The X Lab stimulates and facilitates policy and process innovations that are aimed towards the level of system innovation and works on a case-by-case basis in order to experiment and design concepts and tools for public services in three general innovation areas: (1) the digital economy, (2) inclusive policies and (3) learning government. The mission of the X Lab is to transform the way current governance works. In essence: "who designs, with whom and how decisions are made in a group". Important values for X Lab are "collectivity, ownership and co-creation". X Lab's main focus is to empower civil servants to explore unusual perspectives and develop new skills and abilities that enable them to think and act on complex challenges. The X Lab helps them to translate policy into services by applying the self-developed tools for systems thinking and service design combined with the in-depth experience and knowledge of RVO in policy implementation. In addition, the X Lab collaborates with entrepreneurs and academics who apply scientific findings in their innovation-oriented work, in order to explore the usability and application of new academic knowledge and insights. This collaboration is based on an exchange of ideas and knowledge of social capital. This leads to new collective activities such as workshops, experiments or even the development of new tools, thus promoting the RRI key *public engagement*.

FFG

Depending on the funding area, the organisation as a whole is very active in supporting responsible R & I. As a publicly funded research promotion agency, the FFG is highly committed to developing a broader understanding of funding and has for many years created specific programmes and initiatives that can be associated with the RRI keys. This is evident in the development of new instruments that represent a base for implementing research, development and innovation. Particularly noteworthy here is the expansion of the range of funding instruments to include formats such as *Innovationswerkstätten* that support the formation of innovation laboratories, which allow open access to research facilities and premises, thus enabling real development environments and user-centred innovation projects. In addition to the access to material resources, access to specific know-how, human resources and organisational structures is also made accessible. Furthermore, these innovation laboratories focus on the early involvement of end users and/or society. The innovation process is opened up in the sense of open innovation and expanded to include the design of an innovation-friendly environment for new ideas and concepts, which also promotes a lively exchange of knowledge. In short, innovation

laboratories set the framework conditions for research and innovation performance and thus simultaneously promote interdisciplinary cooperation and the early involvement of users and society.

Most projects funded by the FFG are run by companies that build their competitive advantage on keeping their research results closed. Open access is therefore not obligatory for an organisation in order to receive funding from FFG. Yet, costs for open access publications can be billed to FFG.

Ethics aspects are tackled in a more general way, e.g. by the fundamental decisions not to fund military products, weapons technologies or gambling via FFG's programmes. Beyond that ethics aspects have to be considered – even without an intervention by FFG – in many research and development projects, especially in the fields of medicine, medical technology, veterinary medicine etc., due to European and national regulation. Gender science and gender mainstreaming criteria are included in all FFG programmes and calls for proposals. These criteria reflect gender-specific aspects that need to be incorporated into the content and design of research and innovation projects as well as equal opportunities for women and men. In addition, women, who are usually still underrepresented in research and innovation projects, are addressed through specific funding programmes. The programme *Laura Bassi Centres of Expertise* funded large-scale research and development projects (so-called centres of excellence) headed and managed by female scientists. These centres of excellence performed research at the interface to industry and focussed on trans- and interdisciplinary research, a timely research culture, team culture and targeted career development, equal opportunity in cooperative research and excellent application-oriented basic research. The programme *Laura Bassi 4.0* aims at women who want to participate in actively shaping the digitalisation process through research and development based on the vision of equal opportunity. The format *FEMtech Praktika für Studentinnen* funds internships for female students with the aim of attracting young female scientists for careers in applied research in the scientific and technical RTI area (research, technology and innovation). The students get to know career entry and advancement paths and receive a sound insight into applied research and development. The programme *FEMtech Karriere* supports research- and technology-intensive companies in putting equal opportunities into practice. The programme *FEMtech Forschungsprojekte* supports research, technology and innovation projects with gender-relevant content.

Another de facto RRI activity is the format *Ideen Lab 4.0*. The format runs an ideation lab in which civil society, politics and public administration work together with science and industry in open innovation processes to identify current societal challenges, design potential solutions to those societal challenges together with those affected and fund research and development projects in which these solutions can then be developed. The format aims to create new interdisciplinary cooperative relationships between researchers and companies in order to co-develop and implement application-oriented projects. Here, de facto RRI can be seen in the thematic element of the inclusion of stakeholders (multi-actor approach) from the start of the ideation lab to the completion of the research and development projects funded by the ideation lab.

De facto RRI aspects can be found also in FFG's large-scale bottom-up funding programme *Basisprogramm*. In this case the guidelines contain criteria for funding, e.g. ecology, gender, social aspects or relevance for the region; and applicants have to answer specific questions. It is the applicants' choice how to respond to the questions or requirements. The answers are compiled in a schematic report and build the basis for the assessment and funding decision by an expert committee.

Currently the biggest shift with respect to the responsabilisation of FFG's funding practices is the ongoing and stepwise inclusion of sustainability criteria in all FFG programmes and calls for proposals starting with June 2020. These sustainability criteria are based on the concept of the United Nations SDGs and are meant to assure that research and innovation projects funded by FFG provide a stronger contribution to long-term ecological, economic and social sustainability.

TA CR

In the last few years TA CR was involved in several (defacto-)RRI activities and these activities are being developed further.² The internal project SmarterAdmin – financed by ESF – which is aimed at improving the quality of strategic governance inside the agency explicitly works with development of the horizontal agendas of RRI. There is also effort inside the agency to incorporate RRI more explicitly into future funding programmes and support for other RRI projects. As for funding programmes which could be understood as integrating defacto-RRI issues, TA CR had previously funding programmes which were designated for furtherance of applied research and innovation in social sciences and incorporated themes and problems, which intersect with RRI. Now TA CR is readying a new framework funding programme Sigma which will use RRI as one of the main horizontal agendas. This programme will use RRI subthemes and will be focused on developing more advanced dialogue among funding bodies and recipients.

TA CR participates at several Horizon 2020 projects – the GEECCO and GENDER-NET Plus projects are predominantly aimed at the gender dimension of R & I, the NewHoRRIzon project tackles RRI and the new PRO-Ethics project is concerned with the ethical and participatory side of R & I funding. TA CR is also involved in the CHIST-ERA consortium, which is concerned with issues of open access and open data and it could be also understood as a defacto-RRI activity even though it uses the terminology of Open Science. Mere participation in these projects is fostering implementation of tackled issues as there are e.g. corresponding goals set and outputs delivered.

Due to the involvement in the NewHoRRIzon project, TA CR gained a position of a project employee designated as RRI experts. These RRI experts gained recognition in the area of responsible research and innovation with time. And due to the relative lower awareness of how to deal with these issues while knowing it is something important and needs to be dealt with, they were soon recognized as the people to reach to, allowing for (future) mainstreaming of RRI issues.

²On the international projects and activity of TA CR named in the following paragraph, see: <https://www.tacr.cz/en/international-collaboration/>;

These experts later gathered in the newly created Department for Methodical Support and Change Management which is dealing with horizontal agendas and projects of internal development. This institutional anchoring provides a stronger position for implementation and integration of RRI into funding practice.

According to the activities described, there are many practices within the agencies, some of which have a long tradition (e.g. gender, involvement of all relevant stakeholders) that can be connected to the concept of the six keys of RRI. In addition, RRI criteria and processes are often already included in funding guidelines. Speaking in RRI-terms, we would identify *de facto RRI* in the day-to-day work of the agencies considered.

RRI Workshop Experience

Given these *de facto RRI* activities within the agencies, small-scale internal workshops at RVO and FFG helped to examine how RRI was received and reflected upon by colleagues and teams, with a view to how it could potentially improve their work. The approaches derived from discussions within the *RRI-Network* and from the generation of micro-projects to explore both the awareness of problem constellations and situations as well as the integration of learnings from RRI discourse into the specific agency contexts. Our approach to the transfer of RRI competences to agency practitioners, which was to be used to change working practices (rather than institutional change), was selective and focused at the micro level.

The authors engaged in two other workshops focussing on discussing RRI within the national R & I funding landscape, the results of these workshops being beyond the scope of this article. The main difference is that the latter ones were inter-organisational workshops disseminating the EC-approach to RRI, while the first two were organized within the respective agency and more specifically oriented to the needs of the institutions, thus *translating RRI*. The authors decided to concentrate in this article on the organisational-oriented workshops, taking the results of the latter ones into account in Part 3.

Experience of RVO Workshop

The internal workshop at RVO started with an academic overview on interpretations of RRI. Three different approaches on RRI were presented by Anne Loeber (University of Amsterdam): (1) The four process dimensions, (2) Participative negotiation space (Schroth et al. 2018) and (3) Six keys approach.

In the Netherlands, participating with stakeholders is already quite common in policymaking and regulation practices. Even though, still sometimes some stakeholders are not included in such processes. So, the main question for the ten RVO participants in the workshop was: “*RRI?! Are we doing this already or can RVO learn from RRI?*”

After introducing the participants to the three RRI approaches, the participants were asked to think about their daily work (for instance: executing regulations; improvement of internal processes; or working on international CSR) and if they could recognize (some) elements of RRI in their daily practices. After this, they were asked to reflect on the question whether there would be elements of RRI that were new to them and that they could integrate or use in their daily work. As a last

question, the participants collected ideas in the form of a needs analysis to see what it would take to actually implement the ideas gathered under the second question.

There was a consensus between the RVO participants that they recognized elements of RRI in their own practice, but they had not yet known RRI as such. They did not want to *re-invent the wheel* but were eager to learn more about RRI and to see whether RRI could directly affect RVO tasks. For them to make this work, there should be a very concrete link between RRI and the regulations RVO deals with. For instance, RVO could have a closer look at the link between CSR and RRI, or to find ways where RVO and academic knowledge can meet and learn from each other. Another issue of interest, the participants identified, was in what ways RRI could speed up societal change or reaching policy goals.

As a follow-up, regular meetups between RVO X Lab and the University of Amsterdam have been set up to discuss the needs RVO has and to explore the way(s) RRI could be used to meet these needs. This process is still going on (March 2020).

Experience of FFG Workshop

The internal workshop at FFG in Vienna introduced RRI in three steps. As a first step, the concept of *wicked problems* (Newman and Head 2017) created a shared understanding of the dynamics underlying today's large-scale societal problem situations that call for new challenge-oriented R & I approaches. In a second step, the workshop provided the participants with a four-quadrant model that highlights different regimes of wicked problems based on the respective degree of social complexity, technological complexity and socio-technological complexity (Fig. 6.1). Finally, different framings of RRI were introduced as distinct approaches towards the solution, resolution and management of wicked problems.³

Having been introduced to above mentioned types of complexity and their potential interrelatedness, the participants were asked to identify practical examples for each of the quadrants, that is to decide to which form of complexity these examples most precisely relate to. The following group discussions revealed that the participants were most interested in identifying and discussing wicked issues. *Tame, technologically complex* issues seemed to be of little interest. Most participants voiced strong opinions on the exact position of the identified examples and were convinced that they had gained sufficient understanding of the model as well as the problem situations' complexity. Actually, the model fostered their reasoning on and understanding of some issues currently transitioning from *socially wicked* into *socio-technologically wicked* problem situations due to the current digital transformation. Beyond that there was the overall agreement that there is already quite a bit of work

³To some such a three-step introduction of RRI might seem like a detour. Yet, what needs to be considered here is that more senior agency practitioners have over the years implemented various R & I policy approaches. To them RRI is just one amongst several policy approaches that are currently competing for implementation in R & I funding. They hence want to know precisely what type of issues RRI can help to address, how these issues manifest at the level of everyday funding practice, and how RRI as a policy approach fits into the bigger picture from a historic as well as systematic R & I policy perspective.

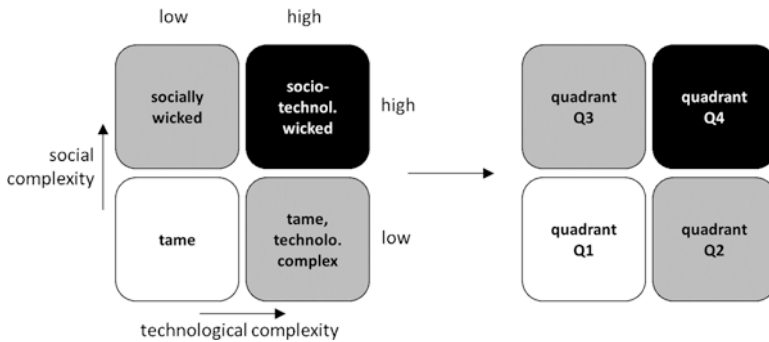


Fig. 6.1 An overview of the four-quadrant model. (Schoisswohl 2019, p. 11)

going on at FFG, which could be labelled *de facto RRI* (Randles et al. 2016) and dates back prior to the invention of the term *Responsible Research and Innovation*.

The FFG workshop demonstrated that the notion of RRI could be successfully connected to the FFG discourse on the funding of applied research and innovation enacted by its different internal stakeholders. The discourse on RRI and the underlying issues driving the RRI discourse became understandable in terms of the FFG internal discourse beyond internal organisational units and academic backgrounds. Consequently, FFG experts can now *own* the term RRI without *disowning* their colleagues of other more established terms or discrediting the practices connected to these more established terms when talking about the necessity to do RRI.

6.5 Discussion

It is evident that RVO, FFG and TA CR have been addressing and dealing with *RRI issues* and *RRI-like issues* via *RRI-like approaches* and some *de facto RRI activities* for a significant amount of time. However, the findings of the RVO and FFG workshops also show that it is not yet entirely clear how RRI is reflected in factual changes at the level of everyday funding/innovation practice. It would therefore be helpful to provide a more systematic understanding of RRI and at the same time to use the practical experimenting of the *AIRR approach* (Stilgoe et al. 2013) as a means of bridging this *theory-practice gap*. Especially because agency practitioners are tasked with the development of new funding instruments, regulations, formats and programmes for the support of a challenge, or mission-oriented policy approach. This approach welcomes perspectives that help us understand and address the dynamics underlying today's large-scale societal challenges. Showing that the RRI discourse provides a range of approaches for solution, resolution and management of some of these dynamics.

Good practice examples seem to be vital to raise awareness about the potential benefit of RRI for the agencies' business, but also to demonstrate ways of practical

applicability. Both workshops demonstrate the openness of the participating representatives of the agencies to learn about new approaches that they could potentially use to solve problems and challenges in their daily work context. It became obvious, that for incorporation into agency work, it is essential to present RRI in a way that makes it understandable, placeable, accessible and foremostly concretely applicable for agency practitioners with perspectives drawing on highly diverging disciplinary contexts and discourses and a common understanding of agency work based on the vivid multi-disciplinarity of the historically grown (and distinct) agencies.

Institutionalization of RRI proves to be a very strong tool for RRI integration as the example of TA CR demonstrates: The people dealing with the project NewHoRRizon and other RRI-like issues were later assembled in the newly created Department for Methodical Support and Change Management, which is dealing with horizontal agendas and projects of internal development. This institutional position enables a stronger lever for implementation and integration of RRI into funding practice. The incorporation of RRI into some funding programmes, its usage in tackling contemporary challenges and even its rudimentary implementation as a crosscutting issue is promising.

But there are also obstacles. These vary depending on the political and cultural contexts. Some agencies are more open to implementation of RRI and RRI-like concepts than others, according to given context. The agencies are also constrained by the conditions of funding – by law, higher-ranking organisations or long-term interorganisational rules. These obstacles provide often limited windows of opportunity when things can be changed and ideally improved. Considering the implementation of RRI, it has to be taken into account that this effort is hobbled by the conditions of financing the activities of the funding agencies, be it by law, higher-ranking organisations or long-term interorganisational rules which can most of the time be little influenced from within the funding agency or by the agency itself. This leads to a necessity of a window of opportunity strategy, i.e. waiting for a reform, introduction of new funding programmes, policy changes, government changes etc. One of the great hindrances was the discontinuity of the SwafS programme as the sole source of RRI-focused project funding in Horizon 2020. These developments, which have easily been interpreted as a signal by the EC on the diminishing importance attributed to RRI, had an irritating effect on those parts of the agencies open to participatory elements in R & I and definitely weakened the inclination to seriously consider RRI.

A major experience has been that different national R & I environments and organisational mandates require specific approaches even though the problems and challenges, which the initiators or advocates of RRI in these funding agencies face, have often the same substance. Although RRI provides a pathway to other parts of the organisation and is working towards similar initiatives, the relative immaturity and plurality of the non-anchored academic field of RRI, with many conceptual discussions, implies that it does not provide easy and universal means to transfer RRI into the practice of funding agencies at the institutional level. In some of the agencies, the RRI dimensions are addressed to a greater or lesser extent, in different ways and with different strengths. Mostly unknown as a term in the agency context but – as learned from the workshop experience adaptable to existing concept-driven

(de-facto RRI) day-to-day work –, this new approach has the potential to gain acceptance, become visible and create unexpected additional connections within and outside of the organisation.

At the organisational level, there is a strong drive for improvement with respect to organisational and funding practices. Accordingly, RRI could be and already is considered a way to tackle some of the current challenges and may appeal to those within the R & I systems who have to come up with new solutions. However, national funding agencies face different challenges, some of which can be explained by varying political and cultural contexts, resulting in different attitudes towards and openings for agendas based on long-term strategic reasoning. The search for answers to current challenges can include and welcome RRI expertise.

Beyond that the integration of Science, Technology, Engineering, and Mathematics (STEM) and Social Sciences and Humanities (SSH) seems to be at times hindered by imaginations and expectations of what a more profound integration of SSH and STEM would entail: STEM wording as well as imaginations, logics and expectations tend to dominate the internal discourses in the agency context, which hence has a tendency towards enacting STEM imaginations and logics.

If RRI would be chosen to learn more from, then a suggestion to funding and innovation agencies and collaborating stakeholders would be not to use RRI in a fluid way. To keep using good agency practices and complement these from RRI where necessary or desirable. The matter of what is desirable is often a policy deliberation. For RVO for example, more knowledge on RRI would then be necessary on a strategic RVO level as well as on a strategic ministry level (since this is the contracting party for RVO). A collaboration between RVO X Lab and an equivalent of X Lab at ministry level could be a starting point. In addition, it would be advantageous to create novel multidisciplinary approaches, with many actors involved, based above all on an integration of research and innovation with practices and spaces of mediation, negotiation, participation and representation. In order to create these spaces and to intensify the involvement of all stakeholders, one possibility would be to involve end users and/or citizens in the process of research and innovation projects as well as in the development of new regulations for new procedures or new subsidy forms. It would also be of interest to extend the policy-science collaboration, as practiced in the workshop with academics of the University of Amsterdam as well as involving educational aspects practiced by X Lab at RVO or in other agency contexts.⁴ In collaborating with even more stakeholders the agencies will benefit from working in different nodes of collaboration to strengthen their joint capacity. Also noteworthy is the benefit from peer-learning or peer-collaboration to understand how to add more and collective value towards the current transitions. Especially the space for discussion and transfer of (not only) RRI-like ideas has been appreciated, which is made possible by international forums or organisations, i.e. TAFTIE, enabling them to find likeminded support by exchange of experience and backing that feeds into their work in the respective national agency.

⁴For instance internships are developed in X Lab at RVO, or even primary schooling projects are originating from the X Lab collaboration of policy and science.

6.6 Conclusion and Recommendations

While RRI and the related discourse proved to be rather unknown to the internal discourse of funding and innovation agencies and sometimes perceived as fluid and imprecise as far as its concise use for the agencies' tasks is concerned, the agency practitioners involved in the described activities experienced the value and benefit of selected RRI practices. The offer to integrate elements of RRI to where and how it is suitable to support responsibility in R & I meets the openness of many involved. Some RRI elements might even add to already introduced new formats within the agencies that work in the same direction, as experienced at FFG and RVO. These are very promising first experiences to build on. However, the empirical analysis of RRI activities already underway in the agencies and the workshop experiences also provided insights showing that it is not yet entirely clear how RRI is reflected in the actual changes at the level of day-to-day funding practice.

The findings inspired the formulation of recommendations for action to bring the strengths of RRI to national R & I funding agencies. In order to really open up the potential benefits of RRI to national funding agencies there seems to be need for action on four levels:

1. The understanding of why RRI is relevant and how it can contribute to improve R & I performance: Facing unprecedented challenges such as climate change, climate adaptation or sustainability (actually all challenges named in the SDGs) the agencies are called on to secure the quality of science, the desirability of R & I and their impact. These new ecosystem-like problem constellations imply that the R & I systems need to respond to the resulting wicked problem situations with new ways to tackle them. The solution RRI is offering goes far beyond the six keys and four dimensions offered in many RRI discourses: Taking participation at its core, it offers new opportunities to tackle wicked problem situations and constellations in multi-level multi-disciplinary multi-stakeholder processes, that is in small- to large-scale participatory negotiation spaces. Although identifying challenge-oriented R & I as the need of our time, the practice of these participatory negotiation spaces as integral part of R & I is not altogether unfamiliar to agencies who have been working on the interface of a multitude of different stakeholders since their establishment.
2. The communication on RRI towards and within the agencies: mediating between politics and the respective national R & I landscape on all kinds of issues to be solved, the agencies – and the individuals working on these issues within the agencies – need to be enabled to judge the surplus value of RRI for the outcome of their work. Thus, it is most relevant to adapt the *operational when and how* of RRI to the language, the needs and the culture of each agency. Best practice examples – at least until practitioners within the agency can build on their own good practice experiences – ease the understanding of benefits, potential barriers and how to overcome them. Actually, the exchange of ideas and new co-operations with external partners familiar with RRI, such as university or non-university research centres or civil society representatives and especially with enterprises already applying RRI to their own benefit, might be very valuable for new impulses to agency practice.

3. The integration of national agencies in participatory RRI spaces: National agencies as R & I funding organisations are addressed by research projects on RRI (mainly on the EU-level) with advice on how to improve their performance to tackle the grand challenges. The research results of these projects are in many cases based on multi-stakeholder processes for reflection, experimentation and experience. The agencies themselves benefit from this advice, however, they tend to stay excluded of these processes and thus outside the experience of practicing RRI and hence cannot influence the outputs of these processes which results in a problematic gap between these outputs and the actualities of national funding and innovation agencies. One main lesson of the *RRI-Network* partners is that doing RRI is the most convincing experiment to transfer it to regular agency work. Yet, due to a limited consensus within the RRI community on what constitutes RRI and what not the agencies practitioners working within the *RRI-Network* are often not sure whether it is (a) actual RRI they are doing or (b) whether it is RRI they are transferring or (c) if they are just doing something they perceive as RRI which is in fact not RRI.
4. The development of participatory negotiation spaces: From the perspective of the participating agencies, it is still quite unclear how the concept of participatory negotiation spaces can be put into practice in the context of regular agency business beyond its use in scientific research. The aim should be therefore to bridge the gap between the RRI discourse and the related theoretical knowledge and practical implementation in the context of the *political*, as it is evident in the context of economy- and enterprise-driven projects of applied research and innovation projects.

Thus, what is practically to be done in the future is to communicate a new understanding of problem situations that demands for new solutions, to convey the practices RRI can offer in a way that agencies can directly link the message to their core business. Finally, it is necessary to increase acceptance and interest in multi-level multi-disciplinary multi-stakeholder processes, practices and spaces. And to re-imagine the practice of applied research and innovation in terms of *the political* that implies to implement new funding programmes that follow the new participatory logic of RRI as a whole as well as the so far relatively little elaborated proposal for participatory negotiation spaces, as they would be required for economy- and business-oriented applied research and innovation projects.

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Part II
Public Engagement for Responsible
Research & Innovation

Chapter 7

Public Engagement in the Tradition of Participatory Approaches – An Approximation



Philine Warnke, Tanja Bratan, and Ulrike Wunderle

Abstract Public engagement is viewed as a prominent aspect of responsible research and innovation (RRI) both in academia and policy circles. In our paper, we would like to contribute to refining the notion of public participation as an RRI element by assessing the potential of four domains of participatory R & I theory and practices that have to date received little recognition in the RRI context: 1. Participatory design, 2. user-led innovation, 3. participatory research and 4. systemic R & I policy instruments. We test the usefulness of our concepts with a set of case studies from a recent RRI research project.

7.1 Introduction

Innovation policy has been gradually shifting from a focus on achieving specific objectives to solving complex problems such as climate change or poverty. These are also referred to as “grand challenges” or “societal challenges”. According to Mazzucato, these problems are “‘wicked’ in the sense that they are complex, systemic, interconnected and urgent, requiring insights from many perspectives” (Mazzucato 2018, p. 803). Solving them therefore requires a wholesome and inclusive approach. Mission-oriented innovation policy consequently involves different stakeholders from different sectors and has a strong directionality (Steward 2008). Mazzucato argues that societal missions are more complex than traditional missions because they are less clearly defined to start with and need to be co-defined by a multitude of stakeholders. Their reach is also much broader, having the potential to ultimately affect the majority of society. This is echoed by the increasing emphasis

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in sustainability studies on transdisciplinary research on transformation pathways with stakeholders (Fazey et al. 2018).

In the context of „Responsible Research and Innovation“ (RRI), public engagement has been one of the key pillars from the very beginning. First of all it is one of the “RRI keys” of the European Commission who defines on its RRI Website: “Public engagement (PE) in Responsible Research and Innovation (RRI) is about co-creating the future with citizens and civil society organisations, and also bringing on board the widest possible diversity of actors that would not normally interact with each other, on matters of science and technology.”¹

At the same time, participation is a prominent aspect in the wider understanding of RRI as responsible governance of research and innovation adopted in the academic community. In the framework proposed by (Stilgoe et al. 2013), which has been adopted by many RRI scholars and practitioners, “inclusion “takes a prominent place as one of the four key dimensions of responsible innovation governance that is closely intertwined with the other three dimensions reflexivity, anticipation and responsiveness. The authors emphasise the need for extending participation to questioning the purpose and process of a research or innovation endeavour as well as the very participation process itself (Owen et al. 2012). They also point to a number of pitfalls and tensions around public participation approaches and argue for the continuation of the ongoing experimentation process for refining and improving participatory research and innovation (R&I) practices.

In our paper, we would like to contribute to this debate by assessing the potential of four domains of participatory R&I theory and practices that have to date received too little recognition in the RRI context: 1. Participatory design, 2. user-led innovation, 3. participatory research and 4. systemic R&I policy instruments.

In Sect. 7.2, we briefly sketch out the key elements of each participation tradition. We close this section by reviewing the potential contributions to inclusive R&I governance in a common framework. In Sect. 7.3, we introduce the results of a recent stakeholder discourse on R&I co-creation requirements in the context of the NewHoRRizon Social Lab Process in two different fields, i.e. healthcare and environment. In particular, we highlight the barriers and challenges to public engagement and the promising practices and initiatives brought up by participants of this dialogue as examples. Finally, in our concluding Sect. 7.4, we compare the requirements brought forward by the participants of the Social Labs with the contributions of the four domains and draw conclusions on where RRI could benefit from reaching out to these four communities of research and practice.

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

7.2 Four Participatory Traditions in Research and Innovation

7.2.1 *Participatory Design*

Pioneered mainly by Scandinavian countries since the 1970es (Sanders and Stappers 2008, p. 7) design-led participatory innovation practices have been substantially developed and have now become highly prominent under labels such as co-design, co-production, co-creation and collaborative service design. In the literature, co-production and co-creation tend to be associated mainly with the participation of citizens to service implementation, whereas co-design implies that citizens participate as initiators of a new solution in the “front-end” stages of a service development process of exploration and idea generation (Voorberg et al. 2015). The most comprehensive models of design-led participation aim for a more sustainable public service transformation and are therefore looking for engagement at all stages of public services development, considering initiatives that support co-design, co-decision, co-production and co-evaluation and ultimately resulting in co-governing (Pollitt et al. 2006). They are gaining prominence in the context of the “New Public Governance” approach, where public value is not only delivered by the government, but co-produced with citizens and stakeholders (Sangiorgi and Prendiville 2017). Participatory design is now increasingly valued as an opportunity to create “infrastructures” (Bjögvinsson et al. 2012) that facilitate dialogue and collaboration among diverse actors involved in an innovation process, from ideas to actual implementation. These “collaborative infrastructures” are creating spaces for experimentation, collaboration and risk taking in very diverse settings, from local councils to government departments and combining stakeholders from the public, private and third sector to create common and often public value. Living labs, social innovation labs, community hubs, co-design labs are some of the tangible manifestations of these collaborative, multi-stakeholder infrastructures that are spreading across the world (Manzini and Staszowski 2013), often supported by public policies (Bason 2013). Benefits discussed include a perceived improvement of service quality, increase of democracy and accountability (Verschuere et al. 2012) as well as social, cultural, political and ecological value (Meroni et al. 2017) and in some cases economic efficiency (Parks et al. 1981).

7.2.2 *User Led Innovation*

From decades of seminal work on the role of users for innovations, Eric von Hippel concluded that “the information needed to innovate in important ways is widely distributed” (Hippel 2005, p. 14), and he advocated “democratising innovation” by recognising and harnessing these distributed contributions. He pointed out that in a very early stage, few users anticipate market needs and are willing to provide ideas

for the development of new products or even develop new or modify existing products. He concluded that such “lead users” with extreme needs and expectations of benefits from an innovative product could improve the approximation of product attributes to heterogeneous users’ needs (Hippel 1986). Their main incentive to innovate is the direct use benefit from a design, a product, or a service and the urge to satisfy their own needs (Piller and West 2014). In the 1990s, the term “user innovation” emerged to describe the phenomenon where users innovate by themselves. Notions such as customers-as-innovators, user driven innovation, creative customers and co-creation (Prahalad and Ramaswamy 2004) have now become widespread in innovation management. Several approaches were developed to support user innovation, most prominently the workshop-based “Lead User Method” (Hippel 1986, 2005; Herstatt 1992). Parallel to this adoption of user engagement within the business realm, scholars from various fields have highlighted a more radical turn of user led innovation: the emergence of Internet-based large and medium scale collaborations among individuals as a new mode of innovation, production and consumption. One of the most prominent concepts is the notion of “commons-based peer-production” proposed by Yoachi Benkler from Yale Law School (Benkler 2006, 2016, 2017). Peer production is defined as a form of open creation and sharing performed by groups online that set and execute goals in a decentralised manner, harness a diverse range of participant motivations, particularly non-monetary motivations, and separate governance and management relations from exclusive forms of property and relational contracts. The two core characteristics of commons-based peer production are decentralisation and the use of social cues and motivations for coordination instead of pricing or hierarchies. While the model first emerged within the context of software production, this is but one instance of a more general phenomenon: “At its core, peer production is a model of social production, emerging alongside contract- and market based, managerial-firm based and state based production” (Benkler and Nissenbaum 2006, p. 400). Benkler argues that in certain cases the commons-based peer production model is superior to the other two models due to information and allocation gains. He states that in the particular conditions of the digitally networked knowledge economy, these conditions apply to an increasing number of production tasks. In his recent work, he argues that the core benefit of commons based peer production is its ability to elicit self-directed action from diverse sources of human talent and diverse motivations without the formalisation losses of market based interactions. This may be particularly beneficial in highly uncertain and dynamic environments (Benkler 2016). Benkler’s seminal work was taken up and further developed by a number of scholars and practitioners and is now widely used not only to further describe the phenomenon but also to actively shaping collaborative innovation projects.

7.2.3 *Participatory Research*

In participatory research, the design, planning and conduct of the research process takes place as a collaborative endeavour between researchers and the people whose lifeworld and meaningful actions are under study (Bergold and Thomas 2012). The research aims, questions and methods are formulated and selected in a joint process, converging the perspectives of science and practice in order to benefit both sides – i.e. lead to new insights for both scientists and societal actors. Such stakeholder interaction has proven fruitful for unearthing important insights across diverse fields: public space and community planning (Senge and Scharmer 2011), agriculture (Gonsalves 2005), architecture, education, software and information systems, and products and services across a range of industries (Reardon 1998). Although everyday practices have been the subject of study for a long time, participatory research enables a fundamental questioning and rethinking of interpretations of what causes certain problems and what could be appropriate strategies to address these problems. It does so by explicitly giving stakeholders of the researched field and in particular marginalised groups a voice (or enable them to make their voices heard). The justification of participatory research comes from the explicit wish to make research significant and useful, and thereby increase the societal impact of scientific research. Reference is often made to evaluation studies, which show that many scientific findings and interventions have not been implemented in society.

Participatory research methods build on well-known empirical research procedures, especially qualitative methodologies/methods such as observation, in-depth and semi-structured interviews and focus group discussions, although quantitative methods such as questionnaires may also be used. In addition, new methods have been developed to enable safe deliberation spaces in which various “stakeholders” engage in reflexive exercises on specific issues, such as multi-stakeholder dialogues and roundtable workshops. Citizen science as far as it allows active participation of citizens not only in data collection but also research design could also belong in this type of co-creation. Participatory research may go beyond mere understanding and also take an “action perspective”, aiming to change social reality as part of the research process (Bell et al. 2004). The research methodology is then often labelled “participatory action research” (Chevalier and Buckles 2019) “community-based participatory research”, “participatory learning and action”, or “transdisciplinary research” with the latter gaining prominence especially in sustainability studies (Fazey et al. 2018). These approaches have in common that they explicitly incorporate a problem-solving intervention component, and are characterised by an emergent and iterative design, combined with reflexive monitoring and evaluation to guide the action towards a common goal. It is here where participatory research shows overlap with participatory design.

7.2.4 *Systemic R&I Policy Instruments*

There is a long tradition of involving stakeholders in R&I policy development, especially in agenda and priority setting. One especially prominent systemic instrument is participatory foresight, i.e. structured multi-stakeholder futures dialogue to underpin R&I policy agenda setting (Grupp and Linstone 1999; Da Costa et al. 2008). Drawing on perspectives of science and technology studies (STS) (Bijker and Law 1997), such foresight processes include stakeholders and actors from the downstream phases of innovation such as users and citizens as experts on important aspects of innovation futures into the foresight processes (Truffer et al. 2008; Rosa et al. 2018; Warnke and Schirrmeister 2016). Another prime example of the “R&I policy co-development” is the so-called *Smart Specialisation* approach, currently the European Union’s paradigm for industrial innovation policy. Smart Specialisation involves setting investment priorities through a process of Entrepreneurial Discovery (EDP) which is designed as an iterative bottom-up “collective experimentation process” (Foray 2015, p. 30), replacing the older top-down processes of deciding on prioritisation areas. EDP entails the co-construction of shared visions concerning future economic opportunities (Gheorghiu et al. 2016, p. 35). Other examples of stakeholder inclusion in R&I policy development are participatory evaluation approaches (Daimer et al. 2012) and stakeholder based public procurement (Buchinger 2017).

7.2.5 *Comparison of Participatory Practice Domains*

All four participatory practice domains are dedicated to “public participation”, where “the act of dialogue and negotiation serves to transform opinions in the members of both parties (sponsors and public participants)” (Rowe and Frewer 2005), in contrary to communication and consultation, where the flow of information is one-directional. Moreover, there are clearly some overlaps and even use of similar vocabulary and methods such as the “living lab” which is seen as a participatory infrastructure in co-design circles and is also used in user-led innovation as a site for various user workshops and has even gained prominence as a systemic innovation policy instrument. Also, if we look at the basic *rationale* of participation, which can be (i) normative (democratic principle), (ii) substantive (improvement of quality), (iii) social-learning (enabling networks), and (iv) facilitating implementation (Schmidt et al. 2020; Fiorino 1990), the four approaches all show an emphasis on substantive reasons, i.e. improving innovation outcomes by involving a richer diversity of expertise and perspectives albeit in systemic innovation policy instruments, social learning and facilitating policy implementation are equally important.

Yet, we can also distinguish clear differences regarding the scope of participation addressed by these approaches (see Table 7.1 below). Even though participatory design covers a very wide range of *innovation process phases*, it is only in commons-based peer production, the more radical variant of user-led innovation, that the participation process itself is fully governed by the participants as requested by (Stilgoe et al. 2013) for fully responsible innovation governance. At the other end of the spectrum, systemic policy instruments mainly focus on innovation policy agenda setting, with only few cases covering participation within evaluation and implementation of innovation strategies and actual innovation activities. Finally, the *type of activity* participants are engaged in varies considerably, along with the *main application domain*: While “user led innovation” focuses on idea generation often for commercial products, Commons Based Peer Production is dedicated to the production of common cultural goods, and participatory design targets the generation of complex solutions for public services in the public sector. Finally, participatory research is tackling actual research processes and participatory practices, while systemic R&I policy instruments are primarily concerned with agenda and priority setting.

Table 7.1 Overview characteristics of participatory practice domains

| | Who is involved? | In what type of activity? | In what phase? | With which rationale? | In which domain? |
|---------------------------------|--|---|--|--|---|
| Participatory design | Whole ecosystem of problem owners | Solution Development | Agenda setting Idea generation, implementation, evaluation | Substantive | Mostly public sector |
| User led innovation | Lead users (users with special demands) Users and volunteers (CBPP) | Product/ service innovation Production (CBPP) | Idea generation All phases including implementation and process design (CBPP) | Substantive | Mostly private sector Mostly information, knowledge or cultural goods (CBPP) |
| Participatory research | Users of the research results (e.g. patients/ relatives, farmers) | Research | Agenda setting, research implementation | Substantive Normative | Research |
| Systemic R&I policy instruments | Stakeholder representatives, users/citizens as “demand side experts” | Policy priority setting | Agenda setting, (evaluation, implementation) | Social learning, implementation Substantive | Research and innovation policy |

7.3 Case Studies

7.3.1 Methodology

Having described and compared these four participatory traditions in R&I, this section introduces the results of a stakeholder discourse on co-creation in the fields of healthcare and environment that took place in the context of the NewHoRRIZon project on “Excellence in Science and Innovation” by adopting the concept of Responsible research and Innovation”.² The New HoRRIZon project uses a Social Lab methodology (Timmermans et al. 2020) to diagnose the current state of RRI in the specific programme lines of the European Framework Programme for Research and Innovation (Horizon 2020) and to assess potentials and barriers of its use. Altogether, the project established 19 Social Labs related to the programme lines of H2020. The Social Lab process involved the experience and expertise of diverse groups of practitioners that have been sensitive to the particularities of R&I as well as the needs and processes of the stakeholders involved (universities, non-university research institutes, industry civil society organisations, the public(s), research funding organisations, policy-makers, and others). In the Social Labs Health and Environment, participants came from mostly but not exclusively European organisations. The Social Lab Health consisted of eleven active participants, while the Social Lab Environment had 30 participants, with 17 being actively involved. They had mostly already been working on various RRI issues without using the overarching RRI concept.

Each social lab lasted for about 34 months and consisted of desk-research and a series of expert interviews to gain insights into relevant issues of the specific scientific-technological areas, three workshops as well as interactions in the phases between the workshops. Here we focus on the findings on participation as this emerged as a common theme in both social labs. We present specific challenges and opportunities discussed, describe co-creation and participation initiatives highlighted by the participants as particularly interesting for reaching specific societal impacts and finally summarise the main objectives and knowledge gaps identified in the Social Lab discussions on participation. The selected examples of participatory practices will be assessed in the last section of the paper along the four participatory practice communities described above.

²<http://newhorizon.eu>; The project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 741402.

7.3.2 *Case Study: Participation in Health*

Public and patient participation in health has evolved considerably since the World Health Organization’s Alma Ata Declaration asserted people’s “right and duty to participate individually and collectively in the planning and implementation of their health care” in (World Health Organization 1978).

While co-creation has played a role in other service-based sectors for years, the health sector has been comparatively slow in adopting it. Historically, patients have been considered subjects of research and have been passive recipients of healthcare services, and the healthcare ecosystem has evolved relatively independently of their voices (Makhni 2017). More recently, the increased availability of medical knowledge has enabled patients to become more active participants in their own care (Janamian et al. 2016). Heightened attention has also been given to the fact that patients with chronic illness are often experts themselves, possessing both experience and knowledge of their condition (Cordier 2014). However, at the point of care, a power imbalance between patients and healthcare professionals remains, which is characterised by patients’ dependence on clinicians. This can impede shared decision-making when it comes to the individual patient’s care (Joseph-Williams et al. 2014).

To unleash the full innovative potential of equal partnerships between all stakeholders involved, patients and the public need to be able to have a more substantial contribution in all aspects of health R&I. Challenges such as an ageing population, the perceived threat of increasing costs for healthcare through personalised medicine or yet unforeseeable consequences of climate change, can only be addressed through strong stakeholder collaboration. Already in the short term, co-creation can lead to increased efficiency in health services, improved health outcomes, increased trust in the health care team, reduced health care costs, increased value and use of medical research, and higher patient satisfaction (Janamian et al. 2016). Additionally, the involvement of patients can contribute to policymaking that is better aligned with societal needs, more valid and beneficial research and reaching a wider audience through addressing target groups better.

Patients are already pushing for a more active role in the R&I process, for example through crowd-funding research they find relevant (Wenner et al. 2015), developing solutions that are not yet on the market as patient entrepreneurs (Hehenberger 2019) or participating in research as citizen scientists (Wiggins and Wilbanks 2019). They are often organised in general or disease-specific patient organisations, which can provide a powerful voice for patients and a point of contact for those who seek to collaborate with them.

The following examples of promising participation projects were highlighted through the social Lab Health process of the NewHoRRIZon project and will later be reflected in the context of the four participatory traditions in R&I described in Sect. 7.2.

7.3.3 A. Reorganisation at Karolinska University Hospital

At Karolinska University Hospital in Stockholm, Sweden, a reorganisation process replaced departments with a smaller number of themes (e.g. cancer, ageing, emergency and trauma) to allow for more seamless care.³ Within these themes, the focus was on providing the best possible care for patients by defining “units” and within them common patient pathways called “sections”. Each pathway is overseen by a multidisciplinary team consisting of the head of the unit, a patient representative and various healthcare as well as business professionals. These participants are regarded as equal and traditional hierarchies play much less of a role than they usually would. The head of a pathway as the person in charge can be a nursing professional and is not necessarily a doctor. The involvement of a patient representative within each pathway is also important and ensures that in the design of the pathway, patient needs are taken into consideration and outcomes that matter to patients are focused on.

7.3.4 B. Science Shop “Science Together” in Tunis

Tunisian civil society has been very active since the revolution in 2011. The science shop at the Institute Pasteur de Tunis⁴ carries out research on behalf of citizens and local civil society, responding to civil society’s needs for expertise and knowledge. It focuses on the fields of health, environment and vulnerable populations. When civil society actors approach the science shop with a viable idea, it is transferred into a project and carried out by students under the supervision of academic staff and in collaboration with the civil society actors. The first health project was proposed by the Tunisian Association for Information and Orientation on HIV/AIDS and Toxicomani (ATIOST). It focused on the genetic characterisation of hepatitis C virus strains among injecting drug users in Tunisia and was co-created between ATIOST and the laboratory of clinical virology at the Institute. This set-up allowed the laboratory to have access to a key population and therefore to have innovative results, which described the circulating hepatitis C virus strains in this population. The outcome was very useful for the CSO’s advocacy towards policy makers on the importance of involving this population in the national strategy for the eradication of hepatitis C in Tunisia.

³ Philips, 2019, <https://www.philips.com/a-w/about/news/archive/case-studies/20190128-patient-first-how-karolinska-university-hospital-is-transforming-to-meet-future-demands-of-health-care.html>

⁴ Institute Pasteur de Tunis, undated, http://www.pasteur.tn/index.php?option=com_content&view=article&id=697&Itemid=827

7.3.5 *C. Participatory Approaches in Research Funding in the Netherlands*

The majority of non-profit health research in the Netherlands is funded by disease-specific health funds (HFs), some of which are either also patient organisations or have links with patient organisations. Twenty of these are organised in the umbrella organisation Collaborative Health Funds,⁵ which focuses on common themes such as patient participation, which they define as “giving experiential knowledge an optimal place in order to influence research” (den Oudendammer and Broerse 2019). Patients are involved in setting research agendas and evaluating research proposals, additionally, the involvement of patient organisations in the research itself is promoted through the requirement to provide letters of recommendation. While there are questions on how best to choose patients and which training to provide to them, there seems to be consensus that patient participation in research funding has a positive effect on outcomes (den Oudendammer and Broerse 2019; Caron-Flinterman et al. 2006).

7.3.6 *D. myCode Project Involving Young Cancer Patients*

The myCode project is being carried out by the Young Cancer Support Association and Karolinska University Hospital in Sweden as well as several other stakeholders including young cancer patients between 15 and 29 years.⁶ Its aim is to enhance quality of life and increase survival rates as well as to improve the experience of undergoing cancer treatment. The project explores new innovative solutions for meeting the specific needs of teenagers and young adults, given that they feel a lack of belonging in the healthcare system, neither being at home in the pediatric nor the adult wards. One part of the project works with four young cancer patients to map their patient journey in order to determine where it could have been improved. Another part tries to create attractive digital social environments for encounters, dialogue and support between health care professionals and young patients adapted to this target group, which is well-acquainted with social media.

There was consensus in the Social Lab that participation in health should fulfil (at least) the following two objectives:

1. Adding value for future societies: This means focusing on research and innovation that is relevant now and in the future by addressing societal needs. It also

⁵ Collaborative Health Funds in the Netherlands (Samenwerkende Gezondheidsfondsen, *SGF*) <http://www.gezondheidsfondsen.nl/>

⁶ Karolinska University Hospital, 2020, <https://www.karolinska.se/en/karolinska-university-hospital/Innovation/mycode/>

involves empowering citizens and patients, eliminating academic research that is self-serving and “arrogant”, as well as minimising the environmental impact.

2. Contributing towards a better science culture in society: Enabling citizens and patients to understand research and fostering collaboration between them and R&I actors.

In the SL discussion on participation, the following knowledge gaps/deficits were pointed out:

- While the concept of responsibility in health research can look back on a long tradition and has traditionally been well established in terms of research ethics (ethical approval, informed consent, data protection), public engagement and co-creation are less wide-spread and are taking place occasionally rather than routinely.
- Researchers are often too strongly rooted in their disciplines and not being aware of issues beyond, such as societal needs. This can lead to a technology push approach, i.e. finding application areas for newly developed technologies rather than finding solutions for real-world problems. Individual researchers can also feel overburdened to consider issues that lie outside their primary field of expertise, especially if there is no tradition of interdisciplinary collaboration and collaboration with civil society and a lack of organisational support for this.
- Although there may be awareness of the benefits of collaboration and an interest in pursuing such efforts, there is a lack of fora where different stakeholder groups can come together and co-create. In addition, there is a lack of awareness of the excellent initiatives which already exist as well as too little exchange on good practices between them and beyond.
- Incentives and immediate rewards for responsibility in health beyond what is required in any case are lacking or not visible enough. Linked to this is the question of “who is responsible for responsibility?” Widespread application of methods to measure its impact would be needed to show benefits and improve uptake.

7.3.7 Case Study: Participation in Environment

Climate change, biodiversity loss and pollution are very close to the lifestyles, attitudes and values of European citizens. Already in the 1970s and 1980s, the environmental movement inspired social-ecological research which developed into a driving force behind participatory and social impact oriented research. Since then, scientists linked to this tradition call for and undertake research on necessary societal transitions respecting the limits of growth and the planetary boundaries.

Today the public is deeply concerned about the state of our planet. They wonder about individual and collective contributions to avert worst case scenarios of climate change, how they could best adapt their lives to unprecedented weather

conditions and how the future of their children and grand-children would look like. The urgency of these concerns have become visible in the immense public support to the World Climate Summit (COP21) in Paris, 2015, that lead to the UN Sustainable Development Goals (UN SDGs) as well as in the Friday’s for Future movement, internationally carried by the concerned youth, voicing research-based claims for rapid political action on climate change to meet the targets agreed upon at the COP21 summit.

Looking at Societal Challenge 5 in the European funding framework Horizon 2020 as the basis for the Social Lab of the NewHoRRRIon project, up to 78% of the R&I projects do not consider RRI as of special relevance to them – which means that in those projects there is no specific attention paid towards “co-creating the future with citizens and civil society organizations”.⁷

To succeed with the upcoming necessary and challenging societal transitions, citizens need to have the opportunity to participate in all R&I processes that focus on climate action, environment, resource efficiency and raw materials. Members of the Social Lab highlighted the relevance of co-creation in these specific areas of research: “The transition to a cleaner and healthier planet is a systemic change that affects all levels of society. If citizens and stakeholders are not part of developing the social and technological innovations and solutions it will become more difficult to bridge the gap between those wishing to move faster and those thinking they are already being pushed too far. [...] As challenges become more urgent, experts and scientists may gravitate towards imposing more radical solutions and seeing public engagement as an unnecessary hindrance to rapid transition, thus increasing the risk of stimulating public resistance to the sustainability agenda. It is therefore of utmost importance that public engagement is seen as a prerequisite for sustainable development and consequently integrated into SC5 R&I project designs.”⁸

Researchers can increasingly build on citizens locally organised and nationally or internationally connected along their stake – may it be as individual citizen scientists fostered by the European Citizen Science Association or as science shops in a network of European hubs or as a multitude of engaged national and transnational civil society organisations. Researchers and innovators should use this potential to come to scientifically relevant and socially meaningful results. Fostering the mutual understanding of needs and opportunities might ease the way towards and the implementation of upcoming necessary and challenging social transitions.

The following examples of participation projects were highlighted as particularly promising in the social Lab process and will later be reflected in the context of the four participatory traditions in R&I described in Sect. 7.2. They all have a link to the European Commission’s objective of jobs & growth, they were discussed in

⁷ <https://ec.europa.eu/programmes/horizon2020/en/h2020-section/public-engagement-responsible-research-and-innovation>

⁸ Statement from a group within the Social Lab focusing on “Public engagement: from “nice to have” to “NEED to have”, to be integrated in the “RRI-Ex”, new.rrihub.eu/newhorizon.php

this specific context and published in a brochure to highlight “impact through participation” (Federation of German Scientists 2019)⁹.

7.3.8 A. Project InnovationCity Bottrop: Public engagement in real-life laboratories

The city of Bottrop had planned to halve CO₂ emissions within a decade by simultaneously improving citizens’ quality of life in a pilot area with 70.000 inhabitants.¹⁰ Citizens were invited to voice their ideas and visions for climate-neutral urban redevelopment. In a series of events they could discuss their ideas with a planning team. On this basis, the Council of the City of Bottrop passed a master plan that has since then gradually been realised by the administration in cooperation with Innovation City Management GmbH and the support of many stakeholders and economic partners. At the end of the project in 2020, more than 300 projects in the areas of housing, working, energy, mobility and urban development had been initiated. The objective of halving CO₂-emissions had been reached in combination with considerable positive effects on employment and investments. This example supports the argument that participatory approaches can foster public support and lead to impressive sustainability solutions.

7.3.9 B. Project CuveWaters: Improving Living Conditions in Africa – Participation to Develop Ownership

CuveWaters (2006–2015) was a German-Namibian joint project about the long-term improvement of living-conditions through integrated resource management in the Cuvelai-Etoshia-Basin in Namibia.¹¹ The project integrated a transdisciplinary approach designed and organised as a joint learning process, transcending the boundaries that separate disciplines and scientific fields as well as the boundaries between scientific and practical knowledge¹²: Those Namibian actors involved in the problem were also integrated in the research process. Their perspective and

⁹Matthias Bergmann, Institute for Social-Ecological Research, Germany, Daniel Dörler, University of Natural Resources and Life Sciences Vienna, Austria, Philipp Schepelmann, Wuppertal Institute for Climate, Environment and Energy, Germany, and Michalis Tzatzanis, Austrian Research Promotion Agency, Austria, designed and implemented the activity in the social lab on this topic, especially <https://newhorizon.eu/responsible-research-and-innovation-for-jobs-&-growth/>

¹⁰InnovationCity Ruhr – Modellstadt Bottrop, <https://www.innovationcity-bottrop.de/index.php?id=3&L=1>; <https://www.innovationcity-bottrop.de/index.php?id=276&L=1>

¹¹CuveWaters – Integrated water resources management, 2019, <http://www.cuvewaters.net/Home.5.0.html> and <http://www.cuvewaters.net/Transdisciplinary-Research.103.0.html>

¹²CuveWaters, 2019, <http://www.cuvewaters.net/Transdisciplinary-Research.103.0.html>

practical knowledge merged with the scientific ways of posing the problem and thereby, expected research results connected to both science and society. Users, beneficiaries, practitioners, administration and political bodies participated in the decision-making process at the local, regional and national level. A demand-responsive approach was developed to involve them throughout all phases of the project and allowed all stakeholders, especially users on the local level, to offer their input. Community workshops were conducted in close cooperation with local partners. A crucial aspect to enhance ownership and economic independence has been the attention given to capacity development (as a main prerequisite to Governance) including both academic education and non-academic training – demonstrating how participative research can foster jobs and growth.

7.3.10 C. Project Roadkill: Citizen Science as Innovation Engine in Science, Economy and Society

Project Roadkill aims to reduce roadkill by investigating which animals are killed on roads and under which circumstances.¹³ The data collected by citizens via smartphone apps on a wide geographic range allow the project to identify roadkill hotspots which then can be mitigated in cooperation with local authorities. The data submitted is displayed on a map on the project's website and shared with special interest groups for their own research. Participants learn about habitat fragmentation, how to distinguish species and they can bring in their own expertise. The blog on the project website keeps them posted on the scientific process from data collection to publishing in peer-reviewed journals. According to the very specific needs of the citizen science project, new software has been developed. Project Roadkill actually was a test run of the concept for an Austrian start-up software company, which has since become one of the main providers of mobile applications and websites for scientific projects engaging with the public.

7.3.11 D. GREEN-WIN: A Win-Win Strategy for Green Business: Is Green Growth Possible?

In the GREEN-WIN project, researchers empirically looked for green business models in three different economic sectors both in industrial countries and emerging economies as win-win strategies for entrepreneurs to gain a living while protecting the environment and contributing to the public good.¹⁴ In a multi-stakeholder process, scientists, local investors and business representatives engaged in a scoping,

¹³Roadkill, <https://roadkill.at/en/>

¹⁴GREEN-WIN, <http://green-win-project.eu/about>

visioning, pathways development, evaluation and iteration process peaked by workshops and a final international conference. The workshops demonstrated that green matchmakers could significantly improve matchmaking between green investors and green entrepreneurs and that more of those matchmaking processes would be necessary. The multi-stakeholder process was accompanied by an exploration on the key financial barriers and opportunities to activate and scale up climate finance. GREEN-WIN thus developed, as a particular theme, the cross-cutting role of finance – including key characteristics of current financial systems in relation to sustainable investments, how specific features of underlying sectors affect the ability to attract finance for win-win strategies, and the potential to transform finance systems themselves to better reflect and integrate climate and sustainability goals.¹⁵ Looking at concrete win-win strategies and climate finance governance the project combines the micro and the macro level to contribute to a green win.

The Social Lab participants attributed considerable importance to the following objectives of participation in research and innovation in the field of climate action, environment, resource efficiency and raw materials:

1. To foster successful transitions by improving the link between science and society. On the level of R&I this implies providing strategies, methodologies and narratives on how to implement participation; on the political level proven best practice examples are necessary. In the long run, this will prevent divides between science and society as well as within society itself.

The following two objectives are closely related to this overarching one:

2. To realise truly impact oriented research & innovation that takes all relevant stakes in and provides answers with an agreed-upon effect on our lifestyles and society in the multitude of transformation processes to come.
3. To work in a new research culture spreading from the niches where it prospers across universities, research & innovation centers, funding organisations and industry, provided with the necessary adaptation of structures, methodologies and resources to make common ownership of R&I processes and results possible.

In the SL discussion on participation, the following knowledge gaps/ deficits were pointed out:

- Participatory approaches are well rooted in some research traditions with the specific expertise that is called for in projects explicitly set up to change social reality as part of the research process. However, R&I funding strategy in general and thus the majority of R&I calls lack the incentives and control instruments to encourage researchers to consider a sound participatory concept for their specific research project.
- The arguments for RRI that are brought up by supporters to better root RRI in research funding are mainly addressing those already convinced. They do not reach the concerns of those following other objectives such as the focus on creat-

¹⁵GREEN-WIN, <http://green-win-project.eu/about/wp2>

ing jobs and growth. There is a need to provide proven arguments for RRI and benefits for applying it that targets those stakeholders in a language they can relate to.

- While researchers acknowledge exchange and discussion on their work with other researchers and stakeholders, they are hesitant to engage in approaches they are not experienced in. To do so would mean to invest scarce time resources without being sure about questions of research ownership, peer acknowledgement and results to be expected. While some institutions seek cooperation with experts and institutes knowledgeable in designing participatory approaches, individual researchers would benefit from training and support in translating the methodology and meaning of such best practice examples for their specific research.
- Civil society organisations would not consider R&I as a genuine field of activity for them as an organisation and for their members. They need to get informed and involved to acknowledge the importance of R&I to their own stake and be empowered to represent it in such processes. Researchers need to take the specific working conditions of many CSO activists into account. They are often – different to many other stakeholders – representing their institution while contributing time and expertise for free: It might be that they are not working on a regular contract or that the content of their work in the CSO is not closely enough related to the research project that they could get involved on this ticket. Alternative resources for remuneration or recognition of their work would be necessary. This is especially the case as engagement in e.g. a multi-stakeholder process needs first and foremost time to come to a common understanding of the problem and to come to viable solutions to invest in. It also requires time for dissemination and implementation of the research results in the various target groups and the general public. In order to integrate civil society partners successfully, it is necessary to provide them with a substantial share of funds to make real participation possible.

7.3.12 *Integration*

In this section we review the cases in the light of the participatory practice domains introduced in Sect. 7.2. In particular, we ask in how far approaches from these domains could contribute to address the knowledge gaps highlighted in the cases studies.

Table 7.2 presents an assessment of the selected examples of participatory practices vis-à-vis our four participatory practice communities. A cross indicates that insights from this community may contribute to the particular participation example. It emerges that all four participatory approaches we have introduced above could contribute to at least one of the projects and the other way round all eight projects may benefit from at least one of the approaches. Looking at the knowledge

Table 7.2 Relating the cases and the participatory practice domains (X: Relevance of domain for case study)

| | Participatory design | User led innovation | Participatory research | Systemic Instruments |
|--------------------------------|----------------------|---------------------|------------------------|----------------------|
| Karolinska university hospital | X | | | |
| Science shop Tunis | | X | X | |
| Project myCode | | X | X | |
| Participatory research funding | | | | X |
| Project InnovationCity Bottrop | X | X | | |
| Project Cuvewaters | X | | | |
| Project roadkill | | | X | |
| GREEN-WIN | X | | | X |

gaps brought forward in the two Social Labs, this potential for enrichment from our four traditions becomes even more apparent:

- Co-creation of solutions in the health and environment fields, especially in cases like the Karolinska and Cuvewater, where concrete solutions are implemented with a wider ecosystem of problem owners could well be underpinned by participatory design approaches. The perceived lack of well-tested and innovative co-creation practices that emerged in the Social Lab health could be addressed by building on the repositories available in the design community. Other more research oriented cases like the Young cancer patients or the Roadkill project could benefit from the wealth of sophisticated methods developed in participatory (action) research. The system capacity building approach of Green Win is well in line with systemic innovation policy instruments. The lead user method could possibly contribute to joint idea generation such as in Innovation City Bottrop and Science Shop Tunis.
- The urgent wish for better impact of sustainability transformation strategies that was strongly voiced in the environment field is echoed in the approaches of participatory design on the one hand and systemic innovation policy instruments that both are directed at social learning and improvement of implementation effectiveness.
- The lock-in of researchers in their disciplines, which has been a key concern in the health Social Lab is also at the heart of the “user led innovation” approach which started from the empirical observation that users rather than technicians at the producer company possessed the relevant knowledge. The wealth of case studies and methods from user led design may therefore come useful to practitioners in the health field aiming at “finding solutions for real-world problems”. Pointing to the well-tested success of the lead user method in the commercial realm may also help researchers to muster organisational support for interdisciplinary collaboration and collaboration with civil society even in cases where there is little tradition.

- A third aspect of concern in the health field was the lack of fora where different stakeholder groups can come together and co-create. Here, experience from participatory design which has moved towards establishing permanent infrastructures for collective experimentation may prove useful. At the same time, there may be an argument to be made for applying systemic innovation policy instruments such as participatory foresight exercises in the health sector that could function in the way of such fora.
- The need for linking up to dominant discourses such as “jobs and growth” in order to reach out to a wider circle of actors was voiced in the environment Social Lab. In this respect, it may be useful to look at arguments from user led innovation, which is well established in the commercial realm but also to align with the tradition of systemic instruments that are also situated in a context where “jobs and growth” often forms the dominant rationale. This may even provide an opportunity to overcome the fixation on the economic growth paradigm as some proponents in both communities of practice advocate alternative perspectives on societal progress.
- For working with CSOs for and with research, as requested by the SL health, there is a wealth of experience in participatory research that very often works with CSOs such as patient organisations, environmental NGOs or trade unions.
- Both discourses point to an even wider range of traditions to be included in particular the socio-ecological research (environment) and the corporate social responsibility (health).
- Finally, the quest for widespread application of methods to measure impact of responsible practices that has been voiced in the Health Social Lab, may find some useful ideas in the area of participatory research where there is a long tradition of extending the participatory approach into the evaluation phase (Verwoerd et al. 2020).

7.4 Conclusions

RRI is a comparatively new research field and has sometimes struggled to transition from a rather abstract concept to an established research approach with proven methods. One of the key domains of RRI is public engagement, which can also be considered more broadly as the participation of relevant stakeholders to address a particular societal problem. In this chapter, we have investigated how the public engagement dimension of RRI could benefit from established research and practice traditions on participation in research and innovation that do not directly frame themselves as RRI but are nonetheless closely related. Four communities of theory and practice emerge as particularly relevant: Co-design, user-led innovation, participatory research and systemic R&I policy instruments. When considering the barriers and challenges of participation experienced by actors in the fields of health and environment as well as individual successful real-life examples of participation in light of these four practice traditions, we were able to identify areas where RRI

could enhance its impact by drawing on the expertise of other communities of research and practice:

Designing participation in RRI should define better the type and level required for the issue at hand and if possible broaden the scope of participatory elements beyond pure implementation (Stilgoe et al. 2013). Drawing selectively from other established communities, especially participatory design seems a promising strategy towards richer and more targeted participatory research and innovation processes. Further communities such as corporate social responsibility (Lubberink et al. 2017; Blok 2019) should be incorporated in a similar manner.

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Chapter 8

Social Labs in Public Engagement Processes for RRI



Ilse Marschalek, Lisa M. Seebacher, Elisabeth Unterfrauner, Katharina Handler, and Margit Hofer

8.1 Introduction

Research and research programmes have explicitly demanded to seek solutions to today's societal challenges and have emphasised the importance of addressing societal needs and ethical questions in research and development (e.g. Owen and Pansera 2019). Since new sciences and emerging technologies are mostly embedded in fields of conflicting interests and are of high complexity, there is a need for multi-actor decision processes, including actors of the wider public (e.g. Chilvers and Kearnes 2016).

One effect of this trend was the new role assigned to societal actors within the Responsible Research and Innovation (RRI) concept which was also introduced in that period of time (see for example Jasanoff 2003; Owen et al. 2013). The paper aims to examine and evaluate Social Labs as an approach for implementing Public Engagement (PE) processes to foster RRI. The Social Lab (SL) approach as described by Zaid Hassan (Hassan 2014) enables a process of acting rather than planning by using experiments and involving different groups of people, with each lab focusing on a specific challenge. This paper is asking how the Social Lab approach is able to respond to frequent challenges of PE processes? We will answer this question by referring to the empirical findings of the applied Social Labs in the NewHoRRizon project - an EC funded project which aimed at further integrating RRI in the European innovation system. The following section lays out a definition of PE and stakeholders, the relation to RRI as well as pitfalls and challenges of PE. Section 8.3 describes the operationalisation of PE in SLs in the context of the NewHoRRizon project. The methodology section comprises the data sources as well as the qualitative analysis approach applied to the material. The results section

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comprises empirical results of the SL processes which are then contrasted against theoretical insights in the thereupon following section of discussion. The conclusion summarises the main insights and concludes with an assessment of the SL approach's potential for solving challenges of PE in general as well as with regard to the specific context of RRI.

8.2 Theoretical Embedding

In the context of RRI, co-production of knowledge by scientists and societal actors is often part of the research process. Similarly, research on PE in research and innovation processes is no new endeavour and abundant in many different fields, such as Science and Technology Studies (STS) (Balázs et al. 2020).

The term 'Public Engagement' encompasses a wide range of meanings, with a variety of actors involved, while a standardised and clear definition is lacking (see Sect. 8.2.1). Accordingly, there is a "lack of shared language about engaged research" (Holliman et al. 2015, 15). Mostly, participation and PE are used interchangeably - with regard to the inclusion of societal actors in research and innovation processes. Within the framework of the new RRI paradigm, PE was introduced as an ambitious term that embraces the idea of "publicly engaged science" (Stilgoe et al. 2014). Public Engagement is therefore an integral part of open and inclusive research and innovation processes where societal actors can give relevant input.

In the context of Responsible Research and Innovation, PE introduces a circularity common to the concept of RRI as e.g. also identified by Timmermans et al. (2020); while PE is aspired and aimed at by RRI, RRI only prospers fully when societal stakeholders are already involved in the corresponding research process (Randles et al. 2016). Based on this understanding, we consider PE as an inclusive process in which we invite stakeholders to co-create innovative formats addressing RRI in their respective working environment.

In this section, we introduce selected challenges of PE in the specific context of RRI, serving as an exemplary systematisation of critical dimensions of PE in research that potentially arise in every form of participatory approach. These challenges represent important bottlenecks for successful PE in research and innovation processes. Listed challenges will later be used as a baseline for evaluating the Social Lab approach's potential for realising Public Engagement in and for RRI.

8.2.1 *Challenges of Public Engagement in Research and Innovation Processes*

While the relevance of PE - in particular in the realm of RRI - is uncontested, the way this can be put in practice is far from being a clear and streamlined process. Potential challenges are repeatedly discussed and several attempts have already

been made to create guidelines, to condense best practice examples on stakeholder processes and participatory formats. This section extends on challenges identified in Marschalek (2018) and elaborates on stakeholders to be engaged, their envisaged roles, involved feelings, group dynamics and impacts.

8.2.2 Selection of Participants

In many engagement processes “the public” to be involved remains unclear (Wickson, Delgado, and Kjolberg 2010). However, a clear identification of individuals or groups of people the process wants to engage with is crucial. Therefore, much effort needs to be invested for mapping and approaching potential participants. Usually, engagement processes start with decisions about who is to be included in the research and innovation actions. Depending on the research focus, the purpose of the inclusion or the design of the process, different societal actors might need to be included. As Fern Wickson, Ana Delgado and Kamilla Lein Kjøberg (2010, 757) emphasised, it is “essential to recognize the heterogeneous nature of ‘the public’ in engagement activities”. The RRI principle does not rule out any potential participants (Timmermans and Stahl 2014), and the challenge of defining principles for inclusion remains pertinent.

In order to prevent limited participation, Alexander Bogner (2012) coined the term “invited participation” as a form of steered engagement where stakeholders are deliberately selected to overcome potential self-selection biases. As Ulrike Felt and Maximilian Fochler (2008) argue, uninvited forms of civic engagement equally need being considered not to overburden invitees as sole representatives of the public. Doing so, however, provokes new questions, namely what kind of knowledge and expertise of the subject in question is required to join the research process; which public, in fact, is welcome to participate? (Delgado, Lein Kjolberg, and Wickson 2011).

Having passed all the hurdles of stakeholder identification, new challenges arise, since PE processes see themselves increasingly confronted with the problem of “stakeholder fatigue” (Delgado, Lein Kjolberg, and Wickson 2011, 834). Chosen stakeholders might not automatically be willing or able to join the research and innovation processes. Public interest in highly technical topics cannot be taken for granted, awareness for even having a stake in the research topic might need to be created (Bogner 2012).

While the inclusion of neglected knowledge in innovation processes is an explicit goal of PE in the realm of RRI, not having a specific expertise in the area of research might also lead respondents to feeling unconfident to accept an invitation (Marschalek 2018; Valkenburg 2020). When invitees doubt the relevance of their perspectives or that their own interests will not be respected, they might distrust the process as a whole. Trustful interactions are important stepping stones for setting off collaboration processes. Fears that engagement might ultimately be instrumentalised by more powerful actors for opposed motives in contrast are lethal for

successful multi-stakeholder processes (Selsky and Parker 2005; Asveld, Ganzevles, and Osseweijer 2015).

8.2.3 The Role of the Engaged and the Timing of Public Engagement in Research Processes

According to some researchers of participatory processes, such as Sheila Jasanoff (2003), it is impossible to include all members of society directly in techno-scientific research processes. From an RRI perspective, research and innovation is to be responsive, i.e. responding to new knowledge as it emerges, to imminent perspectives, views and norms (Von Schomberg 2011; Owen et al. 2013). There seems to be consensus that involvement at an early stage of the innovation process is important to enable societal embeddedness in the research design, good governance and reflexive approaches (Delgado, Lein Kjolberg, and Wickson 2011; Von Schomberg 2019).

Whether PE processes are implemented at early or late research stages also correlates with the role(s) attributed to the stakeholders. While engagement might happen as one-way communication, attributing a passive and listening role to participants, societal stakeholders might also be engaged in two-way communication, a still passive process of consultation to more active involvement. Following Tina Nabatchi (2012), deliberative processes only start if societal actors are actively involved in problem definitions with the highest possible degree of participation once final decision making is in the control of the public (Nelimarkka et al. 2014). This model also suggests that these different levels of participation are no closed containers, rather engagement might shift along the continuum of the research process (see Fig. 8.1).

8.2.4 Management of Expectations

When involving societal stakeholders, not only researchers, but also invited stakeholders have expectations of the process ahead. The management of expectations hence becomes a crucial and difficult part throughout the engagement process. In case created expectations of the engaged are not fulfilled, stakeholders might well get frustrated (Marschalek 2018). Therefore, it seems to be particularly important to agree upon a certain level of participation upfront, aligning levels of participation (see Fig. 8.1) with clear promises made, in order to prevent unrealistic expectations of the process and a mismatch of announced actions. The International Association for Public Participation (IAP2 2007), which created the original version of Fig. 8.1, put forward ‘promises’ communicated to prospective participants for every level of participation employed (see Fig. 8.2).

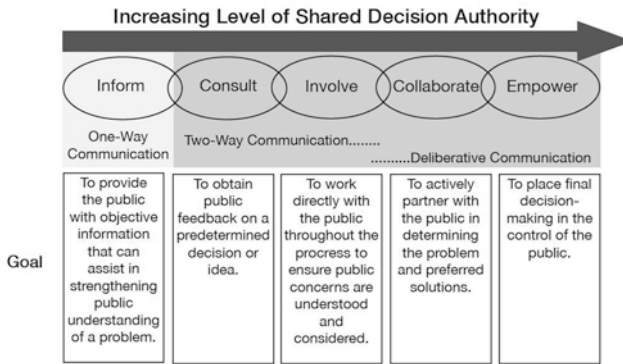
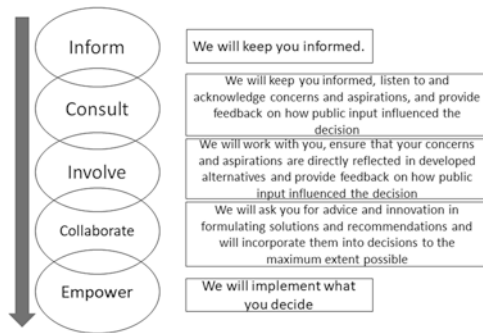


Fig. 8.1 Spectrum of participation. (Nelimarkka et al. 2014; based on Nabatchi 2012; and IAP2 2007)

Fig. 8.2 - Promises to the public based on the Spectrum of Participation (based on IAP2 2007, own illustration)



Also, every engagement process needs to come to an end. This raises the question when participatory processes should be terminated. Recurrent critique has been expressed on the premature closing of engagement processes, leaving participants uninformed about both the way their inputs will be used and the outcomes of the research processes in general (Marschalek 2018). Participants often are no longer involved in the evaluation phase of the processes (Burgess and Chilvers 2006) and can therefore no longer contribute with their perspectives. In order to guarantee that outcomes of engagement processes are also fed back into R & I actions and policies, Rosina Malagrada (2015) recommends planning every engagement process with follow ups and iterative feedback loops.

8.2.5 Group Dynamics

Stakeholder processes often include diverse actors who bring their own and specific perspectives, knowledge and value systems with them. Whilst heterogeneity might be a guiding principle in the process in order for the “complexity of public problems

[being] represented by the infinity of other stakeholders involved in partnership and collaboration, each with their own and legitimate value frames, and even ideologies, with regard to such public problems” (Blok 2019, 252), more homogeneous groups are more likely to reach agreement on problem definitions and the required solutions (Selsky and Parker 2005). Since RRI aspires to solve the grand societal challenges of our times, multi-stakeholder processes are pertinent (Blok et al. 2019).

Diverging perspectives, values, needs and consequently problem definitions pose a challenge for fruitful collaborations. In this regard, Vincent Blok (2019, 245) problematises the emphasis on consensus, harmony and alignment, predominantly discussed in literature of partnership formation. Chantal Mouffe’s (2013) conceptions of agony, which is not seen as constraint but as open contestation of diverging knowledge, resonate with the context of RRI. Diverging perspectives can hence be interpreted as the result of a democratisation process, whereas consensus must be taken with care, possibly resulting in an “oppression of marginalised voices” (Valkenburg 2020, 354). Conflict might hence be productive in fostering processes of learning and reconfiguration, however, not all perspectives can be reconciled in an inclusive and respectful way (Van Bouwel and Van Oudheusden 2017).

This plurality-consensus dilemma is not solvable by maintaining an emphasis on consensus processes. Balancing these tensions at the micro-level might also lead to intransparency, i.e. ambiguity in order to achieve a “balance between being understood, maintaining a specific-self-image, and not offending others” (Christensen and Cheney 2015). In this sense, transparency is a normative concept playing out in engagement processes which is strongly related to trust and power differentials within the group of engaged societal actors (Selsky and Parker 2005). While transparency is a core element of RRI processes (Owen et al. 2013; Wickson and Carew 2014), it can also be an “*outcome* of responsible innovation” (Blok 2019, 226).

8.2.6 *Effects and Impact*

Since PE activities are cost and time intensive for all engaged parties, it is legitimate to ask for their results. As Martina Nitsch and colleagues emphasise, the strength of participatory approaches lies in their “contribution to empowerment and social change” (Nitsch et al. 2013, 44). Repeatedly, however, there is no identifiable relationship between PE and resulting processes in research and innovation (Scholl et al. 2012). In many processes “the how trumps the why” (Stilgoe et al. 2014, 5), and the implementation of engagement processes is deemed more important than achieving a certain result. Accordingly, the usefulness of PE processes might be questioned.

Engagement processes often only involve a handful of people, but even attempts on larger scale such as the VOICES project (Broerse et al. 2014) are criticized not to reach far enough or deeply enough to counterbalance hegemonic research and innovation processes, being “microscopic against the backdrop of global science and its governance” (Stilgoe et al. 2014, 11). Again, the issue of promising too much

is at stake. The scope of engagement processes is hence finite, their ability to create large impact seems to be limited. Small scale real life applications, which directly relate to engagement processes - as for example introduced by the concept of trans-disciplinarity (Jahn et al. 2012) are still missing.

8.2.7 Requirements in Public Engagement Processes

While PE processes are difficult to handle, a considerable number of engagement activities have already taken place. A proliferation of participatory processes, however, stands in contrast to the lack of standards for PE activities and their expected results (Stilgoe et al. 2013; Emery et al. 2015; Rip 2018). While there have been several attempts to create common standards and understandings, up to date, they have not been successful. In a recent review of the uptake of RRI among EU Member States' research and innovation programmes, John Pearson (2019), 109) emphasises the problem of void concepts of 'engagement', which are downsized to "selling science" to the public as "potential customers of innovations". More participatory approaches, hence, might not necessarily imply more responsible and responsive research and innovation processes, but might rather be stripped of their transformative potential (Stilgoe et al. 2014; Gianni and Goujon 2019).

This review of well-known challenges of Public Engagement processes in the context of R & I underlines the difficulty of implementing participatory R & I processes successfully. To sum up, in the following a list of challenges as discussed in the literature translated into basic requirements to be addressed in PE processes, is presented.

8.2.8 List of Requirements

- Targeted selection and invitation of participants including reluctance to participate
- Clear roles for participants
- Management of expectations
- Addressing of Group dynamics
- Visible effects and measurable impact
- Outlines and criteria for engagement process

In the following, the Social Lab approach as a tool to operationalise PE in the context of RRI will be evaluated against this background in later sections. At first, emphasis is put on the definitions of participation and engagement.

8.3 Social Labs to Operationalise Public Engagement for RRI

Zaid Hassan brought the Social Lab (SL) approach forward with his book “The Social Labs Revolution” (Hassan 2014). As he describes, complex challenges of today’s world, such as food security or climate change, cannot be solved with business as usual solutions. Instead of relying on complex planning processes to seek solutions, Hassan argues for an approach of doing rather than planning by using experiments and prototypes and involving the most diverse groups of people. A Social Lab termed by Zaid Hassan in analogy to other types of labs, is not a method but rather a paradigm or an approach which is *social*, *experimental* and *systemic*. SLs are social in the sense that they bring together stakeholders from different fields who actively work together beyond pure consultation as increasingly demanded in PE processes. SLs are experimental as the involved team continuously tries out innovative solutions through an iterative approach and prototyping interventions. The interventions are systemic since they do not address symptoms but the root cause of why things do not work in the first place. Thus, inductively the team moves forward evaluating what has worked out and what has not, adapting actions to new information. As described in the *Social Labs Fieldbook* (Hassan et al. 2015), a lab always focuses on a specific challenge. It represents a stable space supporting the required practice.

The European funded New HoRRizon (NH) project chose the SL approach for particularly fostering PE processes in the context of RRI and modified the approach for its needs (Timmermans et al. 2020), i.e. integrating RRI in research and innovation systems on national and international level. NH targets the 19 programme lines of the European funding programme, i.e. Horizon 2020.

For each programme line, a SL was organised, bringing together stakeholders of the programme line to work on RRI practices and uptake. Each lab aimed to better include RRI in the field. So-called pilot actions were to be developed to address challenges, which were identified for each programme line based on a previous phase of document analysis and expert interviews. The participants leading these pilot actions are henceforth called pilot action hosts.

Each SL had predefined roles based on common project outlines, which supported the SL as a whole and the pilot action development and teams:

1. The SL manager was responsible for setting up the Social Lab process and team. In addition, the manager connected the individual SL with other labs and the project as a whole.
2. The SL facilitator was responsible for designing and facilitating all three face-to-face workshops of a SL putting an emphasis on co-creative workshop techniques.
3. SL assistants supported SL managers and facilitators.

As shown in Fig. 8.3, each SL consists of three main pillars: face-to-face workshops, pilot actions (or short: pilots) and the setup of communities of practices. Each lab team met three times for two-days workshops, but communicated also in between within a period of almost two years.

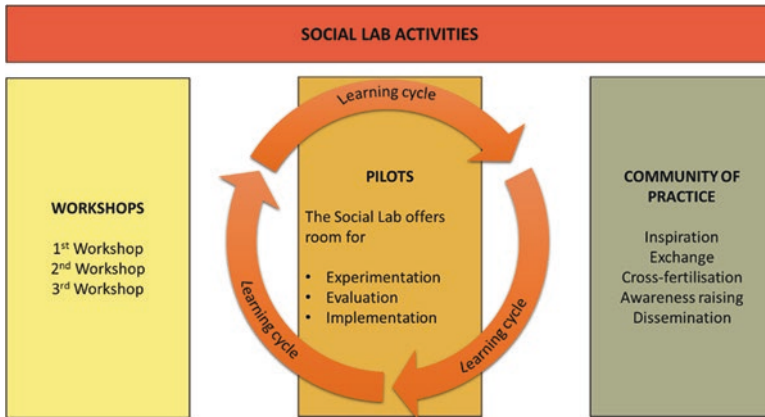


Fig. 8.3 Social Lab structure in NH project

The first workshop served to start and form the SL, scoping the challenge statement and starting the prototyping. Further, it served as selecting pilot hosts and forming sub-teams who supported the hosts. The second workshop aimed at evaluating the ongoing pilots, reiterating and in some cases creating additional pilots. The third and last workshop focused on the sustainability of the pilot actions and put a conclusive assessment area at its core.

8.4 Methodology

The list of requirements in public engagement resulting from literature analysis in the paper is applied to a specific case, i.e. on the public engagement process as operationalised by SL in the NewHoRRIZon project. A case study allows for an in-depth examination of a particular case (Yin 2009). One of the central aims in qualitative research is to develop hypotheses and to build theories (Mayring 2000) and to classify (Lazarsfeld and Barton 1957). Classifying means to systematically order the material following the needed classification rules that are theory driven and empirically solid.

The coding system to develop allows for a systematic analysis of the data, while the rules for applying the codes have to be fixed in a coding plan with the purpose to increase reliability and validity across different researchers working with the same material. While there is a variety of techniques for interpretation available in qualitative research classification and structuration are the most appropriate forms of interpretation for our case, i.e. the SL approach in NewHoRRIZon. The aim here is to explore the data material according to the defined rules and categories (codes) and describe the transverse section in the data; thus to apply the predefined codes from literature (list of requirements in public engagement) to the data material.

Next to the literature review (Sect. 8.2), we analysed the following materials. The analysis is based on different materials and data sources that documented the 19 SLs and two cross-sectional workshops shortly described in the following section:

- SL workshop templates (pre and post)
- Documentation of the two cross-sectional workshop

In order to document the three workshops, SL managers were asked to fill in a template before and after each workshop, i.e. at six different moments within the process.

The documentation of the cross-sectional workshops describes the process and outputs of both two-day workshops, where all SL managers and facilitators as well as members from the Advisory Board (and participants of the SL in the second cross-sectional workshop) came together to fertilise each other and to share insights and lessons learnt.

The material and data sources described above were used as the empirical basis to distil common challenges and solutions, by applying qualitative analysis, combining deductive and inductive coding (see for example Flick 2014).

8.5 Results

The focus of this section is not the output of the SLs but the experiences from the SL process. The following follows the structure of requirements of Sect. 8.2, which also served as codes in the qualitative analysis.

8.5.1 *Selection of Participants and Persuasive Efforts of Invitation*

Forming a SL team, steering motivation, ownership and trust from the very beginning, i.e. already at Workshop 1, in order for team structures to evolve within the SL, was reported as quite a challenge.

It all started with the recruitment procedure to achieve a good balance between different stakeholder groups and different levels of hierarchies. A SL manual (Braun et al. 2020) clearly outlined the numbers of participants in each lab, which ranged from 15 to 20 persons. Also, the lab teams should be diverse representing different stakeholders as well as gender identities, age groups, and regions. According to these outlines, a stakeholder mapping was undertaken by the SL managers to identify institutions and persons relevant in the thematic field of the lab. The following recruitment process was based on this mapping, combined with a combination of targeted e-mails to selections through stratified random sampling and snowballs.

However, many of the designated participants could not see any ‘value’ in participating, or declined because they did not see themselves up to the task. In this

case, clear communication was necessary in order to convince SL participants to take part in the process. They had to be informed about the exact timing and dates of the workshops, and also the extent of the process in general. Time still remained an issue. Although lab managers had sent out save-the-date announcements, it was difficult for participants to find the time for the three two-days-workshops and additionally for the required activities in between the workshops. Also, the need to commit over such a long period of time had a deterrent effect.

The path taken - albeit not inherent to the SL approach - fitted the approach well and resulted in 19 diverse SL teams. However, the challenge of reaching less represented groups remained pertinent and partly unsolvable; despite targeted invitations, civil society representatives remained underrepresented across many of the 19 SLs.

Furthermore, due to the drop-out of participants, after workshop 1 further participants had to be recruited. Labs tried to keep the team structure and replace participants, or they tried to get new participants because of their particular relevance for the selected pilot actions. Although lab teams tried their best to re-recruit after workshop 1 and, the general numbers of participants declined up to workshop 3 across all labs.

8.5.2 The Roles of the Lab Participants

During the first workshop, the topic of the SL, the roles within and the intentions of the process and goals of each workshop were explained. Also, the idea of the pilot activities (including the budget frame) were communicated.

Signing up for the role of a pilot host and to be clothed with tasks respectively proved to be a prerequisite for a successful pilot action as mentioned in many reporting templates. No pilot host was coerced to take on this role, rather, the pilot action co-design and selection processes were set up steering ownership of the ones collaborating, with pilot hosts and teams opting in themselves. In the cases where hosts remained unclear or were not able to dedicate as much time as required, pilot actions were either dropped or worked out poorly as reported by the lab management team. In cases where hosts fully took responsibility and dedicated sufficient time and effort, pilot actions prospered better. However, not all stakeholders were eager or able to take part in the research process.

8.5.3 Management of Expectations – Transparency

Quite a high level of commitment was expected from participants; they were asked to attend all three workshops within a process that lasted up to two years and further required to be active in between the workshops which could not easily be achieved. Whilst travel and accommodation costs were reimbursed participation was

voluntary and unpaid. Not everyone was able to combine this task with their everyday working life depending on the employment situation and the type of institution they were affiliated with. Also, not every stakeholder group seemed to be equally accessible and open to the topic of RRI and the process of the SL.

While a clear outline of the process ahead was important and included in every invitation, the demands of the SL in case of time and resources needed partly represented insurmountable barriers to participation for those, who could not use their working hours for the SL. Participants invested much of their time for the lab process and the pilot action implementation. In case they did not become aware of the value of this endeavour, they dropped out. However, across all SLs about 27% of the participants dropped out; those who stayed were highly committed.

This sense of ownership among the participants is crucial not only for the implementation of the pilots, but also for the overall and voluntary engagement over this long period of time between the workshops. Ownership needed to be continually nourished by the lab management teams. They not only addressed the different values and interests of their diverse lab participants, and applied many group forming activities, but also helped the pilot teams to define their next steps and organised support for these tasks. As the time of the face-to-face workshops was not sufficient for implementing the pilot activities, lab managers stayed in permanent communication with the pilot teams throughout the whole SL period of one and a half years. They organised online meetings and calls with the pilot teams, telephone conferences to discuss pending issues or contents and to interlink the pilot activity with other SLs of the project.

In this way, while still supported by the lab teams and managers, participants could enact their own responsibility for the action and create their own tasks at their own pace rather than being called upon. This is fundamental for involving the participants and aligning the outcomes with promises – the participants themselves define what to expect.

At the level of content, visioning exercises such as future sentences (which have been collected and discussed in preparatory workshops and provided to the lab teams) were used as a tool to bring everyone on the same page. The steered reflection of the participants' own attitudes, roles, potential barriers and enablers worked well in order to foster a sense of agency. The same holds for explicitly identifying best practice examples of RRI on a systemic, institutional and personal level.

In general, clarity in respect to the SL methodology, its objectives and its process was a major challenge and an issue recurrently reported by the lab managers. A certain level of standardisation was necessary to allow for comparable processes in all 19 SLs, but it was also important to regard each SL as a place for experimentation with much room for ideas and options for individual reaction. While the lab process was conceived as an open process, still guiding questions, visions and social challenges needed to be kept in mind. This struggle for balance between structure and standardisation on the one hand and openness on the other hand, sometimes resulted in clashing positions: *“The presentations broke the flow of the workshops: The idea of the workshop to be an exchange of ideas, to get active, to engage and to debate was strongly contrasted by the presentations, where participants were*

required to be rather passive listeners” (SL10, WS1). In contrast, for other participants the rather open design of the workshops also created moments of frustration and it did not lead to their intended effect of bringing them out of *“their own nuclear bubble”* (SL19, WS1).

Having an open and clear communication will help in several aspects. Statements and observations by SL management teams show that it is very important to clearly explain the SL method, the entire process and the specific objectives right at the beginning. This “may help to prevent lacking clarity and understanding” (Marschalek et al. 2021, 49). Secondly, clear communication and transparency on goals, requests, limitations and documentation fosters the building of trust towards the organisation as well as its SL team. Thirdly, the whole process itself has to be transparent to allow all actors to understand why certain steps were undertaken including the follow up.

Given the time and resource efforts that are requested from participants, it played out well to distinctly outline the value of participation in the SL. For some participants it was sufficient to raise awareness that their own reflections and ideas might impact the R & I world and that their input is inspiring for other RRI stakeholders. Outlining the consequences of undesirable effects of irresponsible R & I might trigger motivation to change them. Further, this method might support the involvement of different stakeholder groups, who are not interested in taking part in the first place. During the workshop participants were informed about activities of other labs and the project website was increasingly filled with information on workshops and pilot activities of all 19 labs. Cross-sectional learning and dissemination activities show results of lab processes of all programme lines addressed. Tangible pilot outcomes, such as printed guidelines developed by pilot teams, were distributed across the labs or can be found in the project repository. Informing participants about the big picture helped them to look beyond their own nose and reflect on the wider impact. For instance, participants appreciated the chance to participate in *“something innovative and being able to shape it”* (SL7, WS3). Any individual appreciation, such as “awarding” participants (SL 4, 9, WS 3) for their engagement were welcome. However, from practical experience we emphasise that the more an incentive or issue is directly connected to the (professional) environment of the participant, the higher the commitment and engagement will be. In case the professional interest is lacking, intrinsic and extrinsic motivation become even more important. Expense allowances to especially support civil society actors to participate, and activities developed in the lab which help bring forward already existing ideas or initiatives will positively impact the participation and engagement in the lab.

8.5.4 Group Dynamics and Settings

According to the ‘SL design Workshop’ (November 8–9, 2017) participatory workshop activities and techniques were applied in the labs to create a sense of ownership and commitment to the lab and its activities. Certain exercises which should

enhance collaboration and co-creation, such as group forming activities or workshop rules and explicitly applied attitudes such as ‘active listening’ would help lab teams to get to know each other and “cultivate mutual trust among SL participants” (Braun et al. 2020, p 12). The engagement and motivation of participants requires a sound basis of trust and the feeling of being valued as a person. Only if participants trust that information and ideas presented are valued by others, they will share information openly. Consequently, much emphasis has been put into trust building from the very beginning in order to allow the participants to grow as a team.

Within SLs also friction was noted at different occasions, for instance different ideas on what lab participants intended to achieve with their Pilot Action led to controversies and tensions within the pilot teams could also lead to redesigns of the action or re-arrangements of pilot teams (Marschalek et al. 2021, 27). However, disagreement is somewhat intended by composing such heterogeneous lab teams as it emphasises the diversity of engaged perspectives since diverse stakeholders might also bring in diverging perspectives. Often, lab participants could recognize the diversity of perspectives, values, and different points of view and appreciated its added value.

Nevertheless, tensions have to be dealt with carefully in order not to block the entire SL process or to have a biased discussion throughout, with pilot actions being supported only by a few team members. Throughout the face-to-face encounters it was challenging to make sure that all voices are heard and to manage that participants had equal opportunities to speak up their mind. Everybody must feel represented and empowered to talk and to let others talk too, with each input being valued equally. This process needs support from SL managers and facilitators and hence their roles are essential to manage the diversity of personalities (aimed for in SLs) and usual group dynamics. For the facilitators it was a challenging task to work with the group diversity: “The main challenge thus was to take everybody with us from the basics to a practically usable result at an immense pace” (SL 11, WS 1) (Marschalek et al. 2021, 26). The idea creation and development process of the pilot actions mostly happened during the face to face workshops in which all participants were enabled to contribute. The selection of actions was often organised in transparent voting procedures (e.g. voting with ones’ feet or sticky dots), however, given the heterogeneity of the groups and diverging priorities, not all participants were satisfied with the results.

Charming localities as well as offering an interesting programme to work with a remarkable team expresses appreciation for the participants and their engagement. Therefore, several SL workshops were organised in pleasant surroundings, providing for a calm ambiance and both spaces for recreation and interaction. Often, bright rooms with lots of windows, nice views or furniture were chosen. Also, a flexible setting with chairs and tables that can be moved to provide space for different workshop methodologies was emphasised as key for choosing workshop rooms (D 7.4, 30). Team building initiatives such as ice skating together as a group after the workshop or an RRI inspired activity game were organised by many labs. By bringing participants closer to each other in different activities and environments e.g. through walkshops, i.e. guided discussions in groups while walking (see Wickson et al.

2015) - a good working atmosphere can be created. The analysis shows that the spatial and timely setting can also support trust building among team members, requiring sufficient time for interaction between SL team members.

8.5.5 *Effects and Impact of SL Participation*

The analysis shows direct and indirect effects on the participants and their wider networks resulting from their participation in the lab process. The direct effect and impact relates to participants as this quote shows: *“The greatest transformative effect was probably on the SL participants themselves because the SL gave them the opportunity to dedicate time to learn about and engage with RRI” (SL7, WS3).*

A direct output of the SLs are the pilot actions. Overall, the 19 SLs each developed between one to five pilot actions, dedicated to implementing RRI in practice at different levels, resulting in a total of 57 pilot actions. These pilot actions were co-designed by teams of SL participants, from an early prototyping to their implementation. All of these pilot actions, however, are at their very core a product of stakeholder engagement processes. The pilot actions comprised tangible outputs (such as RRI Career matrix or an open web repository for sustainable energy), RRI training modules for different stakeholders, awareness raising activities, etc. Thus, the indirect effect and impact is associated with the pilot actions which addressed and engaged further stakeholders.

SL participants and in particular the pilot hosts mostly doing the lion's share of the pilot actions do have the clear potential of becoming change agents, as they have a clear goal in mind for improving or changing their working environment. Often they were inspired by the RRI concept which only a few of them had explicitly heard of before. In this sense, as RRI was the umbrella topic of each lab, the lab approach helped to spread the idea of the RRI concept and allowed for personal experiences with the notion, which could contribute to a personal uptake of RRI (which was clearly stated in workshop 3 by most of our participants). While early signs of change in some of the participants' institutions was noted, a real impact on the institutional level takes time and needs actions along several different angle points step-by-step. Also, only a few signs of impact on the policy level could be detected, i.e. RRI taken up at national level in funding instruments.

8.6 Discussion

The subsequent discussion section interlinks the results gained from our SL process with challenges and requirements as identified in the literature (see Sect. 8.2.1). It critically reflects on the way and the extent the SL approach meets the requirements for PE processes in the context of RRI and whether it offers appropriate solutions to overcome frequently discussed challenges. Findings from the literature, i.e.

requirements in public engagement processes, have been contrasted with process elements in the SLs.

The following table plots common requirements identified against the way they are or can be addressed using the SL approach. The later section chronologically elaborates on the way the SL approach deals with these requirements (Table 8.1).

As indicated in the table below (c.f. section 1 in the table), targeted selection and invitation on the basis of a commonly agreed and pre-established set of criteria was

Table 8.1 Evaluation of the Social Lab Approach

| Requirements in Public Engagement | Addressed by SL approach | Reasoning |
|---|--------------------------|--|
| 1 targeted selection and invitation of participants | Yes | Clear guidelines for stakeholder selection and composition of lab teams |
| 1a identifying “the public” in public engagement | Yes | Mapping of stakeholders with connections to the topic of the SL |
| 1b reluctance to participate | Partially | Recruitment for the lab is demanding as it is difficult to explain and asks a lot from participants |
| 1c missing stakeholder group | No | Same problem as in other public engagement processes. Representatives from CSO are difficult to attract → what are the right incentives? In the SL no compensation was foreseen for personal efforts |
| 2 role of participants | Yes | Lab manual with explained roles of management and SL teams |
| 2a timing of public engagement | Yes | The SLs apply deliberative processes from problem definition until the full implementation |
| 3 management of expectations | Partially | Lab activities are co-created and within the responsibility of the participants, however participants could not always say that they had been sufficiently informed on all aims and limitations of the labs |
| 3a termination of participation process | Yes | The lab only finishes when the pilot actions are implemented or finished. Participants take part in evaluation and reflection of the activity and have the opportunity to participate in a cross-sectional workshop to validate their contribution |
| 4 group dynamics | Partially | Lab participants work in teams, alternative settings soften hierarchical or other imbalances between participants |
| 4 a strive for consensus and harmony among the participants | Yes | SLs explicitly acknowledge divergent perspectives resulting from diversity of participants |
| 5 effects and impact | Partially | Direct and indirect impacts through the participation and through pilot actions addressing further stakeholders; limited impact on the policy level |
| 5a small scale real life applications | Yes | Pilot actions are co-created and anchored in real-life working situations of lab participants. |

applied in the SL. Following the approach of invited participation (Bogner 2012), much attention has been paid to stakeholder mapping and to individual selection and invitations of potential candidates (1a). Accordingly, the recruitment processes were time demanding. However, although reasonable numbers of dropouts were reported across the labs, still a sufficient number of participants could be committed to the labs (1b). The problem that CSOs are difficult to attract remained an issue also in the SLs (1c). How to best incentivise participation of CSO representatives is still an open question.

As outlined in the theoretical framework, roles (c.f. section 2 in the table) in engagement processes have to be made clear and put in line with expectations placed on the participants (see Fig. 8.3). The roles present in the SL approach were explicitly defined prior to the start of the process and communicated right from the beginning, thereby making it easier for participants to understand their responsibilities or demands connected to their roles. Placing the final decision making power in the hands of the SL team, starting with the first workshop the SL approach corresponded to the last spectrum of participation: empowerment (see Fig. 8.1). Concerning the timing (c.f. 2a) of the engagement processes, SLs as they are meant for applying deliberative processes from the problem definition via idea creation until full implementation of co-created ideas, they enable participation throughout the whole life span of the activity.

Much effort has been made to communicate intentions understandably. Having the requested effort in mind, it is essential to communicate expectations (c.f. section 3 in the table), goals and aims but also limitations of the SL (project outlines) and the common understanding of the (RRI) topic clearly from the very beginning. Reflections and feedback from the participants emphasised that at times they did not feel sufficiently informed and thus transparency could have been enhanced. SLs have a clear end once (c.f. 3a) the pilots have been fully implemented or finished. Reflection exercises within the workshops and the possibility for feedback and cross-checking at the second cross-sectional workshop (see Fig. 8.3) help to validate the communicated results before they are widely disseminated.

Pilot hosts did not work on their own but needed the support of the lab management and participants' team. Therefore, much attention has to be paid to team collaboration and group dynamics (c.f. section 4 of the table). Lab teams were often invited to stimulating environments which offered many opportunities for working together, but also for informal encounters and team activities other than sole working. Lab teams could retreat from their daily business and thus better focus on the workshop activities. As already noticed in similar settings (Wickson et al. 2015), this approach also softened hierarchical or other imbalances between participants. Instead of always looking for consensus (c.f. 4a), the SL offered room to disagree. The pilot teams could organise their team processes independently from the lab teams, equally team members could refuse to support a pilot action and remain part of the SL process as a whole.

As indicated in the table, effects and impact (c.f. section 5 in the Table 8.1) have been achieved only partially. While direct and indirect impact on the participants themselves and their wider networks has been well documented, only a few signs

indicate a broader uptake on e.g. policy level. Thus the impact requirement of PE has not been fully addressed as the link to the research and innovation system on a (EU) policy level has only partially been established. At the level of the participants, however, the SLs have contributed to empowerment of participants in the sense of Nitsch and colleagues (2013).

The pilot actions and their outputs represent small scale real life applications (c.f. 5a). These actions represent tangible outcomes of an engagement process and are as such a product of a stakeholder engagement process. Pilot actions hence underpin endeavours of the pilot host and thus strengthen their role as change agents in their institutional background. Allowing for a positive experience in practical implementation, pilot actions counteract the participation fatigue, as they provide remaining results. While their results are subject to ongoing analysis, already now they provide evidence of representing innovative activities and new materials for how to implement RRI in different contexts and achieve institutional change.

8.7 Conclusion

With this article we have described SL processes within a case study and investigated whether SLs represent a suitable approach to operationalise PE for RRI.

In general, we have shown that the SL approach provides a potential strategy to cope with some of the challenges discussed with regard to implementing PE processes in and for RRI such as providing a clear definition of roles to all involved actors, providing for transparent yet dynamic and co-creative processes, producing clear outputs (pilot actions), while allowing for space of disagreement or agony. Other challenges, however, remain obstacles for implementing engagement processes when using the SL approach, notably, these concern the underrepresentation of stakeholder groups, intense time demands, and resource requirements.

The SL approach further proved to work well with the circular character of PE as a central part of the lab approach and a core concept of RRI. Therefore, we argue that the SL approach contributes to solving some of the challenges of PE and is a fertile ground for supporting PE in and for the context of RRI.

To date, no common guidelines on how to implement SLs exist, especially not in the context of RRI. This is often the case within participatory processes – although signposted with terms, such as “Social Lab”, processes lack clear instructions or quality criteria (Rip 2018). The project team therefore had to start with some basic understandings on how to implement SLs. In this case, therefore, it took a while and much effort to come up with agreed guidelines which could be applied across all labs. Group exercises, such as a visioning conference, or a co-creation workshop carried out the different roles, lab methods and processes to be applied (see Braun et al. 2020).

Accordingly, looking back at 19 lab processes we can observe that although the labs followed the same rough structure, still the labs have been carried out

individually. With regard to this fact further research and implementations are needed to investigate and define common criteria on how to successfully run a SL.

19 SLs offer(ed) a unique possibility to re-evaluate opportunities and limits of PE processes for RRI, however, more research and experimentations are necessary in this field - how can SLs be implemented in a sustainable manner? How can missing stakeholder groups like civil society organisations and policy makers be reached and included? How to cope with the intense resource demands of the SL process? With this chapter we hope to steer further interest, discussion and research in these matters.

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Chapter 9

Exploring the Ambivalent Nature of Diversity in Social Experimental Settings: First Insights from Social Labs Established to Promote Responsible Research and Innovation



Merve Yorulmaz and Susanne Bühner

9.1 Introduction

Research has provided ample evidence for the performance-enhancing effect of diversity on a wide range of organizational outcomes (Terjesen et al. 2009). The positive effects are manifold and range from better decision-making and corporate governance through better financial performance (Post and Byron 2015), more creativity and innovativeness to more responsible and ethical business conduct (Pechersky et al. 2016). In the context of Research & Innovation (R & I), the cooperation of a diversity of stakeholders has been shown to promote more responsible or ethical business practices (Wood 2002).

In this light, diversity plays an essential role in the theoretical concept and policy ideal of Responsible Research and Innovation (RRI). RRI can be understood as a process that, among others, aims to increase the variety and diversity of stakeholders in R & I by considering different societal needs, interests, values and perspectives. RRI has recently received increased attention in the field of R & I policy (European Commission 2017) and academic research (Timmermans and Blok 2018; Timmermans et al. 2020). However, it can still be characterized as an emerging social phenomenon and fragile concept that lacks conceptual clarity. Timmermans et al. (2020) point out that its ‘conceptual and empirical immaturity’ (2) poses a barrier to the uptake of RRI by R & I practitioners (Novitzky et al. 2020). In the context of Horizon 2020 (H2020), the European Framework Programme for Research and Innovation, RRI is being experimentally implemented in so-called social labs, which are suitable spaces for experimenting with emergent social phenomena such as RRI (Timmermans et al. 2020). Such social labs that revolve around

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RRI are built upon the diversity of their participants, since addressing the social challenges at the heart of the social lab approach requires a multitude of complementary perspectives, views, knowledge and individuals. Even more importantly, it requires the space, opportunity and appropriate (pre-) conditions for productive exchange and collaboration – even under difficult circumstances.

Hassan (2014) states that a high degree of diversity implies that diverse perspectives are present in the discussion. Although greater diversity of individuals and perspectives is associated with a higher potential for divergence and friction, it is highly desirable and beneficial to social lab processes and the promotion of social and responsible innovation. In contrast, high consensus and similar perspectives are less suited to problems that require out-of-the-box thinking and creativity and usually result from an insufficient mix of stakeholders). Blok emphasizes that, particularly in the ‘case of complex public problems’ (2019: 255) where harmony and alignment are very difficult to achieve, difference and constructive conflict can be beneficial to (an ethical approach on) stakeholder collaboration and cooperation.

Apart from a predominantly relative (and mostly hierarchical) description of ‘differing degrees of diversity’, the concept of diversity remains very abstract and difficult to operationalize. The challenge of managing, moderating and measuring a concept that lacks granularity raises the question of ‘how much’ diversity – in terms of the exact composition of actors and stakeholders – is actually needed or sufficient to promote innovative behavior by interaction and collaboration in complex settings.

Timmermans et al. (2020) point out the lack of evidence and knowledge on the ‘what-how-and-who’ of social labs, raising the need for further research into which actors and stakeholders to include in social labs and the barriers and enablers affecting their functioning. A better understanding of the functioning and interactive dynamics of diversity appears crucial to create the right conditions to promote the emergence of creative exchange and thus, social innovation. From an epistemic point of view, an investigation of the underlying dynamics is essential to generate new knowledge on how to manage diversity to make the best use of its potential in agile, complex experimental settings.

In order to address the question of whether and how diversity affects social lab dynamics and under which conditions responsible innovation can thrive, we use the theoretical lens provided by Granovetter’s social network theory (1973), and Kanter’s critical mass theory (1977), both of which offer explanations for significant differences in performance across differently diverse groups and their complex interactive dynamics.

In his groundbreaking research, Granovetter showed that the characteristics of the links between actors within a given network significantly influence the exchange of information and the resulting effects. Whereas the strong ties that typically emerge between homogeneous actors lead to trust and quick decision-making, the weak ties that link heterogeneous actors contribute to more creative exchanges and knowledge creation and thus stimulate innovation.

Kanter enriches the debate by further differentiating degrees of diversity. In her research on power distribution in mixed groups, she shows that the relationship between group diversity and outcomes follows a curvilinear, inverted U-shaped

function: Diversity was only found to be beneficial in a state of balanced diversity, while both lower and higher degrees of diversity, i.e. homogeneity and heterogeneity, were shown to impair performance. The decrease in performance in less diverse groups is explained by a lack of creativity, perspectives and critical voices, while the lower performance in very diverse groups is explained by conflicts, lack of consensus and the time needed for coordination.

Our analysis builds on the premises of social network theory and critical mass theory that explain variance in group-performance based on their degree of diversity. So far, neither theory has been applied in a RRI or social lab context, but combining them seems a promising approach as it focuses on the dual aspects of ‘real’ diversity including friction, conflict, and creative and innovative potential. We apply this to a specific social experimental setting, so-called social labs, to investigate whether and how diversity plays a role in achieving social change and (responsible) innovation.

The core assumption we derive from these is that the social lab processes and outcomes differ according to the homogeneity or heterogeneity of participants. We argue that the more homogeneous a social lab is, the easier and quicker it solves problems, since homogeneous labs reach consensus faster and act according to the same agenda. Accordingly, these labs are expected to develop outputs in a shorter time, but with a lower level of novelty, originality and innovativeness. Heterogeneous labs, in contrast, are expected to need more coordination due to diverging agendas and the associated power struggles, but may be more innovative and produce particularly outstanding, valuable and creative outputs.

By applying a combination of social network and critical mass theory to the social experimental environment of social labs, we deliver new insights into the role of diversity in highly uncertain settings, as RRI is an emergent topic and social labs are uncertain contexts per se. We also show that friction and divergent voices are beneficial to effective stakeholder collaboration as they stimulate creative and critical thinking and productive interaction, supporting earlier research on constructive conflict in stakeholder collaboration (Blok 2019). These insights can help to further ground the social lab approach presented by Timmermans et al., and contribute to improve the understanding of ‘the construction of emerging social phenomena itself’ (2020: 12).

9.2 State of the Art

9.2.1 *The Emerging Policy Concept of Responsible Research and Innovation*

RRI is a policy concept that has been defined as ‘societal actors (researchers, citizens, policymakers, business, third sector organizations, etc.) work[ing] 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' (European Commission 2017). RRI draws on previous activities such as anticipatory governance (Karinen 2010), constructive, Real-Time and other forms of technology assessment (Rip et al. 1995). In the UK context, Stilgoe and colleagues (2013) have characterized RRI as having four dimensions, nicely summarized by the UK's Engineering and Physical Sciences Research Council as 'Anticipate, Reflect, Engage, Act' (EPSRC 2013).

Timmermans et al. (2020: 2) emphasize that RRI, despite its increasing presence and popularity in R & I policy and academic research, still lacks conceptual clarity and evidence and faces a 'paradoxical challenge': in order to make RRI – an abstract ideal that is conceptually and empirically immature – practical reality, 'we have to presuppose that the approach already exists in practice'.

Besides its status as a policy concept/ideal, RRI can also be understood as an emerging social phenomenon that results from complex, distributed social interaction, especially amongst academics, policymakers and researchers and innovators (Timmermans et al. 2020). Thus, the concept of RRI reflects the enlargement of the core set of actors within R & I systems. In this way, RRI can increase diversity in research and innovation processes. Ultimately, this should help to address societal challenges more efficiently. Blok (2014, 2019) discusses the necessity to acknowledge the singularity and thus non-redundancy of actor diversity, whereas most of the literature on Corporate Social Responsibility (CSR) and Responsible Innovation shows a tendency to emphasize harmony, consensus and alignment between actors. Thus, Blok's reflections highlight the need to keep differences among stakeholders in order to realize the full potential of diversity.

9.2.2 Diversity as a Driver of Creativity and Innovation

Diversity in groups and organizational settings has been shown to be a powerful and versatile source of creativity, innovation and competitive advantage. The term 'diversity' is rooted in the corporate context and refers to distinctive features of staff members such as age, gender, ethnicity, disability or different normative values and attitudes (Krell 2004). In an organizational context, diversity has developed into an overriding term referring not only to workforce diversity, but also to the diversity of skills, competences, approaches and perspectives.

The organizational benefits of a conscious and proactive approach to diversity are multifaceted (Bühner and Yorulmaz 2019). The literature provides ample evidence for the performance-enhancing effect of diversity on a wide spectrum of measures, ranging from corporate governance, employer attractiveness, corporate social responsibility, environmental sustainability and various financial measures to a company's innovative potential (Kassinis et al. 2016; Terjesen et al. 2009). The economic benefits of gender diversity, in particular, have been thoroughly analyzed. Studies provide evidence for a higher likelihood of radical and disruptive innovations in organizations with a diverse management (Díaz-García et al. 2013) and an

overall higher propensity to innovate compared to companies with a high concentration of one gender (Østergaard et al. 2011). Diverse teams are much more likely to consider and implement alternative approaches and uncommon ideas. This contributes to the development of ideas, products and solutions that are more creative and ingenious, and often leads to more innovative outcomes (Terjesen et al. 2009).

As mentioned earlier, Granovetter (1973, 1983) attempts to explain the underlying mechanisms for the positive impacts of diversity. He states that the characteristics of the links between actors within a given network significantly influence the exchange of information and the resulting effects. The concept of the “strength of weak ties” (Granovetter 1973; Granovetter 1983; Burt 1992) shows that not only the strong ties that typically exist within groups with a high level of similarity (= homogeneous actors) are advantageous, as they lead, for example, to a high level of trust and fast decision-making. The new insight was that weak ties (that are typically observed between heterogeneous actors) have the potential to build bridges to previously unconnected fields of knowledge and thus promote innovation.

9.2.3 The Ambivalence of Diversity: Varying Performance Effects at Different Levels of Diversity

However, the overall body of diversity research delivers inconsistent results, as studies have found positive, negative or even no relationship between diversity and performance measures (Bear et al. 2010; Ryan and Haslam 2005). Hence, the research does not support a universally positive effect of diversity – particularly when diversity is treated as a binary concept and isolated from its context. However, studies with a more finely nuanced concept of diversity have been able to detect positive effects at intermediate levels, which remained undetected in studies that did not account for different levels of diversity.

In her pioneering fieldwork on power distribution in mixed groups, Kanter (1977) explored how subgroups with different degrees of representation interact and influence group processes. She showed that, in order to exert influence on processes and outcomes, minority groups need to be sufficiently represented in an optimum balance of diversity, and that both very low and high degrees of diversity, i.e. high homogeneity and high heterogeneity negatively affect group dynamics. Many scholars have adopted her framework and examined the relative dynamics of subgroups in various settings, providing evidence for a non-linear, frequently inverted U-shaped relationship between group diversity and outcomes.

These findings imply that diversity can only unfold its full potential if there is an optimum balance of diversity – a state in which behavioral and power mechanisms are most suitable for representatives of minority groups. In contrast, too low and too high levels of diversity can result in no effects or even impair performance, mostly due to a lack of representation and voice or higher levels of conflict, coordination, mistrust and divergence. Kanter’s theory explains why ‘some’ diverse groups have more synergistic and positive dynamics, while others perform worse.

9.3 Materials and Methods

In this paper, we explore the ambivalent nature of diversity, which can function as a driver of creativity and innovation but also as a source of considerable conflict, friction and divergence (Hassan 2014, Kanter 1977). Addressing the complexity inherent in social labs as spaces where diversity ‘drives and thrives’, we investigate the influence of social lab participants’ diversity on social lab processes and outcomes. We also reflect on how diversity can be instrumental in fostering social change through social experimentation and the promotion and application of RRI. Our use cases are 19 social labs that were set up in the H2020 project NewHoRRIZon. *Social lab methodology in the NewHoRRIZon project.*

The NewHoRRIZon project (“Excellence in science and innovation for Europe by adopting the concept of Responsible Research and Innovation”, 2017–2021) aims to promote the integration of RRI into European, national and local R & I practice and EU funding. Methodologically, it is built around 19 social labs, each of which is dedicated to a different section of H2020, the current European Framework Programme for Research and Innovation.¹

The term ‘social lab’ was first coined by Zaid Hassan (2014), who described them as ‘platforms for addressing complex social challenges’ (3). In social labs, the subject and object of the lab are ‘social in nature’, as they involve societal actors and address social challenges – the heart of social labs – by supporting social innovation (Timmermans et al. 2020, 5). They can be characterized as complex and emerging, meaning that ‘their properties arise from the interaction of the many parts’ (Hassan 2014, 19).

The social lab approach adopted in the NewHoRRIZon project differs from more traditional approaches and offers the theoretical grounding needed by combining the defining features of social labs emerging from the literature such as action research and experimental learning (Timmermans et al., 2020). This allows the simultaneous investigation and propagation of RRI, circumventing the earlier described paradoxical challenge by utilizing the circularity.

Each lab consists of a team, a process, and a space where social innovation and experimentation are supported and implemented. Its design and format are informed by the specificities of the complex challenges, which require out-of-the-box

¹ The 19 programmes are: European Research Council, Future and Emerging Technologies, Marie Skłodowska-Curie Actions, Research Infrastructures, including e-Infrastructures, Leadership in Enabling Industrial Technologies, Access to Risk Finance and Innovation in SMEs, Health, Demographic Change and Wellbeing, Food security, sustainable agriculture and forestry, marine and maritime and inland water research and the bioeconomy, Secure, Clean and Efficient Energy, Smart, Green and Integrated Transport, Climate Action, Environment, Resource Efficiency and Raw Materials, Europe in a changing world – Inclusive, innovative and reflective societies, Secure Societies – Protecting Freedom and Security of Europe and its citizens, Spreading Excellence and Widening Participation, Science with and for Society, The European Institute of Innovation and Technology, Non-nuclear direct actions of the Joint Research Center, Instruments of H2020 and EURATOM.

thinking, novel and original solutions, and hands-on experimental approaches as well as a diverse group of individuals committed to addressing the challenge.

Each social lab includes a variety of societal stakeholders, ranging from policy-makers, representatives of businesses, civil society, funding organizations, SMEs, research organizations and other experts. This variety ensures a large repertoire of expertise, backgrounds, and approaches (Hassan 2014), but also perspectives, viewpoints and values. In the NewHoRRIZon context, the social lab teams have been created and recruited with the aim of achieving a good balance between different stakeholder groups and hierarchical levels.

In this RRI-focused lab context, R & I is the object, while its subjects include ‘all types of actors involved in R & I as well as experts from different disciplines encompassed by RRI’ (Timmermanns et al. 2020, 5). Stakeholders, i.e. societal actors that are involved or affected by the R & I processes addressed by a particular social lab, have the opportunity to address complex social challenges related to RRI, experimentally and systemically. Together they co-design social experiments in the form of suitable interventions, so-called pilot actions. They can engage in focused exchanges to address specific societal challenges by systematically integrating aspects of RRI. Pilot actions emerge fully bottom-up based on the stakeholders’ interests and the identified challenges. They have a clearly defined goal and are aimed at practical implementation in a particular context. They gather a group of interested persons and are coordinated by a responsible person/team.

As of July 2020, a total of 60 pilot actions were listed in the project documentation. These pilot actions are either ongoing, in their final stage or already finished. As the pilot actions pursue specific objectives, we are able to collect their outcomes (in terms of number and type of output) and can relate them to the composition of the group that co-developed them according to diversity characteristics.

9.3.1 Data Collection and Analysis

Our research is descriptive and exploratory, and aims to capture and describe the diversity of the 19 social labs, their diversity dynamics, the lab process and the manifold outputs manifested in the pilot actions. Our analysis builds on a thorough examination and synthesis of existing quantitative and qualitative data extracted from two main sources. The first main source are three internal post-workshop reports for all 19 social labs. The reports contained information about the participants at the three workshops held over the course of the project. A total of 57 multi-page reports that are accessible exclusively to social lab managers served as the basis for the extraction of quantitative information related to participant diversity in each social lab. To capture a social lab’s diversity as an umbrella concept, we considered the following three reported diversity categories as components of our overall diversity category:

- Gender diversity in terms of the share of women per lab,
- Geographical diversity in terms of the country of residence (institutional affiliation) of participants,
- Stakeholder diversity in terms of affiliation with the following stakeholder categories captured by the reports: research/academia, policy, business, civil society, other experts.

We extracted and reorganized this information in a master list and complemented it with additional specific information from other main sources. Since the workshop reports included additional valuable information in the form of the social lab managers' reflections on the dynamics, challenges, conflicts or opportunities related to diversity, we thoroughly reviewed the 57 reports and complemented the above-listed quantitative data with the responses given to questions asking explicitly about group diversity, diversity dynamics, and experienced conflicts. Since diversity was a recurring theme in other questions, we systematically reviewed the reports for diversity-related reflections on social lab dynamics. We grouped the individually selected quotes into eight new categories and recurring themes, as listed in Table 9.1. Given the limited space and scope of the paper, we selected and presented only a limited range of quotes, which were, however, considered the most 'extreme'/explicit and thus, representative for their respective category.

Table 9.1 Diversity of the 19 social labs

| | Min | Max | Mean (average all labs) | Sum (all 19 labs) |
|---|------------|-------------|-------------------------|-------------------|
| <i>Participants in all 19 SLs (not individuals, but workshop (WS) participants)</i> | 13 | 59 | 35.68 | 678 |
| <i>WS1</i> | 9 | 22 | 16.06 | N = 257 |
| <i>WS2</i> | 7 | 24 | 13.94 | N = 521 |
| <i>WS3</i> | 3 | 21 | 11.33 | N = 170 |
| <i>Number of women</i> | 6 (SL6) | 37 (SL3) | 21.5 | |
| <i>Share of women</i> | 30 | 71 | 50.84 | |
| <i>WS1</i> | 31.25 | 76.47 | 51.78 | |
| <i>WS2</i> | 28.57 | 83.33 | 53.55 | |
| <i>WS3</i> | 16.67 | 68.75 | 47.81 | |
| <i>Number of stakeholder groups</i> | 1 | 6 | 3.42 | |
| <i>WS1</i> | 2 | 6 | 3.7 | |
| <i>WS2</i> | 2 | 8 | 3.3 | |
| <i>WS3</i> | 1 | 6 | 2.7 | |
| <i>Number of countries of residence</i> | 4 | 11.3 | 7.13 | |
| <i>WS1</i> | 4 | 14 | 8.43 | |
| <i>WS2</i> | 4 | 11 | 7.28 | |
| <i>WS3</i> | 2 | 11 | 6.33 | |
| <i>Number of pilots</i> | 1 | 5 | 3.16 | N = 60 |
| <i>Number of dropouts (WS2 + WS3)</i> | 0 | 23 | 9.26 | N = 176 |

Our second main source were internal excel lists on the pilot actions' status, which contained information on their classification (type of output): these comprise documents, proposals, case studies/best practices, papers, institutional change, tools, awareness and websites, and vary in their degree of tangibility, complexity or innovativeness. We matched the information on the pilot actions with the diversity information per social lab, which allowed us to statistically and graphically analyze and describe their relationship.

We compiled an extensive table using SPSS software listing all the named quantitative and qualitative data/information available in June and July 2020. The aggregated and comparative level of our analysis was the social lab level.

9.4 Results

In a first step, we analyzed the composition of the 19 social labs according to the diversity dimensions gender, stakeholder groups, and countries. Table 9.1 shows the results differentiated by the single workshops that took place over the entire social lab process and in sum. In total, the labs mobilized 678 participants.² The total number of workshop participants decreased over time and across the workshops, whilst the variance between labs increased over time. Furthermore, we observe a large variation in the total social lab size, operationalized as workshop participants, ranging from 13 to 59. The total number of participants in each lab is important as it determines, at least to some extent, the potential level of diversity.

Table 9.1 also shows that the number of women that participated in the workshops does not vary significantly, and their share is constantly around 50%. However, the number of women participating in a single workshop ranges from a minimum of 3 to a maximum of 37. The number of countries represented in the different social labs and workshops is much lower (between 2 and 14).

Figure 9.1 shows the sum of workshops participants for each social lab and the number of pilot actions. It underlines the large heterogeneity of the SLs in terms of the number of their participants, while Fig. 9.2 indicates that a high number of participants does not necessarily mean that the number of pilot actions is high as well.

The following graphs show the distribution of pilot actions by type of output. Figure 9.3 shows that the most frequent output is awareness raising (31%), followed by activities that aim at institutional change (24%). Concrete tools make up 13% of the pilot actions, and 11% mention a concrete practice case. The majority of other tangible outputs are below 10% and include websites, papers, documents as well as proposals that were developed on a team basis.

²The calculation is additive and focuses on *participants per workshop*, not on individuals. It cannot be excluded that, in certain cases, individual persons were counted more than once, if they have participated in more than one of three workshops.

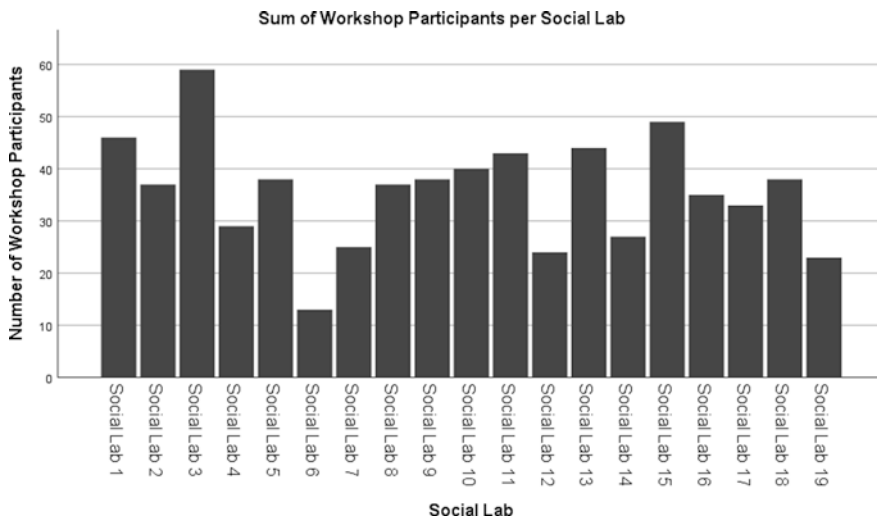


Fig. 9.1 Sum of workshop participants across 19 social labs

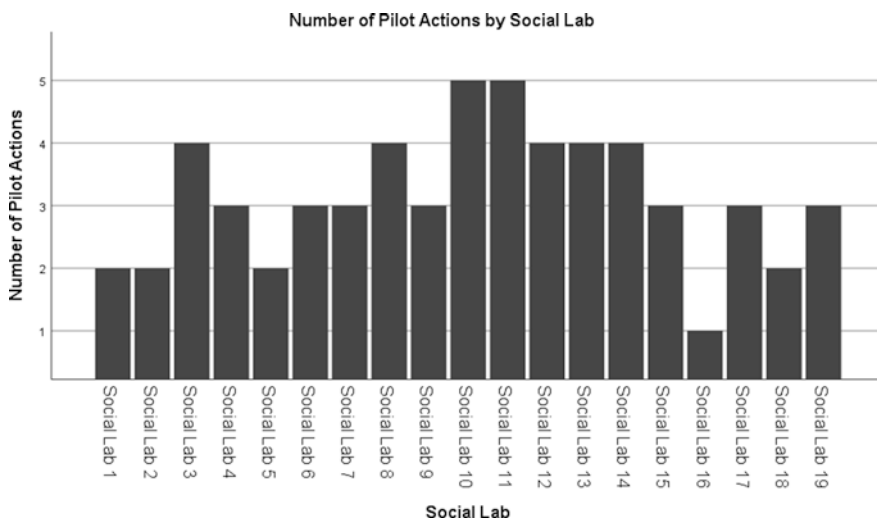


Fig. 9.2 Number of pilot actions by social lab

For a more comprehensible presentation, we summarized some of the categories shown above. The group of ‘tangible results’ now includes tools, documents, papers and proposals, whereas the other categories remained unchanged.

This classification was used in order to differentiate between two categories of results of social labs: tangible and intangible. The group of less specific, less tangible results such as ‘website, awareness, institutional change and practice cases’ is considered less innovative because they are easy to achieve or are unspecific

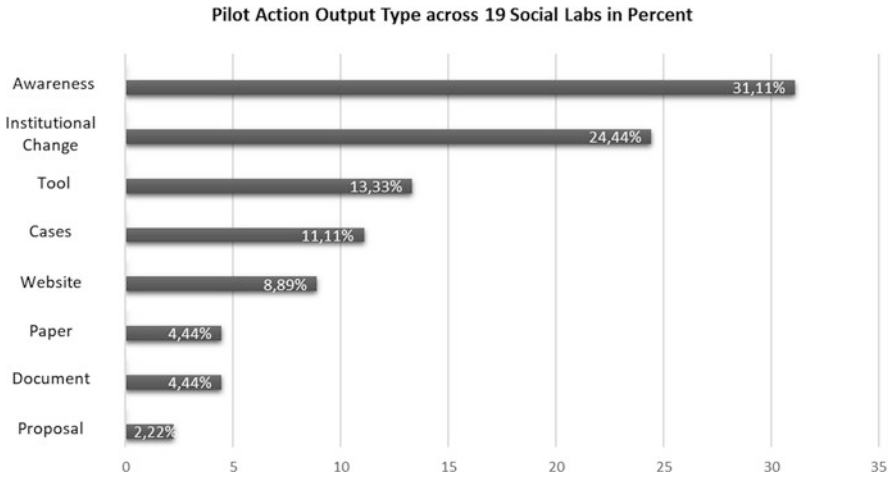


Fig. 9.3 Type of outputs reported for the pilot actions

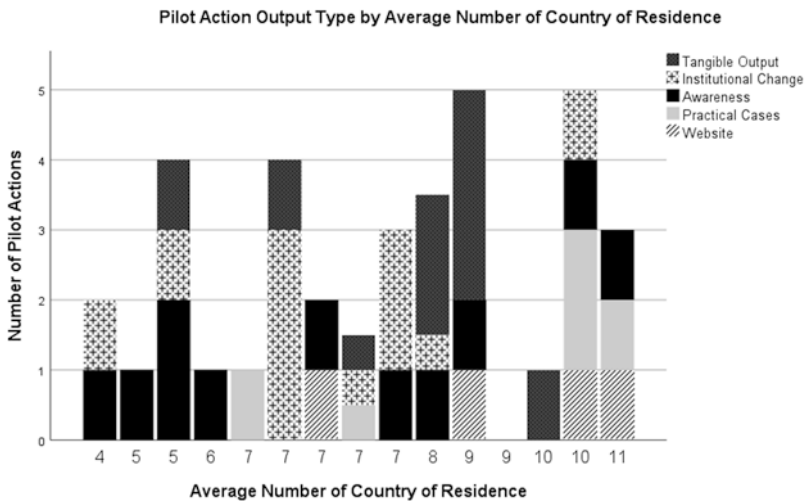


Fig. 9.4 Country diversity and pilot action outputs

(institutional change). On the other hand, the group of tangible results such as tools, documents, papers and proposals require an active contribution from different perspectives in order to achieve a corresponding quality.

Figure 9.4 shows the relation between different types of outputs and the diversity dimension country of residence: We see that outputs aimed at increasing awareness are more frequent in social labs with lower country diversity, whereas tangible outputs occur more in social labs with moderate to high country diversity.

A similar pattern emerges when we look at the results for gender diversity (see Fig. 9.5): Again, the frequency of tangible results increases with increasing gender

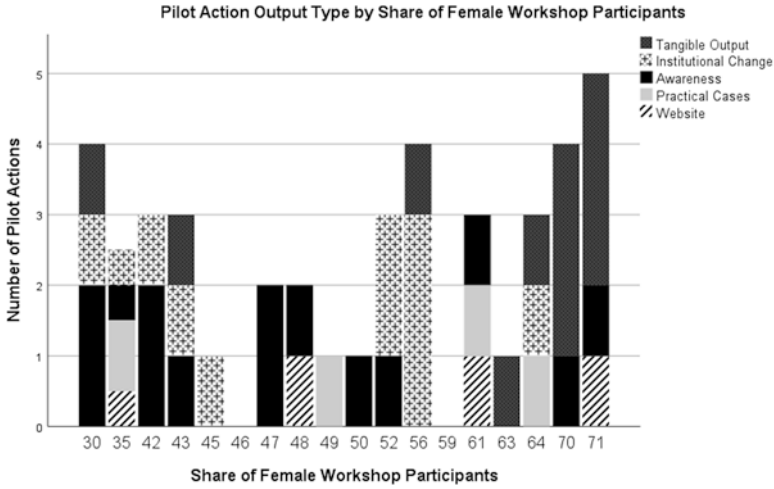


Fig. 9.5 Gender diversity and pilot action outputs

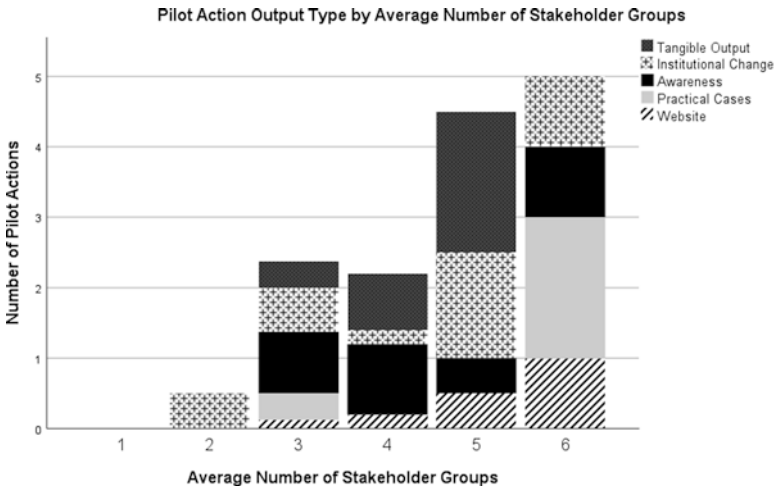


Fig. 9.6 Stakeholder diversity and pilot action outputs

diversity, whereas we find more awareness-related output types in social labs with lower gender diversity. Furthermore, the number of outputs that aim to stimulate institutional change is highest in SL with balanced gender distribution.

Finally, when it comes to stakeholder diversity, a greater proportion of practical cases can be found in groups with more stakeholder diversity, and tangible outputs are more frequently reported in social labs with moderate to high stakeholder diversity (Fig. 9.6).

In sum, we observe an influence of all three diversity dimensions on the type of pilot action output, namely that more tangible results are developed in more diverse groups, while awareness - as a rather weak output - tends to be more common in less diverse groups.

As a complement to the results shown above, Table 9.2 shows a compilation of examined qualitative data in the form of social lab managers' self-reported reflections on the pros and cons of diversity within the social labs.

Table 9.2 Social lab managers' reflection on diversity and social lab dynamics

| Category | Quote by SL manager | Lab characteristics |
|--|--|---|
| Reference: The average lab has 50.84% females, 7.34 countries of residence, 3.42 stakeholder groups and 3.16 pilots. | | |
| Low homogeneity | <i>'The last workshop was the least diverse of all three. Compared to the first workshop the gender composition has totally changed with only one female participant present. Three other women took still part in the Social lab communication between WS 2 and 3, but did not make it to the third workshop, due to a busy schedule. The participants present at WS3 were friendly and worked together very well. Only during the policy recommendation session at the end of the workshop, participants showed signs of fatigue, which affected the group dynamics towards a collective lack of creativity in solving this task.'</i> | 30% female 5 countries 3 stakeholder groups 3 pilots |
| Proper balance | <i>'Social labs should not revolve only around different expertise. It should consider an integration of different ingredients able to facilitate the dialogue between different expertise. In this sense, it is important to foresee participants with different cultural backgrounds and peculiarities so to compensate with each other. Extroverted characters should be combined with more introverted ones. Furthermore, this can trigger diversity, a dialogue where perspectives are not imposed, and new ideas can emerge and flourish.'</i> | 50% female 6 countries 4 stakeholder groups 4 pilots |
| Positive diversity | <i>'The very diverse group (both in terms of practices in which they are normally embedded, as well as stage of career and substantive research interests) really added to the diversity of viewpoints related to RRI and therefore to the creative tension during the workshop and (as we've gathered from participants) to new insights resulting from this friction.'</i> | 30% female 5 countries 3 stakeholder groups 3 pilots |
| Excellent diversity | <i>'Group dynamics were fantastic: Only 4 participants were there for the first time, however 3 of them stepped in for active participants who had changed roles in their home organisations or could not make the date. There was a high commitment to the activities and an interest to contribute to the narrative reflection - despite the fact that participants admitted they were struggling to understand the Social lab and narrative evaluation methodologies. Social dynamics were easy and relaxed, somehow a Reunion of friends.'</i> | 71% female 9 countries 5 stakeholder groups 3 pilots |

(continued)

Table 9.2 (continued)

| Category | Quote by SL manager | Lab characteristics |
|---|---|---|
| Hindering heterogeneity | <i>'During the mingle exercise of our first day afternoon, participants expressed discontent with not having the time to hear from all people on all of the different ideas in the room.'</i> | 70% female 8 countries 4 stakeholder groups 4 pilots |
| Imbalance or lack of representation <u>not</u> affecting or disturbing dynamics | <i>'The group had a very good diversity in different aspects, the only weaker aspect was gender, as there were far more women than men. This however, did not influence the group dynamics in a negative way.'</i> | 71% female 9 countries 5 stakeholder groups 3 pilots |
| | <i>'No representatives from the EC or industry were present, this didn't appear to affect the workshop process negatively (although further perspectives would probably have been beneficial).'</i> | 64% female 7 countries 3 stakeholders 3 pilots |
| Role of individual power, dominance and influence: | <i>'Generally speaking all of them participated in almost every action. The dominant voice from the first workshop was not able to attend, so the distribution of speaking time was more equally distributed this time.'</i> | 30% female 5 countries 3 stakeholder groups 3 pilots |
| | <i>'Different cultural and social background can be an obstacle to a free and comfortable discussion. It is important to lighten the atmosphere as much as possible and address the crucial role of having different perspectives for the lab purposes. We observed different ways of intervening in the conversation: While some would raise their hand, others would directly speak and, sometimes, even interrupt the other person speaking. This generated a bit of inequality between participants, especially between those who are comfortable speaking in public and those who are less.'</i> | 50% female 6 countries 4 stakeholder groups 4 pilots |
| | <i>'This group was very diverse in age, background and nationality. Three persons were rather dominant in discussing, but facilitators could still lead the discussions and enable everybody to talk.'</i> | 61% female 11 countries, 3 stakeholders, 3 pilots |
| | <i>'[...] key multiplier-persons are of uttermost importance in order to activate other staff and to foster (pilot) action. In our case, some of these persons were from higher management positions and thus held institutional power - however, others were not in these type of positions but were still valuable in order to make the SL and the pilots a 'success:.'</i> | 45% female 4 countries 2 stakeholder groups 3 pilots |
| Task, topic, sector moderating diversity | <i>'More women participate than men, even though the ENERGY field is rather male dominated. This aspect was questioned by the participants and the gender aspect was repeatedly taken up in discussions.'</i> | 61% female 11 countries 3 stakeholders 3 pilots |

9.5 Discussion

This chapter aimed to explore the relationship between diversity in an experimental setting in the form of social labs and the outcomes generated in such environments. The starting point of our relationships as well as the findings from diversity research, according to which the relationship between diversity and quality of outcomes is complex and positive results of diversity can be expected above all when this diversity is well managed. To investigate our question of whether and how diversity affects social lab dynamics and under which conditions responsible innovation can thrive, we were able to draw on material from 19 social labs conducted as part of the EU-funded NewHoRRizon project.

We find that social labs with greater heterogeneity show similar tendencies in their behavior and output type: across the three examined diversity dimensions, the frequency of tangible results increased with increasing group diversity. Tangible outputs were more frequently reported in labs with moderate to high levels of stakeholder and country diversity, while labs with higher stakeholder diversity produced a higher number of practical cases. Against the background that outputs in heterogeneous groups are achieved under more ‘challenging’ conditions characterized by a higher potential for friction, divergence but also creativity, we considered tangible outputs as more original and innovative, and outputs related to awareness-raising as more easy to reach and thus more ‘ordinary’ / less original.

We also found indications for the existence of single participants who ‘dominate’ the discourse, ‘interrupt’ or hamper group dynamics through their ‘hegemonic position’ (quote by social lab manager). This finding contradicts the notion of ‘sufficient representation’ of individuals from underrepresented groups from diversity literature (Kanter 1977), which is assumed to be an important prerequisite to influence group dynamics. Individual reflections by social lab managers indicate that subgroups do not necessarily need to be sufficiently represented to have their voice heard and exert noticeable influence on group processes. In multiple cases, dominant individuals were perceived positively since their extraordinary commitment and contribution were highly beneficial for pilot action progress and success.

Thus, our results confirm the main assumptions from the literature that (1) different degrees of diversity have different effects on group outcomes and (2) that, under certain conditions, weak ties, which we find in groups that are more heterogeneous, lead to more innovative solutions, at least to some extent. We interpret the results as providing evidence for the theory that diversity stimulates the type of creative thinking that leads to innovative ‘products’ like new tools, publications or proposals.

By applying a combination of social network and critical mass theory to the social lab context, we provide new insights into the role of diversity, especially of degrees and proportions of diversity in highly uncertain settings. Results indicate that friction and divergent perspectives are beneficial to group processes and stakeholder collaboration as they stimulate creative and critical thinking, supporting earlier research on constructive conflict in stakeholder collaboration (Blok 2019).

With these findings, we shed more light onto the volatile nature and behavior of diversity in these complex, multi-dimensional experimental settings. The question of degrees and constellations of stakeholder groups, which, so far, has not been considered as a major explanatory variable for differences in group performance, might gain in importance in future lab designs.

Moreover, reported challenges associated with power relations and imbalances that can hamper the working climate and group dynamics, and certainly affect group performance, indicate that these have to be properly managed to fully exploit the benefits of diversity. These insights can contribute to improve the understanding of ‘the construction of emerging social phenomena itself’ (2020: 12). Social labs can benefit from the insights gained in earlier diversity research and the present paper, both from a practical and methodological point of view. These learnings can support future social lab design and stimulate a more conscious, deliberate selection of social lab participants – although we acknowledge the nature of social labs as open communities of practice. It might be worth coordinating and managing social labs’ participant base and engage in a process of ‘strategic diversification’, or, at least, adjustment. This could serve to recruit the right amount and set of stakeholders who are best suited for the respective challenge and context, and increase the likelihood of social and responsible innovation. The trade-off between the different and somehow complementary advantages and disadvantages of homogeneous and heterogeneous groups poses a dilemma: What is more important in experimental settings that involve diverse groups? Consensus, quick solutions and a smooth process, or the risk of divergent voices, frictions and conflict and perhaps no solutions at all, but the greater chance of generating more original, innovative and impactful solutions? The latter might be much in alignment with the nature and core design of social labs, which understand friction as indicating a ‘clash’ among a variety of perspectives and approaches. Finding solutions to complex social challenges is in itself a highly challenging task that requires creativity and out-of-the-box thinking, and hence, critical voices and perspectives – all this in a demanding but still inspiring ambiance where ideas can thrive (Blok 2019). Therefore, this might also be a question of quality over quantity in pilot action development and it might be more important to assess outcomes based on their fitness for purpose.

9.5.1 Limitations and Future Outlook

This study represents the first attempt to shed light onto RRI practice, social lab processes and outcomes through the lens of diversity thinking, adapted to the specificities of NewHoRRIZon’s social lab design. Although the explorative approach taken opened up space for new perspectives, we are fully aware of its limitations.

Firstly, the selection of this specific set of diversity categories was guided by the availability of data in our main source of participant information, i.e. the internal post-workshop reports. The comparability of the data and the representativeness of our results are limited for various reasons. The data basis was a challenge, as the

available information relevant for our analyses varied within and across social labs. We created a dataset using data from documents that varied in their comprehensiveness, which is why the analyses might be inaccurate to some extent.

We are aware of the mismatch in levels of data collection and resulting inaccuracies. The participant base varied in diversity across the social labs, workshops and pilot actions and was not stable over time. Since we wanted to examine data on the social lab level, but only had participant information on the workshop level, we decided to aggregate these to the social level, taking into account that the NewHoRRizon project distinguishes between social lab members, workshop participants and pilot action groups. Thus, direct linkages and attributions of outcomes to closed/specific groups are hardly possible. However, this speaks to the nature of the social labs as communities of practice and open spaces for joint learning.

Given the very different constellations of variables and factors in every single lab, e.g. program line, topic, sector, ‘ideology’ and other factors, interactions, processes and outcomes are always specific to one single lab and hence limited in their comparability. Given the variation and heterogeneity of outputs generated in the project, the comparability of social lab success or the innovativeness of pilot actions is also limited.

Our analysis and results represent only a snapshot of the status quo and state of progress at a specific point of time. Given that the social lab activities and pilot actions are still ongoing, different dynamics and results might have emerged since our investigation, which are not considered in this paper.

We also recognize the importance of contextual factors in moderating the relationship between diversity and outcomes and therefore consider the social lab topic and size in terms of the number of participants, while acknowledging the complex, unique and non-replicable interactive dynamics in every single social lab. Given that different standards or norms prevail in each sector, domain or discipline, the very same construct or observation might be perceived differently depending on the respective context and perspective. What is ‘normal’ and common practice in one sector might be viewed as a deviation (even a disturbance or a disruption) in another context. The added complexity resulting from the social labs’ contextual embedding might further intensify our problem of limited comparability, since we cannot account for context dynamics or extraneous variables.

We did not aim to evaluate social labs based on their participant base or processes, and especially not based on their outcomes, as we are very aware of the difficulty of operationalizing ‘social lab or pilot action success’ or comparing performance across a highly heterogeneous set of outcomes and results.

Despite all the limitations discussed above, our approach of combining diversity literature with social lab practice reveals interesting findings and makes a valuable contribution to further research. Our attempt to link diversity with experimental lab settings provides signposts for future research. A more nuanced but also holistic view of lab dynamics offers more explanatory power than focusing solely on the examined diversity dimensions. Future research could assess the degree of ‘innovativeness, originality or novelty’ of outputs of social lab processes such as the pilot actions, and investigate how these are related to the diversity dynamics in a specific

lab or pilot action group. In our paper, the importance of the specific context in which the labs operate was not sufficiently addressed, but it can be assumed that context definitely matters in shaping group composition and dynamics within the labs. Finally, it might be worthwhile to investigate other dimensions and functions of diversity, for example diversity of expertise.

A future study that combines qualitative and quantitative aspects could benefit from the perspectives of a larger sample size, measured in terms of social labs as cases and a higher number of social lab managers. With their deep involvement in the social lab scene and expertise, the social lab managers could enrich future analyses with their detailed, implicit knowledge and profound understanding of the underlying mechanisms at work in social labs.

Such studies could build on and extend the approach taken in this chapter to contribute to the diversity and social lab literature and generate new insights for the RRI and wider scientific community. Future studies could dig deeper into the factors that are decisive for social lab performance, and shed light on the conditions under which we can establish and nurture social labs that are suited to tackle pressing societal challenges and create value for research and society.

9.6 Conclusion

The aim of this paper was to explore the interactive dynamics of social lab diversity and its effect on social lab processes and outcomes. Exploring social lab dynamics as an inherently experimental and therefore dynamic, volatile and multidimensional setting, we aimed to identify patterns and relationships between diversity and outcomes that would allow us to draw inferences about their explanatory power.

Our analysis was guided by the question of proportions and degrees of diversity or heterogeneity as a potential explanatory factor for social lab outcomes, especially with regard to the innovativeness of pilot actions as concrete outputs of social lab processes.

Building on the premises of social network theory and critical mass theory, we assumed that homogeneous groups (= strong ties) can achieve solutions easier and quicker, but generate less original outputs. In contrast, we assumed that more heterogeneous groups (= weak ties) experience more frictions and conflict but are more likely to generate original, novel and innovative outcomes.

Our analysis of quantitative information about the characteristics of social lab participants and outcomes, and qualitative information about group dynamics shows that the degree of diversity affects the type of output produced in social labs with regard to its innovativeness, originality or novelty. Supporting our main assumption, we found that groups with higher levels of gender, stakeholder and country diversity who cooperate under more 'challenging' conditions characterized by more friction, divergence but also creativity, were more likely to produce tangible and practical results. Less diverse groups primarily achieved results in terms of awareness-raising.

Our study provides new insights into the influence of diversity on creative dynamics and innovative behavior in social labs established to promote RRI. Further, it provides learning on how to redesign social labs and optimize the social lab experience /practice to bring about more innovative outcomes and social change through RRI and diversity. Diversity requires conscious and sensitive management to create the right conditions for innovation to thrive. If managed properly, we can exploit the potential of diversity in perspectives, knowledge and experiences to promote more responsible and social innovation in challenging and inspiring working contexts.

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Chapter 10

Engaging Stakeholders by Implementing RRI in the Social Lab Process – A Single Case Study



Elisabeth Frankus and Helmut Hönigsmayer

10.1 Introduction

With new and emerging technologies, process of Research and Innovation (R & I) changed. Some point out an “increasingly growing complexity” (Gianni 2020: 14) that needs to be addressed. Other scholars note that “the pace of technological change has increased dramatically” (Gould 2012: 2) This complexity requires new modes of engaging stakeholders to the R & I process. As mentioned in Chap. 1 of this book, the concept of Responsible Research and Innovation (RRI) (von Schomberg 2013) was created as a way to better engage stakeholders and their needs.

Six years later, Timmermans et al. (2020: 2) claim that “RRI suffers from a lack of empirical evidence to support its claims”, which in the end might create a barrier to the acceptance of RRI by R & I practitioners. In parallel, EC funded projects such as Monitoring the Evolution and Benefits of Responsible Research and Innovation (MoRRI) develop indicators based on the six keys defined by the EC. Here, four categories of benefits regarding the application of RRI were defined, those include societal, democratic, economic as well as scientific benefits (Meijer and van de Klippe 2020). Especially the category of democratic benefits seems appropriate to address the question of stakeholder engagement, as it highlights the benefits of a “more democratic and inclusive way” of R & I (ibid.).

Based on these findings we are asking the question if the application of the Social Lab methodology, an action research approach (see Hassan 2014; Timmermans et al. 2020), proves to be an appropriate approach to solve the challenge of including a wide array of stakeholders and their needs in an increasingly complex R & I process. To answer the research question, this chapter gives first an outline what is recently discussed as Social Lab and describes the single case study as method,

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before the single case study of the EURATOM ¹ research pillar in Horizon2020 is presented, in which relevant stakeholders in the field of nuclear energy and EURATOM were invited to participate in a series of three workshop with the aim of implementing RRI and fostering institutional change towards a more inclusive process of stakeholder engagement. Finally, this paper analyses and discusses the procedure, challenges and lessons learnt of this case study in the context of the four characteristics in responsible innovation according to Blok et al. (2015): (1) Transparency, (2) Interaction, (3) Responsiveness and (4) Co-responsibility.

10.2 From Theory to Practise: Challenges of Implementing RRI via Social Labs

The concept of Responsible Research and Innovation (RRI) as defined by von Schomberg (2013) stresses the importance to engage stakeholders and their needs in R & I processes. A Social Lab, as understood by Timmermans et al. (2020) provides the space for inclusion of a variety of stakeholders. Based on the method of Zaid Hassan (2014) the Horizon 2020 project NewHoRRIZon (under which umbrella the here discussed Social Lab in the research area of EURATOM was conducted) developed its very own scientific method of conducting Social Labs (Timmermans et al. 2020; Griessler et al. 2021). While Hassan defines Social Labs as an effective, flexible response to dynamic and complex societal challenges in which different stakeholders develop and test solutions in the real world (Hassan 2014), Social Labs within the NewHoRRIZon project followed the approach of Timmermans et al. (2020). This way of conducting a Social Lab includes six features: (1) “Social Labs offer a space for experimentation”, (2) “Social Labs are not closed off from the outside world”, (3) “[t]hey require active participation of a wide range of societal stakeholders that are of relevance [...]”, (4) “Social Labs are multi- and interdisciplinary involving a wide range of expertise and backgrounds”, (5) they “support solutions and prototypes on a systematic level” and finally (6) “Social labs have an iterative, agile approach” (Timmermans et al. 2020: 5f).

The Social Lab methodology used in the NewHoRRIZon project (see Timmermans et al. 2020) itself genuinely aims at bringing together stakeholders in order to tackle a mutually defined (societal) problem or challenge. It provides a secure environment, where mutual trust can be developed. In this approach experimental learning hence, developing, testing, evaluating and re-designing of interventions addressing a social challenge (Kolb 1984 in Timmermans et al. 2020; Griessler et al. 2021) can take place, but works only if all stakeholders of the “real world” relevant to that challenge are involved in the process. If we assume that Social Labs are a place of dialogue, that in turn is necessary to make “information sharing” as well as “two-way interaction” possible (Blok et al. 2015: 149), the selection process of

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

stakeholders is crucial. As for stakeholder engagement, Blok et al. (2015) developed four characteristics in responsible innovation. These include (1) Transparency, (2) Interaction, (3) Responsiveness and (4) Co-responsibility. All of these tackle different aspects of stakeholder engagement in responsible innovation (SEIRI). Transparency affects the sharing of information among different stakeholders. As Blok et al. (2015: 151) points out that, “innovation is primarily seen as a source of competitive advantage, which is mainly based on information asymmetries”. This way, stakeholders who are transparent to each other may become vulnerable and risk to lose their (potential) competitive advantage that was existing because of information asymmetries. In order to tackle these disadvantages of knowledge sharing and transparency, Blok et al. (ibid.) name several options, ranging from intellectual property management, to confidentiality agreements, as well as pointing out first-mover advantages or building trust among the stakeholders itself.

The interaction between stakeholders poses different challenges. While Blok et al. (ibid.) refer to “diverging visions, goals, motives and values of multiple stakeholders”, Burchell and Cook (2006: 156) provide the example of the NGO community, where “the diversity and range of organisations covered by this term” can prove to be problematic when aiming for an effective sampling of this group. Another critical aspect of “interaction” in stakeholder engagement is power imbalances. Blok et al. (2015:152) refer to them as “an important reason for conflicts among stakeholders” as well as pointing out that “some actors are even unwilling to interact when they have the feeling that they have less or no power compared with other actors involved”. To solve this, Blok et al. (ibid.) suggest that “stakeholders could interact by engaging in stakeholder dialogue”. As similar approach was already suggested by Burchell and Cook (2006: 155), stating that “by engaging in dialogue, stakeholders learn from each other the different ways that a shared messy problem can be defined”.

The issue of responsiveness poses a similar challenge. Extending the imbalances in power among stakeholders to “vision-, goal-, sector- and motive differences”, Blok et al. (ibid.) argue that these might “result in ongoing debates and conflicts about the purpose of the innovation”, potentially “lead[ing] to the exclusion of radically different stakeholders (Blok et al. 2015: 152). To solve this, efforts should be taken to “align stakeholders’ expectations, experiences with stakeholders during previous collaborations, the identity of actors and the acceptance of conflict” (ibid.).

Although not present in the empirical findings of Blok et al. (2015), co-responsibility seems to be a relevant factor for the Social Lab methodology as stakeholders are not only asked to define a common societal challenge, but also to tackle it by creating and executing pilot actions resulting in institutional change by the uptake of RRI. Blok et al. define the problem here, that some stakeholders (like NGOs) will less likely take responsibility for innovations with uncertain outcomes, because for example, NGOs can be blamed for co-operating with “the enemy”, which “may result in a legitimacy loss” (ibid.). As Blok et al. (2015) note that no management practices are available in the literature, the practical solution to this challenge was searched for in the process of the Social Lab itself.

Based on the mentioned characteristics of responsible innovation, stakeholder engagement, and the methodology of Social Labs we defined our research question: *How can we engage stakeholders in the R & I process by implementing RRI within the framework of the Social Lab Methodology?*

10.3 Methodology

The case study approach is applied to explore how the Social Lab methodology can help to implement the concept of RRI in the EURATOM research area. As an approach it can answer “how” and “why” questions and has been a common research strategy in psychology, sociology, political science and other research fields (Baxter and Jack 2008). This approach is based on a constructivist paradigm which follows the idea that truth is relative and depends on one’s perspective. The case study is designed in close cooperation between the researcher and the participant, with participants being encouraged to share their stories. This allows the participants to describe their view of reality while the researcher gains a better understanding of the participant’s action (Crabtree and Miller 1999). At the end, a case study is a construction of realities (Searle et al. 1995). With the help of the case study approach to complex social phenomena, or social constructions and their processes of development, can be described and understood. The method, with the capability of supporting empirical generalization and a potential to generate knowledge which improves collective problem solving (Barzelay 1993), allows understanding real-life events such as the life cycle of the EURATOM Social Lab through its descriptive nature (Yin 2003; Baxter and Jack 2008).

For implementing a case study, many different sources of evidence and the convergence of all analysis are important and at the same time a major strength of case studies is that they allow the researcher to explore and understand social phenomena through different lenses (Baxter and Jack 2008). As there was no basis for comparison for this specific case, there are also no propositions (cf. Yin 2003) that could be used, but rather ‘issues’ are considered. Stake (1995: 17) defines issues as something that is “wired to political, social, historical, and especially personal contexts,” and stresses the importance of issues for case studies. Relevant issues for the EURATOM Social Lab case will be described in the following sections. Similarly, to the necessity of issues, the conceptual framework plays an important role in analysing a single-case study, as it serves as an anchor, while defining what will and what will not be included in the study. Furthermore, it allows for the description of possible relationships based on experience (Miles and Huberman 1994).

Analysing single case studies can be done using different strategies. The strategy described in this chapter has followed the rules of compiling chronological events (three workshops) as a special form of time-series analysis as described by Yin (2003). As labelled by Yin (ibid.), “some events must always occur before other events, but the reserve sequence should be impossible”. Furthermore, these events have been followed by other events. Yin (ibid: 126) also points out that, “some

events can only follow other events after a pre-specified interval of time”, while, “certain time periods in a case study may be marked by classes of events that differ substantially from those of other time periods”.

Dissecting aspects of a historical episode aims at developing a historical explanation that is generalizable – if possible, to other events. Of interest is *whether* and *how* a variable mattered to the outcome, rather than *how much* it mattered. This needs the awareness that cases can be interpreted and understood in different ways (George and Bennett 2005).

Findings of the single case study can impact theory development and theory testing (Bannett and Elman 2006). The analysis of the EURATOM Social Lab case aims at reflecting how the Social Lab approach can be used as an appropriate way to integrate RRI in the EURATOM research field and by doing so, ensure that relevant stakeholders are included to the R & I process (Bennett and Elman 2006).

EURATOM Social Lab Process

The Social Lab process started with a diagnosis phase in which the Social Lab team did make themselves familiar with the research field, especially from the RRI perspective: the EURATOM working programmes from 2014 to 2020 were analysed and assessed towards existing traces of RRI.

The findings of the diagnosis were discussed in the first workshop. Participants present were rather unfamiliar with the concept of RRI. Here, it was not only a challenge for the social scientists to explain the concept of RRI, but also to translate it into a language that is easily accessible to natural scientists (who are mainly working on the nuclear energy research field) so that they could get an idea of what it means for their work. It was therefore necessary to critically question to what extent the language of the social science researcher who went through the documents and who conducted the interviewees was compatible with the language of the experts from the EURATOM area, and if it is possible to create a mutual deeper understanding in regards to RRI.

This was deepened by interviews with identified stakeholders, which also marked the start of the recruitment for the first Social Lab workshop. The design of this workshop was informed by the findings of the RRI diagnosis. Based on this findings, three Social Lab workshops were implemented – in between enough time for caring out and evaluating the pilot actions developed in the workshops. All together the EURATOM Social Lab lasted 23 months, starting in January 2018 and ending in November 2019.

The EURATOM Social Lab team consisted, similar as described by Timmermans et al. (2020: 9) of the Social Lab managers and the Social Lab facilitator. Content-wise, the process was managed by the Social Lab managers, and facilitated by the Social Lab facilitator. The task of the two Social Lab managers was to recruit the stakeholders, to organise the workshops and to support the stakeholders through the process of creating and further developing their tailor-made Pilot actions. The Social Lab facilitator moderated the three workshops, guided the participants in a definition process of the societal challenge relevant to the EURATOM field and fuel the process of creating and reflecting on the Pilot actions. This way, the Social Lab team

tried to create an environment where by “involving social actors and addressing social challenges by doing social innovation” the social dimension of R & I was included (Timmermans et al. 2020: 5). Accordingly, the Social Lab team came up with three objectives: (a) the design and implementation of social experiments (Pilot actions) to overcome the defined barriers of the societal challenge and to implement RRI into the involved institutions in order to create institutional change with the help of the Social Lab participants as “change agent”; (b) the reflection on the outcomes of the experiments during and after the three sequential participatory workshops; (c) the resulting summary of lessons learned for further steps aimed at embedding RRI into R & I policies and funding programs.

The Three Social Lab Workshops

The three Social Lab workshops were attended by an average of seven people, the first one took place on 18–19 May 2018 in Brussels. Participants included various stakeholders from research, universities, European Commission and an NGO representative. The Social Lab team provided a short introduction on the Social Lab process itself, the NewHoRRizon project and the concept of RRI. As RRI was assessed to be a rather unfamiliar concept within EURATOM in the diagnosis, the Social Lab team put emphasis to translate RRI into the language of natural scientists doing research in the nuclear energy sector in order to make participants imagine what RRI could mean for their daily work. The Social Lab team defined the aims of the first workshop as threefold: (1) to make participants reflect on their notion of responsibility in research, (2) to define one common societal challenge of EURATOM and (3) to reflect on possible ways to overcome this challenge. By using visioning methods, participants were encouraged to think outside of their normal research box. Participants were further asked to define barriers to tackling the societal challenge which they defined as increasing awareness of the society regarding the evolution of energy. Here, RRI was used as a tool through which stakeholders learned the deeper sense of RRI by answering questions posed about the single keys in connection to the societal challenge. By these means, ideas evolved and Pilot actions were developed managing obstacles and barriers for implementing RRI in EURATOM. Discussions on the implementation plan for these Pilot actions during the first event made obvious, that implementing RRI in the EURATOM research field seems to require either extra resources, as RRI is not foreseen in usual EURATOM (business) practices, or a high intrinsic motivation of people who believe in the added value of RRI for research and innovation.

The following workshop took place in Vienna on 29–30 January 2019. Here, special efforts were made to replace the NGO drop out which took place after the first event, but unfortunately it was not possible to recruit a new representative. Much of the second workshop was dedicated to working on the Pilot actions. The question of resources for implementing the Pilot actions was again raised and the question on how to tackle the shortage of resources to achieve institutional change intensely debated. In the participants understanding, limited resources reflect the potential size and impact of a pilot action. Consequently, the Pilot actions were adopted accordingly. Similar to the question of limited resources, the role of the

participants as change agents was discussed. The participants voiced their concerns that their power of influence within their organization was too little to change traditional intellectual approaches, which in turn would need to disrupt existing practices. To tackle this, the Social Lab team actively encouraged the participants to take on this role by emphasising that it would need people in different organisations who canvass the concept of RRI and the positive consequences of its practical application to achieve this goal. This action showed some effect in lowering the critical attitude towards the participants agency for the moment. As a result of this discussion, participants suggested that one way to ensure a broader implementation of RRI in EURATOM was to design H2020 project calls for EURATOM with the scope of implementing RRI. Proceeding this way seemed feasible to participants in order to make an RRI related change, because sufficient financial support would be available.

In the third Social Lab workshop, which took place in Warsaw between 19th and 20th November 2019, altogether six people participated. While five already attended previous Social Lab workshops, one new person took part. In general, this event aimed for in depth reflection on all the Pilot actions that were implemented in the course of the Social Lab with regards to a long-term implementation of RRI. In order to draft first policy recommendations, participants were invited to recap the societal challenge defined in the beginning of the Social Lab process, as well as the barriers and obstacles to tackling it. Out of this, and based on the lessons learnt in the EURATOM Social Lab workshops, two policy recommendations were developed by the participants for the nuclear energy research field. First, transdisciplinary projects, experimental labs and schools were referred to as not only a way to make Nuclear Sciences more tangible, but also provide active learning environments. Second, regarding gender issues, participants stated that the number of women in the nuclear research field must be increased and a gender-neutral language in natural science needs to be developed and generally used. This would attract more female talent to the Nuclear Sciences, according to the participant's vision.

Pilot Actions

As a way to implement RRI while engaging stakeholders as change agents, a total of three Pilot actions was completed in the whole Social Lab process. In the following they will be described in further detail to provide an impression of their scale and impact in terms of institutional change potential.

The Pilot action “Teach the Teacher” was created during workshop 1 and focused on enhancing the teaching of physics in secondary schools and universities by including the RRI keys of Science education and research ethics. Additionally, from a mid-term perspective, public awareness of the defined societal challenges should be integrated into the curriculum of teaching physics. This pilot was focusing on Poland for the proof of concept, still it was designed in a way that it can be taken up in any other country. In order to further implement the pilot, the idea was to create a ‘student call’ before it would be brought up to the EURATOM committees and lobbies, and the national representatives should be approached about including this into future EURATOM calls. The practical phase of the pilot started on January 10th

and 11th 2019 by having a joint workshop together with high school teachers from all around Poland and introduce them to cutting edge technology used in Nuclear Research (such as the “CosmicWatch”). While doing the pilot hosts put emphasis on Science Education and Research Ethics by integrating these keys to the programme of the workshop and connecting it with the new teaching techniques presented.

“Nuclear Dating” aimed at bringing PhD students from nuclear sciences together with social scientists in a speed dating format. The pilot aimed to create a transdisciplinary environment for participants to foster mutual exchange on their research interests. The first event, which took place on 19th and 20th September 2019 in Brussels, in total, eight early career researchers from the field of Nuclear and Social Sciences joined a workshop. After an initial round presenting their research, participants were asked to participate in speed dating in order to try and elaborate on the possibility of a joint research project. While the presentation should provide all participants an overview on the expertise present, the speed dating format was used to overcome a step the silo thinking. In the one and a half day of the event, the participants were given input on the concept of RRI and how to practically apply it. As the participants’ feedback was positive, the pilot sponsors concluded to hold the Nuclear Dating event on an annual basis.

Some participants came up with the idea of actively tackling the shortage of resources discussed in the second workshop by joining a proposal for a H2020 EURATOM call, in which RRI should be implemented. The project proposal was submitted to the European Commission by September 25th, 2019. It also included the concepts of the ‘Teach the teacher’ and ‘Nuclear Dating’ pilots and aimed to generate more interest amongst potential students in the field of nuclear energy by including RRI aspects – in particular the keys of Public Engagement and Science Education. At the end, the proposal included the importance of RRI in the education of young researchers, pointing out that “stakeholder involvement and Science Education are essential cornerstones”, and “using RRI and its emphasis on gender equality is an appropriate way to ensure that more female professionals will enter the field of nuclear”, as well as “guiding young researchers towards Open Access and applying Research Ethics will be beneficial” (H2020 proposal Nr. 945154). The interdisciplinary consortium consists of 23 partner organisations, of which three were already represented in the EURATOM Social Lab workshops. In February 2020, although the proposal exceeded the threshold, the EC decided to not fund the project.

10.4 Analysis and Reflection of EURATOM Social Lab Process

Following the first description of the Use Case of the EURATOM Social Lab, this chapter provides a deeper analysis and reflection of it based on the theoretical framework provided by Blok et al. (2015), reflects on the methodology itself and compares the experience of the EURATOM Social Lab to the findings of

Timmermans et al. (2020). Taking this into account, we elaborate on the question if the Social Lab is a suitable approach to implement RRI by engaging stakeholder in a research field like EURATOM. Therefore, a summarized analysis of the process alongside the categories of transparency, interaction, responsiveness, co-responsibility defined by Blok et al. (2015). The analysis and reflection on the EURATOM Social Lab of the NewHoRRizon project allowed for the summary of the following results:

Transparency

The matter of transparency is the starting point of our analysis. In terms of stakeholder engagement, it is defined as “concern[ing] the opening up of the innovation process by sharing knowledge and information among multiple stakeholders” (Blok et al. 2015: 151). In the here presented Social Lab, stakeholders were generally open towards each other in the sense of sharing insights and ideas. This openness increased over the course of the three Social Lab workshops, as the stakeholders present became more homogenous. It is likely that this atmosphere has been created by the fact that participants of the Social Lab workshop came from a similar background and/or partly knew each other from previous encounters.

Two other factors might have also promoted this atmosphere of mutual trust which according to Timmermans et al. (2020) is crucial for the process. The withdrawal of the NGO representative after the first event and the fact that no industry partner has been present in the Social Lab has likely promoted the process of transparency and trust building among participants because no opposing voices regarding the promotion of Nuclear research interrupted fluent discussions. At the same time hardly, any counterarguments were reflected upon. This composition of participants stays in contrast to a feature of a Social Lab understood by Timmerman et al. (2020: 6) who says a Social Lab is “multi- and interdisciplinary involving a wide range of expertise and backgrounds” including the civic society. Being transparent is much easier if all persons involved in a discussion have a similar opinion.

Although for the Pilot action “EURATOM proposal” the scope of stakeholders became wider than in the Social Lab itself with 23 organisations involved, including industry partners, no confidential knowledge was shared which might “lead to a loss of competitive advantage” (Blok et al. 2015: 151), but the focus was to work on new and innovative teaching methods.

Interaction

The aspect of interaction is defined as “[the] dialogue among multiple stakeholders about the purposes of innovation processes [...] that can be stimulated by transparency among stakeholders” (Blok et al. 2015: 151). As this transparency was given amongst the participants (despite the mentioned limitations), we can relate the experiences from the case study to another aspect of Blok et al. definition, “as [the] interaction with multiple stakeholders enable[ed] actors to develop such a shared objective and purpose of innovation processes” (Blok et al. 2015: 149). In the EURATOM Social Lab, achieving consensus among stakeholders in defining a societal challenge was not an easy process in the first workshop due to the participant composition and different perspectives. At the end participants agreed to the

challenge of “increasing awareness of the society regarding the evolution of energy”, which was also the basis for the Pilot actions aiming to overcome this challenge. As the objective was rather broadly defined, participants had to some extent different perceptions of the challenge which became more apparent over time. Retrospectively, it would have been beneficial to dedicate more time in each workshop to this topic in order to have the objective more present in the minds of the participants throughout the Social Lab process. This would have promoted what Timmermans et al. call the “iterative, agile approach” and “closely inspecting the process” (ibid.: 6). In hindsight, a possible effect of paying not enough attention to the ongoing discussion on the societal challenge could be the rather short-term goals as well as the low scale of the pilot activities, which did not necessarily aim at overcoming the societal challenge, but rather at applying one or more RRI keys somehow connected with the challenge.

Another observed aspect connected to the interaction among the participants was the power imbalance within the group of participants. It emerged for example in workshop one, manifesting in the drop-out of the NGO representative who felt little power to achieve institutional change in the setting of the Social Lab, when being surrounded with nine other participants opposing her actions. Apparently, this person did not feel to have any power to exert influence, which according to Timmermans et al. (2020: 7) is necessary for initiating a systemic change to which all participants agree. While there was a variety of stakeholders present in the first workshop, this variety decreased in workshop 2 and 3. The drop-out of the NGO representative in the aftermath of workshop 1 could not be compensated, as potential other NGO representatives who were contacted to replace the drop-out were reluctant to join the Social Lab, stressing similar motives as the NGO participant stated for resignation. But power imbalance was not only present in terms of representing stakeholders and their (apparent) magnitude of influence in the field of nuclear energy, but also in terms of gender: comparing the talking time of women and men in the three Social Lab workshops it is evident that men took more space for themselves compared to participating women, also because less women than men were participating. This might mirror to some extent the general male overrepresentation in the field of EURATOM which makes it difficult for female researcher to gain attention as gender in this research area itself was analysed in the diagnoses as absent or existed only to a little extent (Rogg Korsvik and Rustad 2018).

Responsiveness

For Blok et al. “[s]takeholder engagement does not end with sharing information and interaction, but should result in action and behaviour, i.e. an institutionalized responsiveness of the company toward society concerning the direction and trajectory of the innovation process”. Within the EURATOM Social Lab the first step towards responsiveness was the guided planning and implementation of in total three Pilot actions. In the beginning all participants were involved in the development of these activities, but when it came to the question of responsibility including provision of resources, only single institutions took over the tasks between the workshops. These Social Lab participants probably saw the biggest chance for a

first step toward an institutional change with the help of the Pilot actions. Although, two out of three Pilot actions will be again implemented in the future (Teach the Teacher and Nuclear Dating participants did not see themselves as potential change agents because they described their impact and influence in their organisation as tiny). The Social Lab team encouraged attendees to reflect on how to achieve impact, even with limited resources. This discussion on potential for change emerged several times in the Social Lab process and, therefore, was given particular attention even beyond the lifetime of the Social Lab. Pilot actions can be one step forward toward institutional change, but they might not be enough, often it needs more effort from single persons (change agents) in further consequence to “accelerate and/or improve the social innovation-processes that are already taking place” (Timmermans et al. 2020:8) during and beyond the social experiment (Pilot action). Although the pilot activities were reflected before and after their implementation, it is questionable if the EURATOM Social Lab team explained the pilot owner well enough how the learning circle as described by Kolb and Kolb (2009; Timmermans et al. 2020), namely learning from the experiences made and developing new actions from what they learned, would work, because further developments based on the experiences made were not transparent at least during the Social Lab lifetime they were not noticeable. Also, insufficient continuous support by the Social Lab team as well as time might have played an important role for not achieving this aim. Instead, the pilot actions were all once implemented but not moved further.

In contrast, when it comes to the responsiveness towards the public the nuclear world also needs to learn how to listen to the public’s need and offer more possibilities of engagement. Still, the fear of being misunderstood was pointed out as a crucial point, as participants worried about a negative image of nuclear energy in media. Therefore, actions were rather directed towards improving the public perception and image of Nuclear Science by using public engagement.

Co-responsibility

As experienced in the EURATOM Social Lab, the assumption of responsibility for a pilot action by a sponsor is crucial for its success. Some kind of frustration emerged when it came to distributing responsibilities. The challenge was, as already mentioned, to identify several sponsors who would commit to introducing and testing a pilot action and activity within their organisation, but the selection of these pilot action responsible persons proved to be difficult. Participants argued that this would mean extra, probably unpaid, work in addition to their daily business. As Blok et al. (2015) states, stakeholders, “in their mutual responsiveness to each other”, become” co-responsible for this innovation trajectory” (ibid: 151). In the EURATOM Social Lab willingness for co-responsibility seemed to depend on resources and potential (long term) outcome for the participants. For the proposal pilot it can be assumed that the long-term benefits here seemed to be greater, and accordingly the willingness to invest time and resources was therefore larger. If the project would have been successfully implemented (unfortunately its funding was rejected), there would have also been the chance of RRI reaching even more institutions over a longer period.

Taking over co-responsibility regarding Pilot actions might also be connected with organisational areas of interests: the less the pilot contributes to them, the lower the motivation can be assumed for taking over (co-)responsibility. As the EURATOM Pilot actions addressed more specific needs of single organisations, the benefit for other institution was rather low. Also, the location (country), where the Pilot action was implemented might have an impact on the willingness for co-responsibility.

In the end, the “capital (of participants) in order to change social systems” (Timmermans et al. 2020: 7) has an influence on how deep engagement and co-responsibility takes place. For the EURATOM Social Lab it is therefore questionable, if the involved stakeholders had an agency for changes in their organisations.

The issue of financial resources was also addressed by contacted NGO stakeholders in recruitment attempts prior to workshop 2 and 3. In addition to that, the perspective of being put together with mostly pro-nuclear actors in the Social Lab workshop might have deterred some from participating.

For all four aspects, transparency, interaction, responsiveness and co-responsibility, not only the composition of participants has an impact, but also the total duration of the Social Lab, including the time between the workshops. As this in between time involves the danger that participants lose momentum, the EURATOM Social Lab team scheduled frequently meetings for the participants. Still, not working intensively together can have an effect on the cooperation.

10.5 Conclusion and Outlook

After presenting the case study the research question needs to be answered two-folded. First, the Social Lab methodology has proven to be valuable in getting different stakeholders together to co-create solutions for their defined societal challenges in EURATOM. Nevertheless, it remains uncertain whether the Social Lab approach is sufficient for the gradual and long-term integration of RRI into a specific research area. Besides the personal motivation and interest of the Social Lab participants, their role in their organisation is crucial not only when it comes to testing Pilot actions, but especially for the long-term institutional change connected to RRI (becoming a “RRI change agent”). Furthermore, the organisational structure – such as hierarchical compositions – as well as the mission statement can have an influence how easy or difficult it is to implement RRI.

The creation of tailor-made Pilot actions led to implementation of RRI in parts of EURATOM while engaging a variety of stakeholders. Nevertheless, the case study also showed some limitations and challenges to the concept. The fact that transparency in the sense of Blok et al. (2015) was only given once the composition of the Social Lab got more homogenous after workshop 1. Here a wider range of stakeholders, also willing to interact with each other, would have been beneficial to trigger change to the R & I in EURATOM. As the dynamic and “success” of a Social Lab highly depend on its participants, more time and effort would have been

necessary for the recruiting process, which turned out to be more difficult than expected in the EURATOM case.

In addition, the question of resources was a hinderance to the scale of the pilot actions in the EURATOM Social Lab. In the specific context of EURATOM, were RRI was widely unknown (one out of ten participants in workshop 1), dedicating work to it was commonly perceived as an additional effort requiring resources to be achieved, rather than a necessity to trigger change.

The engagement of a wide range of stakeholders as outlined by Blok et al. (2015) proved to be challenging in the case of EURATOM. This aspect, as well as the power balance between the participants, which is connected to what Blok et al. (2015) call the factor of interaction, must be sufficiently being acknowledged and integrated into the setup of the Social Lab, something that the EURATOM Social Lab was only partly successful in. In particular it was hard to recruit participants from NGOs or civil society. Here the barrier for participation seems to be lower for those who are holding a permanent position (such as Professors or Civil Servants) than for those working in fields where (financial) resources are scarce.

Another conclusion based on the experiments of the EURATOM Social Lab is the importance of well explaining the general sense of the Pilot actions and their necessary learning loops in order to achieve behaviour changes. This means to make clear, that such an activity should not only be well prepared but also well reflected during and after implementation and then further developed.

Although there is research needed with regard to long-term effects of the EURATOM Social Lab and implemented Pilot actions, we assume that the Social Lab approach can help to integrate RRI in a specific research field, the way how the Pilot actions are implemented and the added value of RRI is experienced, depends on the mentioned influencing factors. Concluding, the case study of EURATOM shows the potential of applying the Social Lab methodology to (a) engage different stakeholders and (b) foster the implementation of RRI despite the limitations previously outlined. Scholars aiming to use action research to initiate institutional change are strongly encouraged to use the method according to Timmermans et al. (2020). When doing so, emphasis to the limitations and challenges mentioned must be given and well thought of in advance to ensure the application of the Social Lab methodology will provide the results desired.

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Part III
Governance of Responsible Research &
Innovation

Chapter 11

Implementing Responsible Research and Innovation: From New Public Management to New Public Governance



Anne Loeber, Michael J. Bernstein, and Mika Nieminen

Abstract The European Commission’s pursuit of “Responsible Research and Innovation” (RRI) and its implementation in the European Research Area serve to investigate how ambitious policy goals can be conveyed into action. Challenging about implementing policy is the need to foster coherence in the interpretation of policy goals while coordinating their elaboration in practice. This chapter identifies the European Commission’s approach to implementing RRI as a case of New Public Management, and contrasts this with efforts at ‘bottom-up’ RRI implementation. Experiments with involving researchers and other stakeholders in designing and executing concrete RRI actions that fit their professional setting are understood as manifestations of a New Public Governance approach to implementing RRI policy. It is found that such deliberation of policy concepts and goals, and their concretization in a context-specific learning-by-doing approach practically enables the uptake of normative policy ambitions in networks of interdependent, non-hierarchically related actors across diverse substantive and administrative contexts.

11.1 Introduction

Well-defined policy objectives are insufficient to guarantee successful policy implementation (Lipsky 1980; cp. Pültzl and Treib 2007: 93). Implementation of policy ambitions remains a tenacious puzzle, in no small part owing to the increasing complexity of a differentiated and decentered polity (Bevir and Rhodes 2008; Bevir 2020). Implementation challenges include ensuring sufficient coherence in the

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interpretation of policy goals, and coordinating the elaboration of goals into concrete policy action among a wide variety of actors. Exacerbating the challenge, policy implementation is highly contingent on the substantive focus of the policy issue in question (Ripley and Franklin 1976) and on the political and administrative systems in which implementation efforts occur (Imperial 2021). The European Union (EU) presents a setting in which policy implementation is notoriously challenging (Bauer 2006; Challies et al. 2017). In part, difficulties with European policy implementation stem from the fact that policy execution takes place among a heterogeneous network of interdependent actors without a formal hierarchical relationship to implementing bodies in Member States. Policy implementation challenges in Europe are further complicated by the proclamation of ambitions in law but with little additional elaboration or guidance in practice.

An example of ambitious policy goals in legal text with limited practical guidance is found in the European pursuit of “Responsible Research and Innovation” (RRI) as a process for “better aligning research and innovation with the values, needs and expectations of society” (EC 2016: 6). The RRI concept was included as a cross-cutting issue in the law establishing the European Commission (EC)’s 8th framework program for funding research and innovation, Horizon 2020 (H2020) (EC 2013). The concept was further elaborated in the 2014 ‘Rome declaration on RRI’ with the intent to stimulate responsibility for better aligning research and innovation with societal values and needs in the European Research Area (ERA). Despite these policy goals, research into the operationalization of RRI across H2020 programming has revealed limited success in policy implementation (Novitzky et al. 2020; cp. Forsberg et al. 2018).

The recently completed NewHoRRIzon project was funded by the EC to review progress towards, and aid the implementation of the RRI policy goal. In our experience, the EC effort to mainstream responsible research and innovation in the ERA presents a prime example of policy implementation challenges in practice. In this chapter, we reflect on NewHoRRIzon results and experiences, asking: How was RRI put into practice in the ERA and what lessons can be drawn about policy implementation in such complex governance settings? Our goal is to contribute to underdeveloped scholarly research on policy implementation in view of complexity (cp. Howlett 2019; Baldwin et al. 2019).

After a brief presentation of the empirical basis for our reflection, we tour the policy implementation literature on two public management reforms, New Public Management and New Public Governance, to provide conceptual background. Next, we situate within this policy implementation context our efforts with RRI as studied and supported by the NewHoRRIzon project. In the project, participants were invited to deliberate RRI policy goals and to design and execute concrete activities (dubbed “pilot actions”) to implement RRI in their context and related research (or research funding) practices. In the final section, we discuss our experiences with implementing RRI among diverse groups of ERA stakeholders. We will consider how the policy goal of RRI, and its attendant normative orientation, exists in tension with the substantive focus (science governance) and administrative setting (the science funding system) of EC Research & Innovation (R&I). We close by

touching on how future research and innovation policy seeking alternative normative orientations, like RRI, might be realized through decentralized efforts among diverse policy targets in diverse implementation settings.

11.2 Methods

Our explorations and reflections on RRI policy implementation draw upon our empirical experiences within the NewHoRRIZon project. The objectives of the project were to, first, assess levels of RRI integration across all lines of H2020 funding (a total of 19 sub-sections of the program were analyzed, see Novitzky et al. 2020). Building upon this analysis, the second objective was to establish H2020 sub-section-specific communities of stakeholders, gathered in so-called “Social Labs”, to advance adoption of RRI in practice. Timmermans et al. (2020) elaborated the methodological adaptation of Social Labs to RRI policy; see Tabarés et al. (2022) for project-wide empirical results.

In this chapter we present a reflective conversation between policy implementation theory and our analysis of Social Lab experiences in the NewHoRRIZon project. The product is an example of what Cicmil et al. (2006: 677; cf. Calori 2002) term, “project actuality research”, in which “scholarly theorizing and practitioners’ narratives” are combined (Loeber and Vermeulen 2016). Since we were involved in designing and running the selected Social Labs, but not in designing and carrying forth the activities (pilot actions) undertaken by Social Lab participants, we characterize our role as “engaged researchers” (Levin and Ravn 2007), rather than action-researchers. Given this kind of involvement, we are able to infuse our reflections as insiders with an outsider perspective (Bonner and Tolhurst 2002).

Among the 19 Social Labs organized by NewHoRRIZon to support RRI implementation (one for each of 19 sub-sections of H2020), our reflection draws upon our experiences with the three Social Labs for which we as authors were responsible. The diverse substantive foci and administrative settings of these three labs – two from the “Societal Challenges” Pillar of H2020, on food and security respectively, and one from the “Excellent Science” Pillar, namely the early career researcher mobility and career development, Marie Skłodowska-Curie Actions (MSCA) – serve as warrant for our choice to put these empirical experiences into conversation with policy implementation theory. As such, these three Labs form the sub-units of analysis in what amounts to an embedded case study (Yin 2003: 42). The three sub-units present “extreme” cases (Flyvbjerg 2011: 307): they convey, in a concentrated form, insights in the range of issues and intricacies that characterized the problematic of RRI implementation. Such an embedded case study approach makes it possible to mitigate potential limitations of case-study methodology. Distinct but contextually connected cases validate and provide a measure of reliability for extending conclusions beyond isolated cases.

In each Social Lab, stakeholders were recruited to three face-to-face workshops (with as much group continuity as possible) to reflect on RRI and to develop and

implement interventions (the aforementioned pilot actions) to tackle specific RRI-related challenges. Social Lab managers had the autonomy to adapt individual Social Lab designs to the particular substantive (e.g., food, security, MSCA) and administrative settings of H2020 programming and Lab participants. Social Labs provided an opportunity for rich discussions on the challenges and opportunities of implementing RRI in varying sub-sections of H2020. Labs were designed to be generally, not strictly, representative of each H2020 program line (i.e., not strictly proportional to any indicative measure of a program line, rather simply seeking stakeholder role, geographic, gender, and sector diversity). As such, our experience reflects working with groups of participants relevant to the policy goal of RRI because of their proximity to the subject matter (Fox and Miller 1996), and comprised of a mix of individuals we could practically reach and individuals who ‘opted-in’ to participate in the specific social context created by the NewHoRRizon project. Given the project’s mission to support bottom-up exploration of, and creative actions to advance RRI through the Labs, however, we see this practical constraint as a strength of the approach.

11.3 Implementation: An Ever-Transitioning Field of Research and Practice

Policy implementation describes the conversion of policy goals into efficacious action aligned with intentions (O’Toole 2000). Edwards (1980: 1) defines this process as “the stage of policymaking between the establishment of a policy - such as the passage of a legislative act, the issuing of an executive order, the handing down of a judicial decision, or the promulgation of a regulatory rule - and the consequences of the policy for the people whom it affects.” The study of such processes connects to wider research efforts into public management, governance, and “policy execution” (Ansell et al. 2017:468).

Empirical studies of public administration in the 1970s and 80s, among them by Pressman and Wildavsky (1984), showed how implementation itself shapes policy (Majone and Wildavsky 1979: 170). These analyses prompted implementation scholars to take implementers’ ‘bottom-up’ perspectives as the point of departure for subsequent study (e.g. Lipsky 1980), often observing departures from policy designers’ ‘top-down’ views (Pülzl and Treib 2007). Over time, studies seeking to make sense of tensions between policy designers and implementers were replaced by conceptualizations of policy-oriented decision-making power being dispersed in polycentric networks of interdependent (semi-)public and private actors (Ansell and Gash 2007).

Regardless of form, the question is how policy goals and practice interrelate (Laws and Forester 2015). How to support coherence in implementation?. Answers to these “how” questions are consistently shaded by the public policy approach *de jour*. Notably, the New Public Management approach (NPM) to public administration has enjoyed a bureaucratic tour-de-force over the past forty years

(Osborne and McLaughlin 2002; Fredriksson and Pallas 2018; Funck and Karlsson 2018).

Gow and Dufour (2000: 578) define NPM as an expression in vogue since the early 1980s to “[d]escribe a new way to study and manage public sector organizations.” NPM represents an analytic perspective on public policy as well as an approach to arranging its practices. Gow and Dufour’s use of the word ‘new’ is somewhat relative – Hood and Peters (2004) wrote in the early 2000s of NPM as being “middle-aged” – yet the characteristics of NPM still dominate many policy fields. While the precise nature of the NPM has been debated, it is generally understood to include the following implementation-related characteristics (Hood 1991; Osborne and McLaughlin 2002; Fredriksson and Pallas 2018):

1. the delivery of public services is organized in terms of private sector methods, allowing for entrepreneurial management, as opposed to the bureaucratic logic of the public administrator operating in line with given rules and hierarchically organized responsibilities. Policy goals and targets are, preferably, formulated in quantitative terms. Public officials are encouraged to skillfully operate as proactive managers who have discretion in implementing these policy goals (Falconer 1997);
2. the efforts of public managers are controlled by output measures, for which explicit standards are set and translate into performance indicators. The emphasis on performance evaluation enables public sector bodies to be held accountable for their activities (Osborne and Gaebler 1993);
3. the emphasis on output controls (Boyne 1999) tallies with the decentralized organization of the public sector (Pollitt et al. 1998). The disaggregated structure of the public sector sets policy design apart from implementation, generating the critical question of how to align action among public sector bodies essentially encouraged to compete with one another over resources (cf. Milward and Provan 2000: 276–277).

In practice, NPM approaches have denuded public bodies to the benefit of commercial and community organizations, contracted to deliver public services previously (Dickinson 2016). The result is typified by Rhodes (1996) as a form of governance “without government,” leaving public policy design and implementation at the hands of networks of heterogeneous actors. Such arrangements not only result in a decrease of the power and influence of public service professionals (as well as demoralization), but also in a struggle over the intentions of policy action and, often, failures to actually deliver public value (Bozeman 2007).

The proliferation of administrative fragmentation and public value failure permeating public policy in the wake of NPM approaches gave way to a new wave of public sector reform. This has placed greater emphasis on strengthening horizontal ties among key policy actors, including individual professionals and public bodies. Osborne, among the most prominent chroniclers of NPM, coined the movement, “New Public Governance” (NPG) (Osborne 2006). Many have since tried to capture what sets NPG apart from NPM. Various authors identify as NPG’s main characteristics (e.g. Xu et al. 2015):

1. an emphasis on participation and interactions to ensure collaborative governance that cuts across organizational and institutional boundaries (Torfing and Triantafillou 2013);
2. a re-centering of the public good and of the citizen as a central sparring partner in deliberating what this entails (in contrast to the NPM's tendency to view the citizen as a customer). This is accompanied with an emphasis on social problem solving via voluntary cooperation;
3. the embracing of a new role for government, namely as a coordinator of interactive and participatory efforts and the processes of meaning making in which these result.

Implementation from an NPG perspective amounts to processes of involving a plurality of interdependent public and private actors who have a stake in some shared issue, to jointly explore how to make sense of the issue and produce innovative solutions that lead to desired outcomes.

To which extent can such ideal-typical conceptualizations of policy action be of use in understanding actual policy processes? The historical interplay of policy implementation studies and the wider context of governing makes clear that policy intent, converted into real world action, strongly correlates with the institutional design in which it takes shape (Peters 2014, 2015). To optimize the explanatory potential of policy conceptualizations, it is therefore vital to consider the institutional setting in which an implementation process unfolds, and to include in the analysis of implementation institutional aspects co-shaping actors' behavior (Baldwin et al. 2019; cp. O'Toole 2000, 2015). In our analysis of RRI implementation we will therefore, following the neo-institutionalist take of Lowndes and Roberts (2013), account for the following aspects influencing actors' behavior in relation to RRI in the ERA: a) formal and informal rules, standards, and regulations, b) situated practices, and c) narratives, which manifest as "subtle processes of explanation and persuasion transmitted through the spoken word" (Jehling et al. 2019: 111).

11.4 Implementing RRI in the European Research Area

The European Research Area (ERA) is comprised of a plurality of regulatory nodes, responsible for the distribution of research funding on European and Member State's national levels, spread across 27 countries. The governance of science is dispersed amongst a network of organizations and intermediary institutions, including standard-setting organizations, self-regulation bodies, regulatory agencies, and ethics boards at national or supranational levels. National funding agencies and universities across scientific fields involved in the ERA, who can be identified as focal actors in RRI implementation, interact with these diverse organisations in the absence of a clear-cut hierarchical structures, making coordination of action and meaning-making a complex affair. While such arrangements are not uncommon in implementation processes of any policy, the case of RRI is made more complex by the progressive – in relation to normal science (Funtowicz and Ravetz 1993) –agenda it entails.

RRI's normative aims espouse an open and interactive approach to research and innovation intended to enhance the ability of societal actors and innovators to work towards "the (ethical) acceptability, sustainability and societal desirability of the innovation process and its marketable products" (von Schomberg 2013: 64). Alongside the progressive normativity of the definition is its prescriptiveness, urging research and innovation processes, "to become mutually responsive" (idem) with societal stakeholders. A range of definitions of RRI share in this conjoined prescriptive and normative frame (e.g. Smallman 2018; Gurzawska et al. 2017).

11.4.1 The EC's Approach to Implementing RRI

The normative and prescriptive aspects of RRI were carried forward by the EC in the founding regulation of the Horizon 2020 (H2020) funding program, stating as a policy goal to "develop the governance for the advancement of responsible research and innovation by all stakeholders (researchers, public authorities, industry and civil society organizations), which is sensitive to society needs and demands, and promote an ethics framework for research and innovation" (EC 2013, L 347/167). Ultimately, the EC operationalized RRI as an umbrella term combining concerns across six so-called keys, themselves leading concepts in previous research funding program frameworks, in casu, gender equality, public engagement, science education and science literacy, open access and open science, ethics and governance. In order to implement RRI in the ERA, these themes were to be addressed in the research and innovation processes that the EC supported financially. H2020, with a total budget of approximately €80 billion (European Commission 2013), hence was the main locus of RRI implementation.

A first step to RRI implementation was to have the six keys elaborated into performance assessment metrics for evaluating research efforts (notably via the assessment of proposals submitted to acquire H2020 funding). To that end, an expert group was commissioned "to identify and propose indicators and other effective means to monitor and assess the impacts of RRI initiatives and evaluate their performance in relation to general and specific RRI objectives" (Strand et al. 2015: 9). This researcher team developed a set of indicators which it presented together with the advice to, instead, make RRI operational in collaboration with the research groups and institutions who had to work with the indicators, inviting them to elaborate context-specific, jointly deliberated qualitative indicators. The EC largely ignored this advice and continued its efforts to operationalize RRI through a quantitative, indicator-based approach.

Subsequently, a commissioned research project, Monitoring the Evolution and Benefits of Responsible Research and Innovation (MORRI), presented a next attempt at creating a monitoring and evaluation system for RRI. Even though the researchers involved shared reservations with Strand et al. (2015) about the usefulness and applicability of the resulting set of indicators, in subsequent H2020 calls for research proposals, the MORRI indicators were often mentioned with the suggestion to apply these in prospective proposals. The ambition of

developing RRI indicators got further elaborated in the form of a five-year research and innovation action (RIA) funded under H2020, dubbed Scientific Understanding and Provision of an Enhanced and Robust Monitoring system for RRI (SUPER MoRRI).

In addition to the efforts at translating RRI into sets of performance indicators, the Unit in H2020 responsible for the Science with and for Society (SwafS) program financially supported some 35 projects on RRI (and the related concept of Open Science). The projects varied in their exact aims yet invariably set out to elaborate or advance questions of what RRI entails, how to make it accessible to researchers, and so on, with the intention of “mainstreaming” RRI in research funded in H2020.

11.4.2 NewHoRRizon’s Approach to Implementing RRI

Among the projects funded to elaborate the RRI concept in H2020 was the NewHoRRizon project, which aimed to “promote the uptake of RRI in H2020 and beyond” (NewHoRRizon 2016). This aim implied, many of those involved in the project argued, a critical questioning of existing research and innovation routines from the perspective of responsibility; the intent being to provoke reflexivity on research and research funding practice. The project’s objectives in principle allowed for such a reading of its remit, as NewHoRRizon aimed at “Promoting a clear concept of RRI...” (NewHoRRizon 2016: 73) while also “... recognizing the need for context specificity, variety, and concreteness.” The project thus emphasized responsiveness in elaborating the meaning of RRI to the actors involved. By not only asking ‘*what* RRI means?’ but also inquiring *how* actors make sense of RRI in their professional context (cp. Yanow 1996), the NewHoRRizon project created settings in which those actors who were directly involved in research and innovation (R&I), and in the funding of R&I, were invited to themselves elaborate the RRI concept.

The settings to do so were created by NewHoRRizon and dubbed Social Labs. While the label was adopted from Hassan (2014; cp. Timmermans et al. 2020), the Social Labs in NewHoRRizon did not draw on prescribed formats, but were designed by the researchers involved, who joined forces with professional facilitators. A “Social Lab Manual” drafted by NewHoRRizon’s project leader and a dedicated two-day workshop gave initial directions to the set-up of Social Labs. As noted, 19 Labs were organized, one for every H2020 sub-section. All Labs consisted of three consecutive workshops spread over a period of two years, and including predominantly virtual interactions in between. Within this shared framework, each Social Lab team organized its own Workshops to suit their program’s specific circumstances. Some 15 to 25 participants per Social Lab, collecting a diverse group of stakeholders involved in a funding scheme, were invited to workshops to reflect on the notion of responsibility and on how that might fit the contexts in which they professionally operated. In doing so, Lab participants were enabled to identify institutional barriers to and facilitators for RRI implementation. Table 11.1, below,

Table 11.1 Barriers and facilitators for RRI implementation in three sub-sections of the ERA, as generated by Social Labs on societal challenges (food, security) and excellent science (MSCA)

| | <i>FOOD</i> | <i>MSCA</i> | <i>SECURITY</i> |
|-----------------------|--|---|--|
| <i>Enabling Rules</i> | Integrating considerations of RRI in evaluation criteria and mid-term surveys of projects | Endorsing RRI at the highest level (unit responsible for MSCA) Requiring an ethics section in submitted proposals Having an ethics review board in place for evaluating proposals | Integrating the need for RRI in policy, work program, and call levels Recognition of the need for ethical considerations and social embeddedness of the research |
| <i>Practices</i> | Including policy, business, and NGOs on program advisory boards, especially for scoping of calls Supporting cross-sector stakeholder contacts and mixing, whether through workshops, lists, alliance building, ambassador exchange etc. Connecting among national stakeholder groups to share, engage, refocus, validate work | Educating early career researchers Enabling early career researchers to themselves design their research projects, travelling to a range of “host institutions” as potential agents of change making RRI-informed research choices Producing a network of scholars who are relatively independent from their respective institutional work environments and hence in a position to carry forth RRI-related ideals | Integrating stakeholders in the research and innovation processes Increasing the focus on fundamental rights such as privacy and data protection as major challenges of the acceptability of security innovations |
| <i>Narratives</i> | FOOD funding helps to ‘reinforce the importance of multi-actor narratives in program communications and other EC resources’ Having time for work related to RRI (e.g., in building relationships as part of multi-actor engagement) FOOD connects to programs that already have societal-challenge and impact focus’ FOOD sets out to ‘align with personal projects, backgrounds and initiatives’ | MSCA is there to ‘help early career researchers in becoming “the academics of tomorrow”’ ‘Gender equality is well-guarded within MSCA’ Compliance with ethics is ‘pivotal to research excellence’ MSCA ‘makes researchers aware of the need to spend considerable time on science education and outreach’ | ‘Ethical and societal aspects of security research are important factors’ |

(continued)

Table 11.1 (continued)

| | <i>FOOD</i> | <i>MSCA</i> | <i>SECURITY</i> |
|---------------------------|---|--|--|
| <i>Constraining Rules</i> | National funding rules; project funding timelines Lack of connection of RRI with the high-level consultation process that sets broad agendas | No follow-up on (ethics, science education) plans included in proposal once projects are approved No incentives to work towards promised ethics and impact objectives | No call-level incentives, like proposal evaluation criteria, to further the uptake of RRI No follow up procedures for implementing RRI |
| <i>Practices</i> | Lack of RRI training Language barriers particularly on multi-national efforts Limited leadership—Scientists may excel at research but not at keeping up interactive momentum | Gender discrimination, as experienced by female grantees in practice (e.g. limited options for parental leave due to contract duration) Short duration of MSCA grants, leading to temporary contracts without proper institutional backing, limiting proper embedding of RRI notions in ‘host organization’ Tick-boxing ‘ethics’ in proposal writing, and exempting the ethics paragraph from the regular review procedure | Ethics mostly recognized through human rights, legal factors and privacy protection Predominantly law enforcement agencies and practitioners recognized as key stakeholders |
| <i>Narratives</i> | ‘There is no time’ or rather ‘one cannot justify the time’ it might take to integrate RRI practices There is ‘no deeper political support or engagement, behind funders, for RRI’ ‘RRI implies a disconnection from the broader scientific cultural zeitgeist’ ‘Stakeholder are not interested in participation’ | ‘RRI is in fact what we already do in MSCA’, implying it does not need additional effort <i>Excellence</i> means ‘publishing in high impact journals’ <i>Public engagement</i> equals ‘science education’ | The program and projects are ‘in the first place to support Europe’s security sector competitiveness’ Since the program is concerned with security it ‘cannot be open’ to engage citizens RRI and technical development are ‘separate parts of research’ |

summarizes – by way of illustration – the rules, practices, and narratives (cp. Lowndes and Roberts 2013) that were addressed in the Labs that we, as authors, were responsible for managing. The barriers identified were, subsequently, addressed via the pilot actions so as to further RRI implementation.

Social Lab efforts surfaced the observation that the Commissions’ view on responsibility was narrow and did not fit participants’ institutional contexts, or their

associated dominant practices and narratives. The pilots and discussions clearly indicated the need to develop new, localized narratives on RRI and to create new contextualized practices and – where possible – buttress these practices with the formal rules and incentive structures. By targeting such practices through the Social Labs, RRI gained meaning and concrete shape from a bottom-up perspective in a form befitting the fragmented setting of the European Research Area itself.

11.5 Discussion: RRI as New Public Governance

The observation that the EC's implementation strategy to reconciling the H2020 program with RRI ambitions proved of limited success (Novitzky et al. 2020) was puzzling to many. Various RRI observers have pondered whether the EC's choice to make RRI operational in terms of the keys limited the potential scope of the notion, as originally defined and introduced (Von Schomberg 2013). Although for the EC, there was a broader narrative about improving science and society relationships accompanying the keys, the keys nonetheless prevailed as isolated themes. The reduction of the notion's meaning to the keys-logic implies, Owen and Pansera (2019) argue, an a priori limitation of the imagination required to see RRI develop as a genuinely new discourse, and thus succumb to cooption by 'business as usual' policy and practice (2019: 40–41).

This assertion can be put in perspective by bringing policy implementation literature into conversation with these views and our results and experiences as engaged researchers in the NewHoRRIZon project. Based on a comparison with the characteristics as listed in Sect. 11.3, we classify the EC's approach to RRI policy implementation as a classic case of New Public Management. Notably the emphasis on top-down selected keys and the efforts to have these elaborated in quantitative performance indicators speak of a managerial approach to implementing RRI in the NPM tradition. In addition, the fact that a single H2020 program ('Science with and for Society', Swafs) was made responsible for advancing RRI (e.g., in the form of developing RRI-tools), with seemingly little additional support for integrating RRI in peer funding schemes across the disaggregated structure of the ERA, fits an NPM approach. This tallies too with the idea that RRI indicators would incite funding organizations to stimulate researchers and innovators in adopting RRI, and to be accountable for their actions in those terms. Such an approach feeds into and reinforces the market logic embodied in the ERA in which organized competition for scarce resources is used to enroll researchers and innovators and their respective institutes.

The narrow operationalization of "RRI as keys" rendered the policy a seemingly apolitical, administrative endeavor. The approach echoes a trend in public sector financial administration wherein, to overcome the fragmentation of public administration there is a tendency, Pollitt and Bouckaert posited, to fit "all agencies into one set of accounts" (2017: 85) so as to be able to keep track of 'the bigger picture' financially. We conclude that, as applied to RRI implementation, tracking and measuring keys without regard for substantive difference or diverse administrative

contexts of R&I fields typifies a self-sabotaging approach to aligning R&I policy goals and implementation.

What then to make of the NewHoRRIZon approach to RRI implementation? It remains too early to assess the impact of project's 'bottom-up' approach to "mainstreaming RRI." The experience does, however, present a robust opportunity to revisit the idea of implementation in science policy. Considering the fragmented institutional context of the ERA, involving a diverse range of countries (27) and scientific programs (19), each with multiple and differentiable substantive sub-domains, an approach to implementing RRI that supports bottom-up interpretations, our findings suggest, might be more promising. In that sense, NewHoRRIZon resembled a 'New Public Governance' (NPG) approach to RRI implementation, rendering a process of joint and creative problem solving (Ansell et al. 2017).

One might argue the EC reached a similar conclusion, funding the NewHoRRIZon project and other decentralized implementation efforts through its Science with and for Society (Swafs) program. However, the instantiation of these efforts as projects in-and-of-themselves likely inhibited a more potent NPG approach to RRI. Indeed, the transient nature of such projects excluded recourse to establishing, for example, RRI competence units across program lines with dedicated resources and active coordination from a central hub.' Yet even within the constraints of a project setting and narrow policy mandate structuring its co-production process, NewHoRRIZon implementation still represents an example of supporting practices and narratives to inform actions to build a culture of RRI in the ERA. It did so by sometimes challenging – and sometimes seeking alliances with H2020 protagonists – to advance RRI in their localized contexts. Implementation for the Social Lab management teams entailed networking to mobilize energy for strengthening practices and narratives conducive to RRI, and challenging those counter to it. We place this implementation under the broad umbrella of NPG. We do so based on reference to the variety of collaborative arrangements allowing for the governance of public issues, emphasizing "inter-organizational relationships, networks, collaborative partnerships, ... and other forms of multi-actor relations" advanced by NPG approaches (Sorrentino et al. 2018: 20). Interestingly, Social Labs did not only invite participants to deliberate the RRI notion, but also to actively design and execute concrete actions to help change their own context in line with the policy goal. This action-orientation of the Social Labs resulted in a learning-by-doing approach to elaborating the 'what' and 'how' of RRI-in-context.

11.6 Conclusions

NewHoRRIZon's Social Lab approach built on the project's analysis of the EC's lack of success at implementing RRI across H2020, and presented a more agile approach to RRI implementation. This observation enables us to answer our main question in setting forth this comparison between the EC letter and NewHoRRIZon practice of implementing policy. We can now draw several lessons about

implementing a normatively and practically challenging concept like RRI in the complex governance setting of the European Research Area (ERA).

A first observation is that the very quest for coherence and centralized coordination may come at the expense of implementation success. The NPM approach to elaborating policy in terms of ‘keys’ made RRI a standardizable, calculable, and measurable intervention and, in principle, narratively coherent. Yet, as the findings from the NewHoRRIZon diagnosis showed, the success of including such efforts in R&I policy were modest at best. As presented, formal implementation of RRI in terms of new rules and standards was often counteracted by standing practices and signature narratives characterizing the lived experience of those active in the ERA and supported by H2020 programs. We found it was often these standing practices and narratives keeping the RRI policy’s ‘target groups’ (the highly varied sets of grantee researchers and innovators, as well as funding officers, National Contact Points (NCPs) etc.) from ‘co-producing’ (Whitaker 1980) the EC’s RRI policy goals in practice.

A second observation concerns the affordances and limitations of letting go of the idea of substantive coherence in implementing policy concepts like RRI. While the EC’s keys structured conversations on RRI, we encouraged Social Lab participants to focus on lived experiences to help make sense of RRI. In practice, this meant enabling reflection on participants’ own tacit knowledge and backgrounds, and tap into each other’s experiences to co-construct what “RRI” meant for and to them. As a consequence, the Social Labs created spaces to explore and leverage instances of what Randles (2017) dubbed *de facto* RRI, that is, of the empirically diverse answers to the question we raised in the Social Labs: ‘what does responsibility mean to you in the context of your professional practice?’ The choice to adopt such a responsive approach in making sense of RRI may foreclose on straightforward quantitative assessments of the impact of Social Lab participants’ actions in terms of “RRI uptake” (for example, gender ratios across teams). Such measures, of course, help track vital improvements, as visible in progress on gender balance goals dating back to at least the Fifth EC Framework Program (EC 1999). These measures, however, are insufficient to the larger task envisioned by RRI—namely, an embodiment of European values and a precautionary approach to research and innovation. The NPG approach we documented allows for “a way of embedding deliberation on [aspects of societal concern in research and innovation] within the innovation process” (Macnaghten 2020: 13); a responsiveness which the author identifies as quintessential, together with the dimensions of anticipation, inclusion, and reflexivity, in giving hands and feet to the responsibility theme. For Macnaghten (2020), this holds for innovation but, we argue, this is equally the case for research and innovation policy, that is, all those processes the RRI concept principally addresses.

In conclusion, the Social Lab approach to implementing RRI as executed in the NewHoRRIZon project, offers hallmarks of an NPG approach. Most particularly, Social Labs put researchers and other stakeholders in the ERA center stage in elaborating what RRI policy might mean and how it could be conveyed in real-world settings and actions. The fact that the Social Labs presented a forum for a variety of

stakeholders from across research and funding institutions who seldom ran into each other – researchers, funding specialists, NCPs etc. – was extremely helpful. Namely, this cross-pollination allowed for socialization and explication of barriers to effectuating RRI (as well as sharing of what might enable RRI). By cutting across organizational and institutional boundaries, the interlinkages between various aspects of research (and research funding) came to the fore. This exchange formed a starting point for practically enabling the uptake of RRI across diverse substantive and administrative contexts of the H2020 funding program and ERA. The Labs showed that for such actions to be effective, coordination across the actions and various realms of action is also required.

Our NewHoRRIZon experiences, in the light of policy implementation, offer a vital empirical critique of the dichotomy suggested by Owen and Pansera (2019) who separate “RI” as an academic approach to problematizing responsibility in processes of innovation from “RRI” as a policy construct. Such a dichotomy, our NewHoRRIZon experience shows, is not only misconceived, but also potentially at cross-purposes to the larger project of aligning science and society. We suggest that the differences ascribed to the articulations of RI and RRI, rather than being distinct academic and policy constructs, stem from different approaches to R&I governance. As an expression of an NPM approach, the idea (captured by Owen and Pansera under the ‘RRI’ heading) seemingly imposes an ‘alien’ add-on to what researchers’ and other stakeholders consider to be their core business. Such a narrative becomes counterproductive to any ‘mainstreaming’ effort purporting cross-cutting programmatic reflection (e.g., on societal concerns about and in research and innovation). Contrastingly, an NPG approach to implementation (e.g., as ‘RI’) affords decentralized pathways to leverage diverse research cultures and cares across disciplines in service of advancing societally engaged and responsive R&I. For policy makers, remembering this distinction – and the vitality of the NPG alternative – offers a way forward in implementation of RRI policy better tuned to the spirit of the ERA: namely, the project of supporting integration of cultures and values across Europe (Kuhlmann 2001). For academic practitioners, our experiences show the benefits of developing collaborative networks, tailored to field contexts, when seeking to implement ambitions of research and innovation with and for broad-based, lasting societal benefit.

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Chapter 12

Stakeholders in Research and Innovation: Towards Responsible Governance



Robert Braun and Johannes Starkbaum 

Abstract The concept of Responsible Research and Innovation (RRI) revolves around stakeholders of research and innovation aiming for societal desirability of the innovation process. In practice, it is often not clear, however, why one instead of another stakeholder-(group) is invited and for which purpose (Repo and Matschoss 2019). In most of the RRI discourse, ‘stakeholders’ are used as a catchall phrase denoting societal actors without actually pointing to who they are, why their participation is important, what exactly they contribute and why they should be involved in the R & I processes. In the case of citizen engagement, a typical bias emerges around the inclusion of easily accessible groups of publics. In this chapter we look at stakeholder theory as it has been developed and used for strategic business purposes from the mid 80’s and suggest how stakeholder theory may be combined with RRI, RI and QH approaches and applied to research and innovation. We argue that moral, epistemic and power diversity and balance is key to a stakeholder theory of RRI in order to facilitate a democratic debate amongst a wide group of stakeholders in a specific R & I endeavor in order to arrive at outcomes that are appropriate, legitimate, and desirable.

12.1 Introduction

The concept of Responsible Research and Innovation (RRI) revolves around stakeholders of research and innovation aiming for “societal desirability of the innovation process” (Von Schomberg 2013). Inclusivity, participation and engagement of a variety of stakeholders are key to RRI (Blok 2019, Brand and Blok 2019, Timmermans et al. 2020), which is also confirmed in empirical studies on RRI (Loureiro and Conceicao 2019). Stakeholders, it is argued, are any

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group or individual that can affect or be affected by the fulfillment of the goals defined by the research and innovation (R & I) process (Silva et al. 2019). When addressing stakeholder inclusion, Silva et al. (2019) classify stakeholders as internal or external groups to the innovation process, including both economic and non-economic actors. They thus suggest the inclusion of various external stakeholders, like individual researchers, research ethics committees and their members, research and innovation users, civil society organizations, public bodies as well as lay citizens in the R & I process. They also argue that employees, users, supply chain stakeholders and external research institutes make important contributions.

In practice, it is often not clear, however, why one instead of another stakeholder-(group) is invited and for which purpose (Repo and Matschoss 2019). In most of the RRI discourse, ‘stakeholders’ are used as a catchall phrase denoting societal actors without actually pointing to who they are, why their participation is important, what exactly they contribute and why they should be involved in the R & I processes. In the case of citizen engagement, a typical bias emerges around the inclusion of easily accessible groups of publics (Braun and Könniger 2018). We thus see the need to operationalize stakeholder engagement in R & I in order to avoid or make transparent these kinds of biases. Thus, this chapter focuses on the question of *responsible* stakeholder inclusion and brings examples as to potential avenues for operationalizing the normative ideals of inclusion and social legitimization in R & I.

First, we will look at stakeholder theory as it has been developed and used for strategic business purposes from the mid 80’s as a point of departure, as well as its application and evolution in research and innovation (R & I). Then we will briefly reflect on the anticipation-inclusion-reflexivity-responsiveness (AIRR) principle from a stakeholder engagement point view, an often-used procedural conceptualization of stakeholder engagement in R & I processes (Braun et al. 2020; Owen et al. 2012). We will then reflect on political Corporate Social Responsibility (pCSR) conceptualizations of responsible governance in stakeholder engagement. Stemming from this conceptual discussion, we will report on two co-creation exercises that included a number of stakeholders in two institutional settings, both initiated through projects funded in the EU Horizon 2020 (H2020) framework. One of these co-creation processes, i.e. social labs (Timmermans et al. 2020), was driven by the Joint Research Center (JRC) of the European Commission and the second one is the Community Creates Mobility (CCM) initiative of the Austrian Railways. These two examples are to bring empirical perspectives on how different stakeholders are involved and engaged in R & I processes, as well as to reflect on how governance challenges are dealt with in these cases. Based on these practical examples of stakeholder inclusion, we will draw conclusions and extend the theoretical pCSR governance conceptualizations, targeted towards specific modes of corporate governance and responsible stakeholder inclusion (RSI), to R & I governance in general.

12.2 Corporate Stakeholder Theory

Stakeholder theory evolved in the 1980s in the context of corporations and the business sector. It is argued that the corporation is a quasi-contractual relationship of almost endless individuals and groups – without limitations of time or space and positive and negative impacts (including externalities) are part and parcel of how the company is and should be embedded in society (Freeman 1994). In Freeman's (1984) original definition, stakeholders were the suppliers, consumers, employees, the owners, the local community and the management. These were the groups that could contribute to the success of the corporation and that could legitimately enforce their interests and claims against the corporation. Other authors expanded the number of groups by adding governmental bodies, various political and social organizations and institutions, competitors, trade unions, representatives of the media, and past and future generations (Donaldson and Preston 1995, Clarkson 1995b). Mitchell and colleagues (1997) created instrumental stakeholder typologies based on a power-legitimacy-urgency model to be better applicable to corporate strategy in line with Freeman's original strategic intentions. Clarkson (1995a) argues that stakeholders are to be assessed based on the risks they bear as there is "no stake without risk".

Following Donaldson and Preston (1995), three kinds of stakeholder theories are differentiated. (1) Descriptive stakeholder theory suggests that a variety of different stakeholders represent different positions, interests and modes of value creation and such different vantage points as 'factual representations' of potential societal impacts should be incorporated into business operations. (2) Instrumental stakeholder theory proposes stakeholder-oriented answers to strategic business challenges, and suggests attendance to such challenges to better achieve corporate goals. (3) Normative stakeholder theory draws on ethical principles to propose stakeholder-oriented answers to strategic ethical challenges in governing the corporation. Normative theories focus on governance questions related to ethics and responsibility (Hendry 2001).

These three conceptualizations have been complemented by political Corporate Social Responsibility (pCSR) *politicizing* stakeholder theory along lines of corporate citizenship (Crane et al. 2004). Authors from the field of pCSR claim that the corporation should be a political system of 'stakeholder democracy' (Braun 2019) geared towards the public good (Scherer and Palazzo 2008). Such stakeholder theories, stemming also from corporative settings, are increasingly referred to in the context of R & I and related normative questions of responsibility (Blok 2019).

12.3 RRI and Its Stakeholders

RRI and responsible innovation (RI) have its origins in risk assessments of scientific innovations, especially in nanotechnology research. The concept was also applied to issues of research related to socio-technical integration and the ethical, social

implications of scientific innovation in general (Owen et al. 2012). RRI has been defined as “a transparent, interactive process by which societal actors and innovators become mutually responsive to each other with a view on the (ethical) acceptability, sustainability and societal desirability of the innovation process and its marketable products” (Von Schomberg 2013, p. 50).

In order to arrive at such acceptability, sustainability and societal desirability, RRI theorists suggest the inclusion of a variety of stakeholders in the R & I process, including actors from civil society. Blok et al. (2015) thereby suggest demarcating the engagement of economic (e.g., employees and suppliers) and non-economic (e.g., NGOs and research institutes) actors into the R & I endeavors. Von Schomberg (2013) proposes multi-stakeholder engagement, bringing together actors from industry, civil society, and research. Again, this perspective focuses on societal sectors and offers a differentiation of stakeholders on a macro level.

While the engagement of actors from civil society is a key aspect of RRI, this concept provides little guidance on the “how” and the “who”. As Bauer and colleagues argue, “there is lack of clarity about what societal engagement under the terms of RRI precisely means” (Bauer et al. 2016). Scholars from fields such as Political Science or Science and Technology Studies (STS) have critically reflected on the participatory turn in R & I (Braun 2019) highlighting stage-managed exercises of invited publics facing barriers, such as limited time resources and asymmetric involvement (Felt and Fochler 2010). Others have criticized simplistic conceptions of publics that ignore less privileged groups from civil society, oppositions, and so-called mini-publics (Dryzek 2012, Michael 2009). Furthermore, it has been raised that the link between deliberative democracy and public engagement is too often taken for granted and that information as such will not increase public acceptance of science (Chilvers and Kearnes 2016). Institutional conditions are typically ignored when reflecting on roles and ‘problems’ of civil society (Wynne 2016). Thus, aims and rationales for engagement are oftentimes black-boxed while publics may, in the same move, legitimize the science-society relationship (Starkbaum 2018).

Coming back to stakeholder engagement more broadly, we see different attempts to open strategies for stakeholder selection. It is suggested that stakeholders in R & I may be identified, for instance, by categorizing them in relation to their level of interest, influence and relevance to the specific research and innovation project (Leventon et al. 2016). Another approach proposed by Reed et al. (2009) suggests technical competence and influence on outcomes as selection criteria. We take a different route. Our approach is to ground stakeholder inclusion and its normative base in the idea that research and innovation (R & I) are based on a “social contract” between researchers, innovators and society (Guston 2004, 2008; Te Kulve and Rip 2011, Bird and Ladyman 2012, Brown and Guston 2009). From this perspective, researchers, innovators and societal actors of all colors should be involved in co-producing the cognitive, the material, the social and the normative basis of the research and innovation process (Jasanoff 2004). This requires a strategy that stems not from an output or legitimacy orientation of inclusion (Mena and Palazzo 2012), but a co-creative approach that looks at the R & I process as a whole to be embedded in social meaning production.

In other words, stakeholders are to participate in determining both research and innovation agendas, take part in the research and innovation process, and be involved in the dissemination and use of R & I, covering the full R & I cycle.

Each stake bears also risks and that RRI is likewise grounded in risk assessment. R & I place stakeholders at risk (Clarkson 1995a) as they have either invested some form of capital (human, financial, knowledge) in the R & I process directly or indirectly through public monies, and are impacted by the outcome in a number of ways (directly through negative or positive impacts on stakeholders; indirectly through technology determining common sociotechnical futures). It is challenging to avoid these risks. Given the dominance of public funding of R & I and the levels of uncertainty in these processes (Van de Poel et al. 2017), all stakeholders are voluntary and involuntary stakeholders at the same time. Thus, scholars such as Brown and Guston (2009, 364) initiate a discussion on what sort of research is appropriate, legitimate and desirable (see also Raman and Mohr 2014). Stakeholders have different risks, claims, interests and values, therefore it is important to have some clarity on what these stakes and claims may be and how a level playing field of such stakeholders can be created.

12.4 Linking Stakeholder Inclusion Challenges of RRI and pCSR

There is an ongoing debate in pCSR, on the (necessary) conditions for stakeholder engagement in order to account for the normative goal of responsibility and diversity. On the conceptual level, Voegtlin and Scherer (2017) argue that corporate governance of responsible innovation should meet three types of responsibility: (a) the responsibility to do no harm, (b) the responsibility to do good, and (c) that of responsible governance. The third type of responsibility involves establishing institutions, structures, and procedures on multiple levels in the process in order to facilitate innovations to comply with the ethical and normative propositions of the first two types. They claim that governance is thus a meta-responsibility and key to achieving responsible innovation (Voegtlin and Scherer 2017). Specifically, responsible governance requires governance structures at various levels (e.g., global, societal, corporate) that facilitate an inclusive process of collective will formation on the goals and means and the societal acceptability of innovations (Owen et al. 2012, Voegtlin and Scherer 2017), thus focusing on both input and output legitimacy. Scherer & Voegtlin (2020) furthermore claim that governance should influence the innovation process so that the outcomes are socially acceptable (legitimacy), meet sustainable development goals (effectiveness), and use appropriate means (efficiency) so that the resulting innovations avoid harm and do good to society and the planet. While we witness overlaps in perspectives on stakeholder engagement in pCSR and RRI literature, we see the necessity to specify this for the context of the latter. From an RRI-stakeholder-perspective, the procedural responsible innovation

triad of anticipation, reflexivity, and responsiveness (Owen et al. 2012) may be related to three dimensions of stakeholder attributes: (a) the distribution of moral labor they denote (Blok 2019, Rip 2014); (b) the epistemic qualities and approaches they contribute to (Deblonde 2015; Jasanoff 2004; Wickson and Carew 2014); and (c) the power or social embeddedness they represent in the innovation process (Blok 2019; Eizagirre et al. 2017). If we conceptualize RRI as the inclusion of different actors to anticipate societal benefits of R & I, prevent negative consequences from occurring and bring about social goods based on stakeholder needs and wants, we need to create a stakeholder constellation in each innovation project that brings all three dimensions – the moral, the epistemic and the power/participatory – into the inclusion process through involving and engaging the stakeholders best suited for the purpose. The goal of RRI is to anticipate, reflect and respond to the ‘moral’, ‘epistemic’ and ‘power’ aspects of the social embodied in the different stakeholders invited to, involved in, and engaged with the innovation process (Braun 2019).

We started our discussion on stakeholder inclusion stemming from a business/strategy approach (Freeman 1994) and followed up with discussions that occur in responsible innovation (Blok, Hoffmans, and Wubben 2015) in industry settings (Voegtlin and Scherer 2017, Scherer and Voegtlin 2020). Thus, it is important to make a demarcation here. As opposed to a business oriented stakeholder construct, where the goal of the theoretical construct is to assist managers in dealing with the different stakeholder groups and the responsibility that stems from epistemic and ethical responsibilities towards them (Hendry 2001), the aim of the stakeholder construct in RRI, as discussed above, is to assist the selection of diverse stakeholders representing the moral, the social epistemic and the power-political aspects of the social to better embed the innovation process in society through proper and diverse stakeholder inclusion. Groups representing moral claims in the research and innovation process would be, from an ideal-typical perspective, NGOs, CSOs and social enterprises. Epistemic claims would be mainly addressed by stakeholders with diverse types of theoretical or practical knowledge, expertise and experience including, but not limited to researchers and industry actors, social innovators and citizens. Finally, power discourses are foremost animated by funding agencies, policy or industry representatives familiar with the governance structures, management processes and policy discourses framing socio-technical visions. It is important to emphasize that all stakeholders may contribute to each of the three dimensions.

We assume that the goal of such moral, epistemic and power diversity is to have a democratic debate among the stakeholders on what R & I is appropriate, legitimate, and desirable. One way to do so is to open-up the R & I process to the deepest possible societal scrutiny (Raman and Mohr 2014). We may then conceive participatory innovation processes as a form of action-research platform (Argyris and Schön 1989) as it is the knowledge embodied in the moment-to-moment dialogic action of each participant. As such, it may be seen as the “communicative co-inquiry” into the world through collaborative relationships with each other and the “experiential presence” of persons through sharing their sensing, feeling, thinking and attending to arrive at socially desirable and socially legitimate new knowledge embodied in concepts, products or services (Reason and Torbert 2001).

While the emergence of RRI has led to the institutionalization of stakeholder engagement in R & I and in respective policy landscapes, we see only few contributions that develop a stakeholder theory for RRI, particularly for the democratic engagement of actors from civil society and other publics (cf. Blok 2019). These are too often assumed either as ‘easily accessible citizens’ or as institutionalized actors, such as CSOs. Both represent privileged segments of the civil society sector. Bajmócy and Pataki observe this ‘absence’ of citizens and characterize RRI as consensus oriented: “RRI invites stakeholders (and in rare cases citizens) to take part in a joint problem-solving exercise, in order to arrive to a shared understanding and a shared vision on possible future directions” (Bajmócy and Pataki 2019). Brand and Blok (2019) argue that there are tensions between the ideal of opening-up innovation processes to deliberative engagement and the current mode of competitive market operation. Popa, Blok, and Wesselink (2020) make the case for an agonistic approach to conflict in innovation. As an alternative or parallel to consensus oriented conciliatory or constructive approaches they argue that with an agonistic approach, conflicts can be brought to surface and mitigated. Such a strategy may help avoid immunization strategies that are meant to resolve the discussion in favor of one of the dominant stakeholders. Following this debate, we will, in the next section, move closer to the conceptions and practice of stakeholder engagement in EU R & I landscape. Our arguments so far have been that (a) stakeholder inclusion is necessary to live up to the “social contract” between researchers, innovators and society that legitimates R & I; (b) that inclusion should be co-creative that is a process followed through-out the innovation process from concept to product; (c) that a responsible governance approach is to be applied. Now we turn to a mode of R & I, based on a normative social ideal of inclusion, that of Quadruple Helix (QH) innovation (Carayannis and Campbell 2009, Carayannis et al. 2017) to offer a theoretical perspective as to how to embed the normative ideal into research praxis. We will bring procedural examples from our methodological experimentation with the social lab concept (Timmermans et al. 2020) to substantiate that a QH model applied in a methodical way may offer modes to operationalize the normative ideals.

12.5 Open Science, Open Innovation & the Quadruple Helix Model

In accordance with the strategy of the European Commission (EC) as represented in the “three Os” – Open Science, Open Innovation, Open to the World – several new research and innovation governance structures, participatory processes and coproduction formats are experimented with (European Commission 2017). Open Innovation is understood to be “a distributed innovation process based on purposively managed knowledge flows across organizational boundaries, using pecuniary and nonpecuniary mechanisms in line with the organization’s business model” (Chesbrough and Bogers 2014, 17). This aims at moving away from a firm-centric

innovation process, claiming that innovation processes take place in webs of innovation, rather than in clear and singular value chains (Rip and Robinson 2013). The constantly changing webs of innovation are highly complex processes, structures and governance models, involving companies and other groups that are affected by or contribute to research, innovation, market uptake and diffusion such as NGOs, CSOs, regulatory agencies and consumer group representatives.

The core premise of creating multi-institutional collaborating innovation ecosystems is the hope of creating robust reciprocal linkages between government, universities, and industry, forming the crux of the well-established Triple Helix innovation model (Etzkowitz and Leydesdorff 2000). However, in recent years, the effectiveness of this model has been questioned and a need for more co-creational engagement was expected from innovation policy. In order to address these challenges, recent policy initiatives have identified the need for more open and democratic innovation processes involving key social stakeholders, in addition to those of the Triple Helix (European Commission 2017).

This led to the emergence of the Quadruple Helix (QH) innovation model (Carayannis and Campbell 2009): the inclusion of a 'fourth helix' – social innovation users/stakeholders (Arnkil et al. 2010) and members of the civil society, the media and arts sector (Carayannis and Campbell 2014). The QH model is increasingly present in different EC R & I policy documents and the H2020 funding landscape (particularly the stream *Science with and for Society* - SWAFS). Authors discussing the Quadruple Helix model of innovation emphasize (a) the involvement of citizens; (b) adding media-based and culture-based publics; (c) democratizing and opening up knowledge production; (d) creating non-linear innovation models; (e) using serendipitous and prototyping innovation modes; (f) shifting from economic to social- and ecologic driven innovation (Yun and Liu 2019, Carayannis et al. 2017, Arnkil et al. 2010).

The theoretical framework created within the RiConfigure project (Schroth et al. 2019), one of the empirical cases we report on, argues that four areas are especially relevant for QH practice, namely, (a) how (governance) structures are built, (b) how interaction between actors is fostered, (c) what type of value is created and (d) how mutual learning is nurtured. In accordance with this, CCM focused on building governance structure as a key prerequisite of such constellations to work in praxis. As Schroth et al. (2019) argue "In order to effectively build a structure for QH-collaboration, formal procedures for partner selection, reporting, and communication have to be developed, (...) [additionally] a common goal has to be identified and agreed upon." Operationalizing stakeholder inclusion through QH practice can be seen as a key element for managing collaborations across four sectors and for maintaining it over time. These include formal and organisational structures as well as setting-up a common vision and ensuring trust.

Bridging the theoretical link between QH innovation and RRI, we will look at two empirical case vignettes of stakeholder engagement in a QH context and reflect, in accordance with pCSR responsible governance claims, on the structures built in the QH process, via the social lab as method, to facilitate an inclusive process and enhance the societal acceptability of innovations.

12.6 Case Vignettes

In two H2020 SWAFS research projects (NewHoRRIZon [NH] and RiConfigure [RiCon]), we applied the method of social labs to co-create collaboration solutions in specific R & I areas with the ambition of stakeholder inclusion (Timmermans et al. 2020). In both projects the Quadruple Helix concept, that is the inclusion of four different types of actor groups in the innovation/experimentation process to broaden knowledge base and social legitimacy, was present. In the case of NH, the QH ambition was implicit, mainly operationalized in stakeholder selections guidance documents (cf. <https://newhorizon.eu/social-lab-manual/>) and an explicit awareness of bringing all four types of actor groups on board in the social labs (cf. <https://newhorizon.eu/deliverables/>), while in RiCon it was explicit as it was specifically looking at QH constellations or collaborations with such ambitions. In NH, nineteen social labs were created to reflect on and experiment with mainstreaming RRI through policy implementation betterment in the European Research Arena, while in RiConfigure, four social labs were established to reflect on the emerging praxis of Quadruple Helix innovation collaborations. It has been argued, in both contexts, that one possible way to operationalize stakeholder engagement and co-creation in solving complex social challenges is through participatory action research (PAR). In our version of the social labs, they provide settings for doing social experiments, based implicitly or explicitly on a QH stakeholder selection criteria, for stakeholders to collectively work together to initiate actions focused on jointly addressing identified societal challenges. It is not guided by predetermined project plans, lists of deliverables and without knowing how to proceed (Hassan 2014), but instead, to proactively experiment with possible strategies, approaches and solutions at the micro level in order to draw lessons for the systemic level of research practices. The method is characterized by (a) being a space for experimentation with actions to address societal challenges; (b) involving social experiments in real-life settings; (c) active participation of various types of stakeholders; (d) being inter- and multi- disciplinary involving a wide range of expertise and backgrounds; (e) experimentation on the micro level supports solutions and prototypes on a systemic level; (f) having an iterative, agile approach and involve learning cycles, allowing the evolution of prototypes and solutions over time.

We have selected the two case vignettes as they (1) offer perspectives to see QH constellations in praxis; (2) address challenges focused on participation and stakeholder engagement in mobility innovation; and (3) offer comparative perspective in terms of method and process similarity. Our empirical motivation is to show, based on the conceptual discussion above and the social lab process with a QH ambition, that responsible stakeholder inclusion is possible and operationalizable by applying a QH approach.

12.6.1 Case 1: Stakeholder Engagement in a JRC Mobility Project

The first case is that of the social lab established together with the Joint Research Center (JRC) of the European Commission. In this social lab, participants selected a specific research and innovation process, that of doing research on connected and autonomous vehicles. Within the bigger framework of the research objective, that of mainstreaming RRI in the European Research Arena, they choose to focus on stakeholder inclusion in the research and innovation process. The JRC is both experimenting with the automation process in its laboratories as well as investigating the wider socio-economic impacts of the emergence of autonomous mobility within the European Union. During the social lab process, a variety of stakeholders representing different disciplines, responsibilities and hierarchical levels of the JRC team including non JRC affiliated stakeholders identified the lack of stakeholder inclusion as impeding the socio-technical integration and the inclusion of the ethical, social implications of CAV innovation in society.

During the social lab workshops, it was widely acknowledged that science has to adapt to ongoing changes in society and that elements of RRI could support this process. Through group work and a voting process, and with helpful reference to the specific project of Connected and Automated Vehicles (CAVs) innovation selected, an experimental process emerged revolving around (a) stakeholder/citizen engagement, (b) stakeholder/citizen needs mapping and (c) testing alternative non-technology focused narratives. The experiment aimed to explore how an RRI inspired approach with the inclusion of a wide variety of stakeholders (including artistic and lay approaches in line with the original QH concept by Carayannis and Campbell (2009) could benefit stakeholder inclusive knowledge production and policy design for CAVs.

12.6.2 Case 2: Stakeholder Engagement Through a Mobility Initiative of the Austrian Railways

The second case is the social lab formed around the open innovation team of the Austrian Railways (ÖBB), a publicly owned company, that has both a public and economic mission in its DNA. The company has been experimenting with different forms of open innovation (OI) in the past and was aiming at a step-change to create a multi-institutional collaborative innovation ecosystem beyond rail-travel. In the social lab, participants selected the creation of a mobility innovation community. Additionally, within the bigger framework of the research objective, that is to observe the workings of quadruple helix innovation constellations, participants choose to focus on stakeholder inclusion including civil society in the mobility innovation process. During the social lab process a wide variety of stakeholders were selected based on QH principles, representing different responsibilities and

hierarchical levels of the Austrian Railways, as well as non-ÖBB affiliated groups and representatives of comparable stakeholder inclusive mobility endeavors. The social lab group worked towards establishing a stakeholder inclusive mobility innovation ecosystem to facilitate socio-technical integration and inclusion of ethical implications of mobility innovations into society.

During the social lab process and understanding the call for meeting the inclusion challenge, an open innovation ecosystem was started, named “Community creates Mobility (CCM)”. Initiated and managed by the ÖBB OI Team, an experiment in the creation of a relatively loosely organized community initiative, based on and operationalized by the QH ambition, emerged, aimed to challenge the status-quo of mobility innovation by sharing their learnings and jointly defining common set of goals in a Mobility Manifesto (cf. <https://www.zusammenbewegen.at/>). The Social Lab provided reflections and input from research on non-linear innovation and inclusion of the civil society. The CCM addressed the absence of civil society actors and specifically asked actors outside the traditional settings to speak at the events and to use the QH Model as a tool to shed light on the consumer or citizen perspective that is often not visible in innovation settings.

12.7 Discussion

In both cases the main social challenge addressed was creating a stakeholder inclusive process to attend to a shared responsibility in R & I doing no harm, doing good, and facilitating collective will formation on the goals, means and societal acceptability of R & I. This was operationalized by a specific attention to the QH model in (a) selecting stakeholders, (b) applying the social lab process as a methodological framework to create a level playing field for all actors in the QH process; (c) and creating a process within the social labs that was attentive to the four areas relevant for QH practice: governance structures built, democratic and open interaction between actors which maintains the social value created and mutual learning nurtured. In the case of the JRC, a research framework was created that used quantitative and qualitative methods to enhance the societal acceptability of the research at hand. This involved quantitative research on assessing the opinion of a representative sample of European citizens as well as a series of workshops and focus groups asking for reflection by different stakeholders on the research findings and innovations delivered in the JRC. As Scherer & Voegtlin (2020) emphasize, a responsible governance model should focus on stakeholder inclusive processes that provide (i) social legitimacy to facilitate wide inclusion, (ii) sustainable effectiveness to frame goals in terms of avoiding harm and potentially doing good, and (iii) stakeholder efficiency to mitigate the sole leadership and overriding power of one of the potentially dominant stakeholders. Following the theory distilled from QH innovation, we take social legitimacy as a concentrated effort of selecting stakeholders to bring all three R & I dimensions, the moral, the epistemic and the power/participatory into the process. This was achieved in the case of the JRC by specifically selecting

stakeholders from all four helices and fostering interaction between them via focus groups. During the social lab process reflection and mutual learning was facilitated on the inputs from the specific phases of the research by a wide variety of actors, including staff members who are typically engaged in artistic work within research projects. The interviews and narratives collected during the research project aimed at building trust and aligning expectations, to “speak a common language” and to include voices reflecting different sustainability views and impact vantage points of stakeholders willing to participate. Openness in terms of sharing knowledge and reflecting on data about issues of sustainability and social impacts is also beneficial for strengthening social effectiveness of the inclusion process.

After the first phase of building up a community of like-minded people and institutions in the ÖBB case, the OI Team approached members of the CCM to be part of the management board. These were the representatives of the community who also manage the community. This role was shared amongst various types of actors. Parallel to building sustainable structures for future collaboration, the CCM designed an open and participatory goal setting process enshrined in a co-created document, the Mobility Manifesto. This document was created in two workshops and invited all members of the community to collect main topics the community should address and concretize the direction the community should go towards. Between these workshops, an open online document was made available to gather and revise input. Mutual learning and participatory events were organized on a regular base. CCM used the QH Model as tool to identify speakers and to give people from the civil society a better voice in these events. Stakeholder efficiency in this view would boil down to creating appropriate legal/ governance frameworks that foster trust and define responsibilities and (shared) goals. This seems to be particularly relevant in a collaboration dependent on a single actor providing resources, as was the case in our social labs. Legal and governance frameworks (within and beyond the research endeavor or QH process) were particularly important once unforeseen events have threatened the collaboration, such as individuals or partners leaving the collaboration, withdrawal of support by external forces, changes in governance boards, or local security issues (specifics are confidential information). Such a framework allows for a joint and level playing field for developing a common vision and a set of shared goals, complemented and guided by wider aims such as national R & I strategies or the UN SDGs.

Reflecting on the inclusive process in our two cases, we see that within the framework of their own process – research in the case of the JRC and innovation in the case of ÖBB – practices of social legitimacy and sustainable effectiveness were put in place via paying attention to the QH framework, however in different forms and diverse stakeholder engagement levels. The JRC social lab experiment addressed a wide number of stakeholders to arrive at social legitimacy, however it also applied traditional top-down research processes to include sustainable effectiveness via engaging with the diverse opinions of different stakeholder publics that may be impacted by the development of connected and autonomous mobility solutions. This said, the QH model provided a framework for stakeholder selection, for the engagement and involvement of a variety of diverse (mainly internal) stakeholders

in the governance structures of the collaborative research efforts between departments, for fostering open interaction between stakeholders during the focus group process and for focusing on the potential social value created in the R & I process related to CAVs. Mutual learning was applied in the social lab process.

The ÖBB CCM also applied the QH model throughout the operationalization of the stakeholder inclusion process by reaching out to a wide number of stakeholders, however with the limitation that participation was mainly offered to those interested in the creation of a business focused ecosystem. In terms of sustainable effectiveness, in both cases, alternative narratives (case JRC) and sustainability minded NGOs and start-ups (case ÖBB) were addressed and social impact and sustainability principles were in the forefront of discussions. While the mixed method applied by the JRC may seem more traditional (and also better fitting a traditionally conservative research outfit), it did provide strategic learning opportunities for the research actors involved and reflection potential for stakeholders on both social impacts and engagement methods. It also showed that responsible stakeholder inclusion operationalized by applying QH principles and the social lab method is effective in maintaining a research ambition that aims at addressing societal concerns and better embedding CAV research in societal expectations. In the ÖBB case the participatory process, both in the form of the community events and the social lab reflection process, assisted in directing the process towards a more inclusive and trust enhancing mode of collaboration, again, based on and operationalized by the QH process.

However, when the mitigation of the leadership and overriding power of the potentially dominant stakeholder (JRC and ÖBB) was concerned, the two cases show different patterns and somewhat diverse outcomes. In the case of the social lab involving the JRC and its partners in mobility innovation, no instrument was put in place to mitigate the dominance of the JRC as dominant partner in the stakeholder inclusive process. No apparatus to foster trust of the stakeholders involved was conceptualized, nor were a common vision and set of shared goals defined together with the engaged stakeholders. This shows that when applying the QH process tensions may arise between the operationalization of responsible stakeholder inclusion and more traditional modes of governance that focus on efficiency, research excellence or the sovereignty of scientific inquiry. In the case of the ÖBB, a special emphasis was put on creating such structure and attending to the challenge of establishing some form of shared governance, first involving representatives from all four helix stakeholders and later deciding that a specific legal instrument, that of a formal association with appropriate board structure, should be initiated. Common goals were also defined in a stakeholder inclusive process via the CCM manifesto, something that was lacking in the case of the JRC process. It is worth noting, however, that the common goal definition was developed only on a generic vision level, which did not allow for the diversion from the business or economic mission orientation of the innovation process. Therefore, the operationalization of the responsible governance attempt did not yet create a level-playing-field engagement of actors from civil society who may have been interested in other, equally important, non-business focused potential missions or goals. This was witnessed as some of the civil society actors lost interest and withdrew from the co-creation process (Table 12.1).

Table 12.1 Aspects of ‘shared responsibility’

| | JRC/CAV | ÖBB/CCM |
|---|---|---------------------|
| Inclusive selection of stakeholder (social legitimacy) | Broad | Broad |
| Mode of engagement (sustainable effectiveness) | Mixed (qualitative and quantitative, participatory) | Participatory |
| Sustained inclusion of stakeholders (sustainable effectiveness) | Low | Moderate |
| Goals setting and mission definition (stakeholder efficiency) | Initiator dominated | Initiator dominated |

Our findings confirm the importance and the operationalizability of appropriate governance mechanisms as meta-responsibility in responsible innovation or RRI processes as heralded in pCSR literature (Voegtlin and Scherer 2017). Operationalizing responsible stakeholder inclusion as responsible governance via QH is particularly important as RRI and stakeholder engagement endeavors often lack responsibility towards citizens and their representatives by marginalizing their roles and impacts on R & I processes and outputs (Repo and Matschoss 2019). Differences in research and innovation processes notwithstanding, principles of responsible governance in stakeholder inclusion should apply. It is therefore possible to extend pCSR conceptualizations of responsible governance and its argument related to the meta-responsibility beyond corporate governance and suggest that its principles may be applied to governance processes facilitating common will formation across all stakeholders involved in the process. This may, as our case vignettes showed, be operationalized by attending to QH principles and processes as well as applying an agile and reflective method, such as social labs. Only through operationalizing responsible governance and stakeholder inclusion can it be guaranteed that stakeholders participate in a responsible and inclusive process: *determining* research and innovation agendas, *being included and engaged* in the research and innovation process, and *being involved* in the dissemination/use to cover the full cycle. It is clear that while broad stakeholder inclusion and participatory social impact assessment is very important in avoiding harm and potentially doing good, the key to the operationalization of inclusive stakeholder orientation is, as the concept of QH suggests, building structures that guarantee shared mission and goal determination as well as mitigating the impact of a potentially dominant stakeholder. In both our cases however, while there was a broad inclusion of the stakeholders bringing moral, epistemic and political power to the co-creation process, and bottom-up perspectives were considered, stakeholders could not have a strong position in re-defining or even influencing the research agenda or the mission of the R & I efforts. In the case of the JRC, the mission was sustained and technology-focused research on CAVs, with input from diverse stakeholder on acceptance, needs and wants, was continued. The planned outcome of the experiment is an internal report and an academic publication; both important in their own right, however both of them use stakeholders as source of academic input (research subjects) as opposed to stakeholder relevant co-created content. In the case of ÖBB, the mission

always remained business, start-up and technology focused and therefore solutionist (Dewandre 2018) in its epistemic orientation. Co-creation stopped short of being transformative in the innovation mission conceived and aimed for. This suggests that further research is required on how the QH model needs to be further developed to offer appropriate guarantees that co-creation with and by stakeholders is fully compatible with responsible inclusion. Our research has shown that QH is a promising mode of operationalizing stakeholder inclusion in a responsible way. However, the QH process needs to be complemented with other modes of governance and collaborative approaches to arrive at socially acceptable outputs for all stakeholders involved.

12.8 Conclusion

In this chapter we look at stakeholder theory as it has been developed and used for strategic business purposes from the mid 80's and suggest how stakeholder theory may be combined with RRI, RI and QH approaches and applied to research and innovation. We argue that moral, epistemic and power diversity and balance is key to a stakeholder theory of RRI in order to facilitate a democratic debate amongst a wide group of stakeholders in a specific R & I endeavor in order to arrive at outcomes that are appropriate, legitimate, and desirable. We emphasized, using pCSR principles of shared responsibility in R & I, that doing no harm/doing good as well as facilitating collective will formation on goals, means and the societal acceptability of research and innovation social legitimacy, sustainable effectiveness, and stakeholder efficiency is required. However: this is theory. We wanted to see how a model, that of QH, may be applied to operationalize shared responsibility in R & I or responsible stakeholder inclusion. Looking at cases that involved stakeholder inclusive, albeit different, processes when applying the QH model and the social lab method it emerged that the key to sustainable stakeholder engagement is to focus on stakeholder efficiency and creating governance structures that are able to mitigate the overriding powers of one of the stakeholders; creating a level playing field for all stakeholders to engage in jointly and democratically defined missions; and determining the goals and aims of the inclusion process. Naturally, as suggested at the end of the discussion, more research is required to discuss and determine how this can be done most efficiently. The QH innovation model and the social lab method suggest avenues and modes for doing this, however, both come short of suggesting a clear pathway for creating democratic stakeholder inclusion and engagement in R & I.

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Chapter 13

Managing the Responsibilities of Doing Good and Avoiding Harm in Sustainability-Orientated Innovations: Example from Agri-Tech Start-Ups in the Netherlands



Thomas B. Long and Vincent Blok 

13.1 Introduction

Responsible innovation (RI), also termed Responsible Research and Innovation, has emerged due to increasing concern over how to integrate ethical and societal values into research and innovation policy and governance (Von Schomberg 2013), in response to questioning of the societal role of science as well as populist resurgence in some countries (Long and Blok 2017a). Within a RI approach, innovators must consider three dimensions of responsibility, including the dimensions of (1) ‘avoiding harm’ to people and the planet, (2) ‘doing good’ through the offering of innovations that foster sustainable development, and (3) the development of facilitative global governance schemes (Voegtlin and Scherer 2017).

Programs to enhance the alignment of research and innovation objectives with sustainability development and societal benefits are evident in jurisdictions such as the USA and EU. Within in the EU, RI has been pursued as a priority across through the H2020 program, with nearly €80 billion allocated during the funding period 2014–2020. This commitment to RI will remain for the forthcoming Ninth Framework program through a focus on Open Innovation, Open Science and Openness to the World (3 O’s).

In spite of the resources employed towards implementation, RI has experienced a range of difficulties (Novitzky et al. 2020). Chief amongst these are low levels of awareness of RI in general and especially in relation to industry. For instance, research on the industry focused ‘Leadership in enabling and industrial

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technologies' (LEIT) H2020 program found only sporadic evidence for RI (Tabarés et al., 2021). RI's importance within industry settings centers on the role that industry plays in the diffusing and embedding of research and innovation into society.

The current low awareness and take-up of RI in industry contexts raises the question of how to boost RI adoption within industry settings. To tackle this question, draw on literature on sustainability orientated innovations (SOIs) that offers guidance in terms of how sustainability concerns – primarily 'doing good' – can be incorporated, as industry actually has experience with these types of responsible practices. At the same time, it is less clear how to extend industry responsibility to incorporate 'avoiding harm' as well as ethical concerns into research and innovation processes (Adams et al. 2016; Geradts and Bocken 2019; Schaltegger and Wagner 2011). To illustrate how 'doing good' can be combined with 'avoiding harm' and ethical concerns, to produce RI outcomes, we explore the case of agri-tech start-ups and their development of smart farming innovations. Exploring an example of RI within industry helps us to consider the question of how RI can then be facilitated and supported within other industry contexts. Our cases focus on the development of smart farming SOIs, such as drones, artificial intelligence, the internet of things or gene editing technologies. We argue that the nature of these SOIs means that the dual consideration of benefit and harm is required for their successful diffusion and to ensure the 'right' impacts.

Consequently, we build a framework for RI in industry by combining the strength of the concepts of SOI with RI and explore its dynamics in empirical cases. We first highlight how 'doing good' can be combined with 'avoiding harm', before exploring options of how to enhance RI uptake within industry contexts. We go on to propose a combined bottom-up and top-down policy formula, and in so doing, contribute to the Voegtlin and Scherer's (2017) third dimension of responsibility, that of governance-responsibility.

13.2 Literature Review

13.2.1 *Responsible Innovation in Industry Contexts*

The concept of RI has roots in different disciplines, from science and technology studies, management science to the philosophy of management and innovation (Burget et al. 2017). All framings however involve harnessing the power of innovation for the solving of societal challenges, while acknowledging the potential for unintended, negative consequences and the harms that can occur (Voegtlin and Scherer 2017; Von Schomberg 2013).

While innovation is undertaken by a wide set of actors, industry in particular is highlighted as having a particular role to play (Voegtlin and Scherer 2017), due to their resources, 'scope for action', and special role in societal diffusion and embeddedness of innovations. We use the conception of RI offered by Voegtlin and Scherer (2017), which presents successful RI – innovation which contributes to the solving

of societal grand challenges and UN Sustainable Development Goals – as being dependent on three dimensions of responsibility. A responsibility to ‘do good’, a responsibility to ‘avoid harm’ and lastly, a ‘governance-responsibility’ (Voegtlin and Scherer 2017). The responsibility to ‘do good’ incorporates scholarship and practice such as sustainable entrepreneurship, social innovation, or shared value approaches (Lubberink et al. 2018; Schaltegger and Wagner 2011). The responsibility to ‘avoid harm’ highlights the use of codes of conduct or risk management frameworks (Owen et al. 2013), which link to conceptions of RI, such as the AIRR framework and its dimensions of anticipation, inclusivity, reflexivity, and responsiveness (Stilgoe et al. 2013).

While research on both ‘do good’ and ‘avoid harm’ approaches exists separately, few cases in practice successfully incorporate both dimensions of responsibility while also ensuring ethical considerations are taken into account so as to manage user adoption (consumer, psychological, stakeholder) and sufficient market appeal (investor, economic). In order to explore how to increase the uptake of RI in industry we take the practice of SOI as a point of departure as it is a relatively more established practice in industry.

13.2.2 Sustainability Orientated Innovations and Their Prominence in Industry Contexts

SOIs are innovations that seek to create social and environmental value, in addition to economic returns, via alterations to the philosophies and values behind their development (Adams et al. 2016). We will explore SOI literature to consider the extent to which it could help enhance uptake of RI in industry contexts, improving societal outcomes and the chances of technology success.

Sustainable entrepreneurship provides evidence of the positive effects that RI could have (Hart et al. 2005; Markman et al. 2016), yet fails to incorporate considerations of unintended impacts or consequences need to ‘avoid harm’. While ‘avoid harm’ approaches are overly risk focused, potentially at the expense of creativity and ingenuity.

Approaches to the management of SOI can broadly be split into those with a more internal orientation, based on research focused on the relationship between SOI and financial performance, capabilities, and knowledge management (Del Giudice et al. 2017; Teece 2010); versus those, with an external focus, which focuses on stakeholder and network perspectives (McVea and Freeman 2005).

Internally focused approaches to the development and management of SOIs include techniques such as life cycle thinking, triple bottom line approaches and environmental management systems. These techniques are used to include sustainability criteria into innovation processes to produce SOIs. For instance, life cycle thinking expands consideration of impacts beyond just the production or use phase, to cover the whole life cycle, whereas triple bottom line approaches broaden the

criteria considered during the innovation process (Long et al. 2015; Matos and Hall 2007). Higher level strategies are also evident, such as strategic niche management, which seeks to enhance the early development of innovations through the generation of protective spaces or ‘niches’. This helps overcome issues with slow development times or initially unfavourable market conditions (Kemp et al. 2000; Kivimaa and Kern 2016). Business model innovation is a further approach, highlighting the key role that business models play in the success or failure of product and systems innovations (Bolton and Hannon 2016). There is a vast literature focused on business models, and how this impacts SOI performance (Bocken et al. 2014; Boons and Lüdeke-Freund 2013). This literature takes an almost exclusively value creation perspective on doing good via SOI’s (Evans et al. 2017), where the consideration of potential harm is often not addressed (see for exceptions Bocken et al. 2013; Long and van Waes 2021; Yang et al. 2017).

SOI development is heavily influenced by external relationships and the wider network of the innovator (Williams et al. 2017). The importance of ‘user’ values and societal involvement for successful SOI is well established (Baldassarre et al. 2017; Cillo et al. 2019; Nielsen 2020). Within agri-food systems, SOI processes and their outputs have been influenced by societal representation and power relations, often to the detriment of sustainability aims and marginalised communities (Bronson 2018, 2019); it is argued that the complex nature of agri-food challenges and the wide impacts they have mean societal ‘stakes’ in SOI processes are even more critical (Rose and Chilvers 2018). However, within SOI contexts, inclusion is often employed in a narrow sense, including only socio-economic or technical perspectives to the exclusion of broader societal or ethical perspectives. This means issues related to smart farming SOIs likely to impact their successful development, such as avoiding harm and more explicit ethical aspects, are still left unincorporated.

We have shown that SOI approaches offer guidance of how some aspects of RI, such as ‘doing good’, can be applied in practice. Yet we find that SOI lacks the explicit consideration of more ethical components. The incorporation of RI principles within SOI would involve the explicit consideration of societal and ethical criteria and concerns. This would include the inclusion of, and deliberation with a broad set of societal stakeholders in order to explicitly consider the potential for harm and incorporate ethical concerns that can help mitigate these issues.

The focus on inclusion and deliberation in RI is based upon the ethical and epistemic potential of engaging with multiple stakeholders. On the one hand, ethics can be seen as embedded in the social relation between multiple stakeholders (Blok 2019). On the other hand, it is argued that multiple sets of views have to be incorporated into innovation processes in order to facilitate social desirability and ethical acceptability (Stilgoe et al. 2013). Much of this thinking links to ideas and debates concerned with the democratisation of innovation and research processes. Innovators, including those within industry contexts, are seen as key enablers of this process. The inclusion of a wide set of stakeholders, reciprocity between stakeholders, as well as diverse and well-formulated viewpoints and arguments are necessary requirements for a legitimate and effective inclusivity efforts (van Mierlo et al. 2020). These requirements however can create challenges, especially when dealing

with cutting edge technological innovations, such as artificial intelligence or genetic modification (Buhmann and Fieseler 2021). In these contexts, it is questioned whether the public and other stakeholders are sufficiently informed of the issues at hand. Within industry contexts, there are the additional challenges of the tensions between transparency and competitive advantage (Brand and Blok 2019). Faced with these challenges, inclusivity, and deliberation within RI in industry contexts may need adjusting to take account of what is possible.

As such, for SOI approaches outlined above to be consistent with RI, and fully contribute to sustainable development, including in terms of societal desirability and ethical acceptability RI principles must be integrated. For example, the dimensions found within the AIRR framework, including anticipation, inclusivity, reflexivity, and responsiveness (Stilgoe et al. 2013), would enable SOI to both ‘do good’ while also ‘avoiding harm’. This would be achieved first through the integration of anticipation to combat the unpredictable nature of (SO) innovation. Anticipation requires that ‘what if...’ questions are posed and seeks to ensure that innovators are open to a myriad of possibilities and think systematically about possible impacts. The inclusivity dimension seeks to ensure that a wide set of societal stakeholders are involved and included in deliberative discussions concerning the aims and potential impacts of the innovation. Stakeholders must be informed of innovation aims, whilst also aiding innovators in understanding societal desires and potential concerns. The reflexivity dimension is more focused on questioning and examining the moral boundaries and roles of innovators. This includes self-critique of any assumptions held by the innovators as well as reflection on how the innovation and related issues are framed. The fourth dimension, responsiveness, focuses on responding to any issues raised through the articulation of the other dimensions. This includes ensuring that there are necessary resources and capabilities to respond in an adequate manner.

By envisaging the combination of SOI and RI, we highlight how the responsibilities of ‘doing good’ with ‘avoiding harm’ can be combined. This provides a first step to understanding how RI can be practiced within industry settings. Next, we explore this question empirically, highlight the challenges that exist in combining these responsibilities and the policies (governance-responsibility) that can be enacted to support further industry uptake. In the discussion, we then consider the specific the strategies and governance modes of managing these responsibilities.

13.3 Methods

This research aims to explore how start-up firms manage the dual responsibilities to do good and avoid harm in relation to smart farming SOIs for agri-food challenges. To do this we used an inductive research approach. This allowed existing concepts and frameworks to be drawn upon to help understand and explain the empirical data obtained, while also allowing space for the data to ‘speak’. This was an iterative process, involving the reapplication of theory to empirical results and vice versa,

where we develop theoretical insights through the language and meanings of the actors within the study.

We integrated qualitative data from three rounds of data collection: a first exploratory round of 18 interviews, followed by workshops with 10 start-ups and follow-up interviews with 9 of them. The workshops and follow-up interviews formed part of a tool the authors developed to help start-up firms identify societal and ethical issues related to their technological innovations. This data was used to substantiate the method of the tool, which is reported in Long et al. (2020). The content of the workshops and follow-up interviews are combined with a set of interviews for the purpose of this paper.

Our sample consists of agri-tech orientated start-ups conducting innovation within the context of smart farming. We defined agri-food start-ups as young, innovative firms in search of sustainable and scalable businesses, who utilised new technology or used existing technology in new ways for the solving of agri-food system challenges (Dee et al. 2015). We set the study within the context of the Netherlands.

From the outset, we instigated a non-probabilistic purposive sampling strategy. Participants were primarily identified through internet searches and co-nomination, then approached – with respondents from phase one, being invited to then participate in subsequent rounds. The research participants had to have senior-decision-making responsibilities for how the SOI was being developed. Table 13.1 provides an overview of the data sources, while Fig. 13.1 provides an overview of the phases and their focus. For all interviews a semi-structured interview technique was chosen (Taylor et al. 2015), as this allowed respondents freedom to express their experiences, and structured so that the data could be collected and compared.

13.3.1 Phase 1: Exploratory Interviews

To start we felt it necessary to gain an understanding of the various ways the smart farming SOIs had the potential to do good and or cause harm and start to explore the ways these were being managed. As such, this formed the focus of the first round of 18 interviews. Additional information included the history of the start-up and how they currently managed their responsibilities.

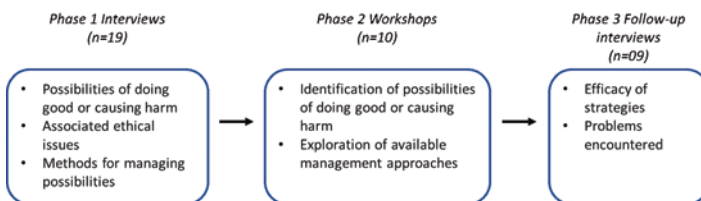


Fig. 13.1 Overview of data collection phases and their focus

13.3.2 Phase 2: Development and Implementation of Ways to Manage Responsibilities

During the workshops 10 start-ups were engaged in formal exercises to better understand the ways in which the smart farming SOIs had the potential to do good or to do harm as well as exercises to develop and implement ways to manage them. Many start-ups had been attempting to manage their innovation responsibilities already, and as such, some cross-over in the data collection between phase 1 and 2 is evident in terms of identification of how these responsibilities were managed. By the end of the workshop both existing and new ways of managing their responsibilities had been identified. The workshops lasted for between 2–4 hours, and were audio recorded. These were then transcribed and analysed.

13.3.3 Phase 3: Follow-Up Interviews

The final phase involved follow-up interviews three to six months after the workshops were completed. These interviews focused on how the implementation of different ways of managing their responsibilities, whether they were successful and why or why not. In total, there were 9 interviews in this third round.

The data generated took the same form in all rounds: transcripts produced from audio recordings of either semi-structured interviews (phases 1 and 3) or workshops (phase 2), containing the thoughts, opinions, and knowledge of the participants. While each phase was initially coded independently, due to overlap in some topics covered meant that data from phases 1 and 2 were combined. This decision was made to have as much data as possible available to answer the research question. An example of the potential for overlap between phases 1 and 2 concerned the nature of smart farming SOIs and the potential that they could do good or lead to harm in relation to agri-food system challenges.

The same coding process was applied to all phases. Initial broad codes were generated focused on any information that seemed relevant to the answering of the research questions to generate themes (Corbin and Strauss 1990). These were slowly altered to the first order codes. We then searched for similarities and differences within the initial codes, and where codes related or overlapped, the codes were condensed, consistent with the axial coding approach. This initial part of the process is ‘informant’ led, seeking to maintain the ‘voice’ and meanings given by the interviewees themselves. Following the development of the codes, concepts were developed to represent the different ways the smart farming SOIs had the potential do good or cause harm of the SOIs on the one hand, and how these different responsibilities were managed on the other, as well as what factors seemed to influence the success of the different management approaches. Where possible, triangulation was attempted using company websites, which were read to gain additional understanding of the innovations and any actions undertaken to manage the potentials of doing good or causing harm.

13.4 Results

In this section we show our empirical results of how start-up firms balance the process of ‘doing good’ and ‘avoiding harm’, while complementing it with ethical considerations. Our analysis also uncovered the barriers they face while attempting this balancing act.

13.4.1 *The Management of Dual Responsibilities*

Having characterised the different possibilities of doing good and/or avoiding harm and the challenges SOI’s may face in this regard in the previous sections, we now detail how the start-up firms managed the dual responsibilities to do good and avoid harm. An overview of the coding structure can be found in Table 13.2.

The first method that emerged from the data was ‘balancing demands’, which included codes ‘It’s about balance’ and ‘Its ok to make less money if we help solve the grand challenge’. Both approaches focused on accepting that tackling for agri-food system challenges involved a trade-off, as illustrated by quotes from respondents 03 and 01.

So, the [potential of doing good] is now having to balance with the business and economic aspect. (03)

We are willing to make less profit, if that increases the environmental and social impact of our product. (01)

It was recognised that to have a sustained impact on agri-food system challenges involved generating revenues and a viable business. The need to balance demands extended to information, as well as business versus sustainability value. For instance, respondent 18 developed an insect-based food product. This provided a protein rich food source without the ethical or environmental issues linked to the industrial production of beef or chicken. However, the novelty of using insects meant that the start-up firm felt responsible to fully inform consumers. However, this had to be done within the competitive contexts of a retail environment. This meant the information had to be consistent with marketing the product and making it seem attractive. This involved balancing competing demands.

There is more guidance needed because it is a new product, but not too much, as they won’t read it. (16)

The next broad approach was ‘openness and engagement’. This included specific codes, such as ‘including people’, ‘communicating challenges’ and ‘I need to be transparent’. This approach involved reaching out and making sure that key issues were expressed to stakeholders. For instance, respondent 18 had experienced problems due to the use of hemp in their product, which was often associated with the drug cannabis. Overcoming these perception issues included testing different narratives and explanations with consumers, through a process of ‘including people’.

Respondent 4 noted an alternative approach, while developing a new technique for breeding potatoes. They faced the risk that their process would be compared to GMO and experience similar controversy. They included specific stakeholders in their development process, such as experts, who could help to understand the issues around the potential of causing harm and signal the involvement of non-profit making research orientated actors in the project.

So, we know that even though a technology might be powerful, there are issues of how you bring it to market and how you inform people. Fortunately, we have cooperation with the [research institute], as well as cooperation with the [University]. (4)

‘Being transparent’ was a less proactive approach, enabling stakeholders to see the key processes, and potential tensions, within an SOI and business. For instance, respondent 15 ran a community orientated container farm, producing leafy greens, whilst engaging the local community. The ‘lab’ like nature of the operation was thought to seem contrary to the sustainable aims of the SOI, so being open and letting stakeholders engage with and explore the (shipping) container was a way of managing this issue.

It kind of looks like you’re working in a lab, but it’s more for hygiene because the produce that comes out of the container is not being washed. So, you need to take care... But I’m being transparent for that, I think you need to let your customers see. (15)

‘Integrative approach, through ambition and design’ represented a set of codes that highlighted how the respondents indicated that achieving social and environmental objectives involved aiming to ‘have it all’ as well as using design to incorporate what can appear to be contradictory aims. For instance, respondent 2, during their efforts to develop a renewable energy system that could share land with agricultural production and that minimised the use of unsustainable inputs, such as rare earth metals, highlighted that the aim from the start had been to have an environmentally, socially, and economically sustainable business. This uncompromising vision was viewed as essential – ‘if you do not try, how can you succeed’.

We work on the concept that sustainable energy production is not only renewable, but also socially acceptable as well. And be economically viable at the end. So basically, if you want to build a sustainable business – all three aspects, people, planet, profit – should be taken care of. (2)

With a vision, the technology, value proposition and accompanying business model could be designed to incorporate these aims. For instance, respondent 2, in attempting to incorporate and avoid clashes between environmental and social issues (in this case, renewable energy technologies occupying agriculturally productive land in food stressed regions), specifically sought a technology to fulfil these needs.

[O]ur technology was developed with the idea that we could in the future, combine food production with electricity production on the same piece of land. (2)

The final approach was ‘separation’, which included the codes of ‘separate the profit and not-for-profit parts’, ‘separate the products’ and ‘first the grand challenges, then the business’. This was a common approach, used or planned to be used

by respondents 2, 3, 13 and 17. The principle behind all these approaches was to manage challenges through separation, with different ways of separation, either physically, temporally or via alternative business models. This was most commonly used to overcome business society tensions. Separation of the profit orientated part of the business and the not-for-profit (or environmentally or socially orientated aspects) involved either creating two businesses, or one business and an adjacent ‘foundation’ or charity, with the profit-making entity supporting the non-profit-making part financially. Where two businesses were created, the products were the same, but aimed at different target groups (which distinguishes this code from ‘separate the products’).

So, this would be the social bit of our business, and probably a non-profit part. This would be in such a way so that they could maintain it themselves and give them access to the rest of the world. The second part would be the profit part (1)

Separation of the products involved the development of two different products for different markets. This enabled a profitable, market orientated product, to have greater success in commercial contexts. This success could then be used to support a product specifically designed for social or environmental value creation. For instance, respondent 4, developed potato varieties for the commercial market, focusing on taste and texture, as well as a potato for food security contexts.

So, at that point of time, we tried to balance the two objectives. Let’s call the MacDonald’s potato, and all the work we do for Europe and the US ‘luxury’ and everything else we call ‘life’. (4)

The other separation method involved focusing on and achieving objectives sequentially – meaning that the challenges could be separated temporally. Respondent 3 noted how they first started by focusing on the environmental and social problems they tried to solve. Once these aspects had been planned and assessed, efforts were then switched to explore how to create value for customers, in turn, making the initial social and environmental efforts viable.

We always started with the [environmental] problem. But now my investors are starting to push a little for starting with the problem for the customers. Not the problem of the [environmental impact]. So, now the challenge is to shift and think about the value for the customers. (3)

13.4.2 Barriers to Successfully Managing Dual Responsibilities

The second set of results focuses on the barriers that inhibited the management of dual responsibilities of doing good or causing harm. An overview of the coding structure can be found in Table 13.3.

The first barrier identified is *moral orientation* of the start-up, that is the extent a start-up primarily looks at the net outcome (in an ethical way) or also to the process. In some instances, the wider aim of the innovation to tackle an agri-food system

challenge was used as a justification to limit further reflection on the possibilities of doing good or causing harm linked to the SOI – ‘the ends justified the means’. So, while awareness of smaller and often process related ethical issues was raised, this awareness was often downplayed as irrelevant and not morally significant, in the name of the greater challenge.

The aim is on sustainability, so not ethics. It’s more about sustainability rather than ethics. Ethics is broader. And we are more focused. (1)

So, for me, I am a practical guy, I am not a theoretical guy. It is not important for me; I just want to build a prototype. I am pushing technology. (9)

The level of *complexity* of the possibilities of doing good or causing harm was also found to inhibit their management. This operated by impacting the ease of understanding around an issue as well as the availability of potential solutions. For instance, respondents noted that often there was not a simple or quick fix to manage the potentials or responsibilities.

While it is good to be aware, this isn’t enough. It’s only a first step. I need a clear plan and targets. (13).

Stakeholders were noted repeatedly as being a barrier to successful management approaches. For instance, often stakeholder perspectives did not align with the start-up and their attempts to manage the responsibilities of doing good or causing harm. This was often the case where there was too much distance between the start-up and the stakeholders. For example, in high distance relationships or highly contested contexts the approaches focusing on collaboration becomes less effective.

I think they are very focused on economics and processes. So, a little less on ethical aspects. (3)

Technological factors potentially prevented the start-ups from providing the service or managing the identified potential for doing good or causing harm. For instance, testing may not provide the expected results, or the assumed capabilities of a technology may not actually exist.

So, we realised that the measurements we want to do with the smartphones, well, it seems that the current smartphones are still not capable of doing the accurate measurements. (17)

The *speed and nature of the innovation and start-up process* emerged as a barrier. For instance, the innovation process was highlighted as fast-paced and time constrained. This meant that there could be little time for thinking about the potentials of doing good or causing harm according to the respondents. Sourcing finance, developing business plans, or prototyping could all change rapidly making previously identified issues defunct and introducing new issues quickly, changing the approaches enacted. As these factors are intrinsically related to the business development process, they represent a profound and challenging barrier.

While as a start-up, you iterate quite fast, and what you offer may now change quite a lot in a month. So, there is a trade-off in how much time you give up to this kind of abstract thought around the impacts and societal point of view. (17)

There is a balance in trying to learn from this, versus being viable and successful. To make a good choice. (15)

13.5 Discussion

Our results highlight how start-up firms, within an agri-food context, approach the challenge of managing the dual responsibilities of ‘doing good’ and ‘avoiding harm’, and the challenges they face. In doing so, we shed light on broader questions of how to enhance levels of RI within industry. Previous research had explored the issue of possible harm and ethical challenges in relation to smart farming, however, these contributions only identified the challenge as one of a lack of RI, primarily the exclusion of society and stakeholders (Eastwood et al. 2019). We go further to specify how RI can be enacted, the challenges involved as well as discussion of what policies could be used to enhance uptake.

While we highlight that a range of approaches are available and present a framework for managing RI in industry, the question still remains as to how to stimulate the uptake of RI approaches in similar start-up contexts, and more broadly in industry.

Recent research has highlighted that there is a lack of clarity and understanding regarding RI among key stakeholders. In addition, the top-down approach taken within EU funding programs, driven by the RI agenda set by the European Commission, has not born fruit (Novitsky, 2020). Given our results, we argue for a mix of top-down and bottom-up approaches. By top-down we mean the development and implementation of processes and policy from top-level executive positions. Within the context of RI in agri-food systems, this has included deployment through H2020 and mandates that RI approaches be included in funding applications, for example. In bottom-up approaches, by contrast, we refer to the emergence of practices from a community of innovators. Within our cases, this is demonstrated by the RI approaches we see emerge within start-ups, often due to intrinsic factors and motivations, such as innovators feeling that they have a wider responsibility (rather than a top-down mandate) to undertake RI.

Our argument that there needs to be both top-down policy, accompanied with bottom-up action is based on several advantages to such an approach. It should also be noted that we build our arguments from an innovation management and business ethics perspective, rather than one based on policy. First, it would represent a more progressive approach. The failure of current top-down approaches highlight the need for change (Novitzky et al. 2020), and the inclusion of bottom-up approaches would build on the responsibility orientation already evident in the start-up firms in our sample. We see that the start-up firms are already intrinsically motivated to enact RI approaches, and so this would complement top-down support. For instance, our sample shows that start-up firms (industry actors) are willing to invest in RIs themselves yet may require guidance and additional support (and motivation) where tensions between business and society remain. Policy requirements and guidance

may for instance be necessary additions to persuade reluctant investors or other stakeholders that additional investments in time or capital are justified to find RI solutions. Firms are often willing to take responsibility but may need policy interventions by the state to safeguard responsible practices where market tensions arise (Tempels et al. 2017). Indeed, this is where top-down action may be necessary, mandating RI practices in order to access funding or acquiring licences for pilots etc. Economic or information based regulatory approaches could also offer possibilities, such as public support for stakeholder engagement efforts (reducing costs). Several of the challenges highlight structural limitations to RI within competitive settings (Brand and Blok 2019). A potential example can be seen in measure to encourage carbon measurement, reporting and reductions by corporations, which were supported through information-based policies in the UK (HMG 2019). Arguments over costs and lost competitive positions were overcome through policy that mandated listed company report their carbon emissions, which in turn leveraged reputational drivers to enact reductions to carbon emissions (Long and Young 2016).

We found that the start-ups in our sample had to balance the values of the innovators, societal stakeholders and (economically driven) investors. This was especially applicable to business and society tensions, or tensions existing between environment and/ or societal objectives. Within the context of SOI smart farming innovations seeking to address climate change, the ‘soft push’ of the Paris agreement and associated national policies is significant, clearly signalling wider intent and providing legitimacy. Where this was deemed insufficient, additional measures, such as mandatory reporting of engagement efforts or inclusion of RI approaches within reporting guidelines, could offer one example of how top-down approaches could support RI update in industry. This shows how policy and market interventions can supplement bottom-up action that may not be sufficient to overcome market barriers. Indeed, this combination is likely to harness industry motivation to act to avoid additional regulation (May 2005) in conjunction within the intrinsic motivation to do good. A role for bottom-up approaches to RI is also evident in our results on integrative approaches, which first use ambition, for example, seeing the problem and having the ambition, and intrinsic motivation, to solve it directly (Lubberink et al. 2018); and second, the use of design to overcome the issues related to the potential to do good or avoid harm.

Some may be unreconcilable, in which case stakeholder engagement and acceptance approaches should be used. Innovators within the sample highlighted how being open and inclusive helped to diffuse potential conflicts and issues and could even help with the identification of ways to overcome challenges. Inclusivity and deliberation here can be seen to operate in two ways. Where an unreconcilable issues is genuine and intractable, for example, where a smart farming innovation has a range of beneficial impacts but leads to an unavoidable change in how a farmer undertakes his duties. Inclusivity and engagement would operate as a tool to reduce mistrust or misunderstanding, better inform impacted stakeholders and would act as a way to mitigate the impacts of undesired impacts (Garcés-Ayerbe et al. 2019). Where the unreconcilable issue is not intractable, stakeholder engagement and

inclusivity acts similar to processes highlighted in open innovation, facilitating the input of new, previously unconsidered view points and solutions, leading to a change in the design and/or implementation of the smart farming innovation (Bogers et al. 2020; Long and Blok 2017b). This could include change to the technology nullifying the negative impacts on farmers duties. This illustrates the potential of bottom-up approaches, enacted through intrinsic means by innovation, to RI to lead to deliberative and responsive innovation approaches which are able to incorporate both 'do good' and 'avoid harm' aspects. In either case, where inclusivity and deliberation are ineffective, state (political) action, in the form of more direct rules or regulations.

The final approach identifiable within our sample is that of separation, where the different components of a challenge are separated. This could include, for instance, the use of different business models or different products for different target groups. Business model or team separation was especially relevant in contexts where an SOI could have multiple uses – for instance, if they could be on the one hand targeted at mass conversional markets, and then with small alterations, used to target agri-food challenges (Baldassarre et al. 2017; Bocken et al. 2014; Bohnsack et al. 2014).

We identify and discuss the bottom-up strategies, such as separation, integrative approaches, or balancing demands, used to implement the dual responsibility dimensions, balanced with economic interests. These are however subjected to barriers which limit their efficacy and so ability to the dual responsibility of 'doing good', while 'avoiding harm'. For example, we found that some innovators suffered from a lack of moral orientation, including where process related sustainability elements were side-lined in the name of final goals. This often limited 'avoid harm' actions taken within processes in the name of 'doing good' in the end. Top-down policies could help tackle this challenge by formalising RI processes, helping to ensure that moral orientation is maintained. Similarly, formalised processes encouraged from above could help tackle the issue of complexity, which impacted the ease of understanding around an issue as well as the availability of potential solutions. Top-down requirements regarding formalisation could help some innovators mitigate complexity with set routines and methodologies.

Other challenges included the potential for a lack of stakeholder support in integrating RI principles. For example, investors could see these RI principles are superfluous and unnecessary, and as a drain on economic returns on their investment. Top-down support or even mandated RI policies would provide innovators with arguments for why RI should be integrated in these circumstances. While challenges such as the limitations of technological factors and the speed and nature of entrepreneurial processes could both be mitigated via top-down RI policies by altering investment dynamics. For instance, both challenges encompass temporal aspects, highlighting how a lack of time within innovation processes can limit the potential of integrating both 'do good' and 'avoid harm' dimensions of responsibility. Top-down support, in terms of financing or support could signal to other stakeholders, including investors, that additional time is needed. In these ways, top-down policies can complement the bottom-up measures we find in our sample, and help innovators overcome the challenges that they face., for instance by creating a level playing field.

By highlight the potential of bottom-up, often intrinsically driven, RI practices and also the complementing role that top-down measures could play, we show how

governance arrangements (the key third dimension) could also operate (Voegtlin and Scherer 2017). Indeed, the top-down measures may be needed in many instances to overcome, or at least mitigate, the challenges that we find that innovators face. In detailing these approaches, we also show how ethical acceptability and societal desirability can be integrated into the SOI process through a combination of bottom-up action and top-down support (Baldassarre et al. 2017; Cillo et al. 2019; Liedtke et al. 2015; Nielsen 2020).

The results highlight that agri-food start-ups may need to improve their ability to recognise and correctly frame issues around the potential to do good and avoid harm which can be achieved through stakeholder support as well as taking a more critical and reflexive stance to their own practices.

In summary, we develop a framework of how RI is managed in start-up enterprises where we further propose that the context of a SOI influences the specific potentials of doing good or causing harm, which then necessitates management approaches for successful SOI development. Further, we highlight that successful development is predicated on a range of barriers, linked to factors such as levels of moral orientation, complexity, or supportive stakeholders. We illustrate this visually in Fig. 13.2 to provide a visual overview of the key results and their basic interaction.

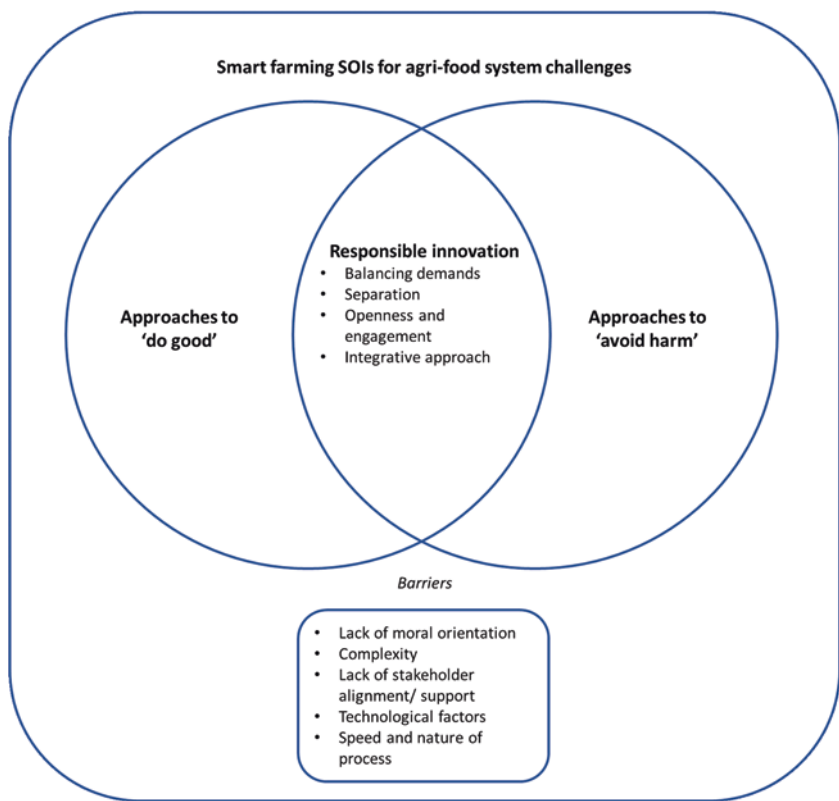


Fig. 13.2 Management of the responsibility to do good and avoid harm by start-up firms developing SOIs

13.6 Concluding Remarks

By analysing data from Dutch start-ups innovating for agri-food system challenges, we provide an initial exploration of how start-up firms manage the dual dimensions of responsibility of doing good and avoiding harm in relation to agri-food system challenges; these include ‘balancing demands’, ‘openness and engagement’, ‘integrative approach’, and ‘separation’. These results lead us to highlight how bottom-up RI processes may play a key role in driving RI in industry settings and could help mitigate the current weak implementation of top-down approaches seen to date. While current top-down approaches have had disappointing results, we highlight how they are likely to play a key role in complimenting and bolstering bottom-up approaches. Such top-down additions could include legislative guidance in case of tensions and trade-off as well as actions to create level playing fields by making unsustainable and non-desirable business practices less competitive.

We contribute to RI literature by adding detail about how start-up firms manage the dual responsibilities of doing good and avoiding harm. In doing so, we inform debates focused on how to boost RI take up in industry.

This research was exploratory in nature, based on a limited sample and undertaken from an innovation management and business ethics perspective. The country focus of the Netherlands may impact the types of possibilities of doing good or causing harm faced and the different management approaches used. Our sample also focused on early-stage start-up firms. It is possible that larger, more established business face different types of challenges and as such may require adjusted approaches to deal with them. Future research should validate our results through larger samples, including countries not included in this research, and/or explore these questions from a policy or other disciplinary perspective. Further possibilities also include taking a more quantitative approach, to explore the prevalence and character of challenges, as well as the longer-term impacts they potentially have on performance.

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Appendices (Tables 13.1, 13.2 and 13.3)

Table 13.1 Overview of research participants

| # | Nature of start-up firm and SOI | Phase 1: Exploratory interview | Phase 2: Workshop | Phase 3: Follow-up interview |
|----|--|--------------------------------------|----------------------|------------------------------------|
| 1 | Algae-based foods. Using algae as a nutritional additive in common foods. Incorporate social project. 1–10 employees. Founded 2014. | X | X | X |
| 2 | Renewable energy system. The product integrates into agricultural production systems, using these systems to generate power. Can provide power for irrigation or other machinery. 10–50 employees. Founded 2009. | X | | |
| 3 | Process for making agricultural waste into products for food and pharmaceuticals industry. Waste is removed from farm, heat treated and made available for industrial applications. 1–10 employees. Founded 2012. | X | X | X |
| 4 | Enhanced plant breeding technique. Enables faster non-GMO based experimentation and variety generation. Included development of varieties for famine environments. 10–50 employees. Founded 2006. | X | | |
| 5 | Meatless food products produced using hydrated vegetable fibres, from raw organic sources. 1–10 employees. Founded 2006. | X | | |
| 6 | Insect based food products. Produce both semi-finished and finished food products to restaurants and supermarkets. Use insect protein in 1–10 employees. Founded 2014. | x | | |
| 7 | Bio-based chemicals, using previously unproductive inputs (trees). Chemicals can be used to protect surfaces and are substitutes to more harmful substances. 1–10 employees. Founded 2016. | X | | |
| 8 | Vegetable production using fortified water. Produce organic, community orientated produce with higher nutritional values. 1–10 employees. Founded 2015. | X | | |
| 9 | Autonomous farm vehicle with renewable electrical power source. 1–10 employees. Founded 2012. | X | X | X |
| 10 | Standalone water salinity regulator. Decreases salinity of surface and ground water, preventing negative impacts. Founded 2014. | X | | |
| 11 | Manure nutrient recovery system, focusing on recovery of phosphate, nitrogen, micronutrients, and organic matter in an environmentally and economically friendly manner. Founded 2015. | X | | |
| 12 | Smart farming technology. Low cost and accessible sensor and analysis software. Founded 2014. | X | X | X |
| 13 | Indoor growing system, using vertical hydroponic systems that work with micro-climate control. In contrast to many existing hydroponic systems, it uses natural light and provides water and energy efficiency improvements. Founded 2011. | X | X | |

(continued)

Table 13.1 (continued)

| # | Nature of start-up firm and SOI | Phase 1: Exploratory interview | Phase 2: Workshop | Phase 3: Follow-up interview |
|----|---|--------------------------------------|----------------------|------------------------------------|
| 14 | Mushroom producer using waste as growing medium. Growing technology is combined with community supported agriculture model. Founded 2017. | X | X | X |
| 15 | Small scale container farm utilising hydroponic system. Located in community and encourages community participation. | X | X | X |
| 16 | Insect based food producer. Founded 2017. | X | X | X |
| 17 | Mapping and software developed aimed at improving understanding of flood risk. Novel advances in terms of crowd-sourced measurement and community development approach. Founded 2017. | X | X | X |
| 18 | Hemp clothing company seeking vertically integrated supply chain to ensure full transparency of impacts. Founded 2017. | X | X | X |

Table 13.2 Data structure showing first order codes and second order concepts for ‘how’ dual responsibilities of doing good or causing harm were managed

| Illustrative quote | 1st order codes | 2nd order concepts |
|---|--|-------------------------|
| <p>“So, the ethical aspect is now having to balance with the business and economic aspect.” (3)</p> <p>“There is more guidance needed because it is a new product, but not too much, as they won’t read it.” (16)</p> | It’s about balance | Balancing demands |
| <p>“We are willing to make less profit, if that increases the environmental and social impact of our product.” (1)</p> <p>“We’d rather leave a legacy than making the money.” (13)</p> | It is ok to make less money if we help solve the grand challenge | |
| <p>“Our issues are partly about perception, so we have to include people. That is important. So, the narrative association of incinerators – And see how to improve them.” (18)</p> <p>“So, we know that even though a technology might be powerful, there are issues over how you bring it to market and how you inform people. Fortunately, we have cooperation with the [research institute], as well as cooperation with the [university].” (4)</p> | Including people | Openness and engagement |
| <p>“Consumers not wanting to eat insects should be seen as a risk, and it should be calculated. These risks are inherent in our company. And the best thing you can do is communicate.” (16)</p> | Communicating tensions | |
| <p>“I am also hoping that being open will have boosted the life part of the business [the ‘doing good’ part of the business]. I can develop the seeds for India and China and Africa etc., but I am just 40 breeders in a building in the Netherlands. I need help.” (4)</p> <p>“It kind of looks like you’re working in a lab, but it’s more for hygiene because the produce that comes out of the container is not being washed. So, you need to take care... But I’m being transparent for that, I think you need to let your customers see.” (15)</p> | I need to be transparent | |

(continued)

Table 13.2 (continued)

| Illustrative quote | 1st order codes | 2nd order concepts |
|--|--|---|
| <p>“We work on the concept that sustainable energy production is not only renewable, but also socially acceptable as well. And be economically viable at the end. So basically, if you want to build a sustainable business – All three aspects, people, planet, profit – Should be taken care of.” (2)</p> <p>“We always kept saying that we do this from the perspective that there is a waste stream. And we want to make revenue from the waste stream – That is the goal.” (3)</p> | Aim to have it all | Integrative approach, through ambition and design |
| <p>“So, there are a whole range of [doing good or avoiding harm] issues involved in produced energy. Basically, the whole rationale behind our technology is that we try to solve all of these problems at once.... [O]ur technology was developed with the idea that we could in the future, combine food production with electricity production on the same piece of land.” (2)</p> <p>“For instance, we design our sensors in such a way that they can be dismantled. So, basically, we were inspired by circular economy, you can swap components between units. That way the lifecycle impact is reduced as components are reusable” (12)</p> | Design to incorporate diverse aims | |
| <p>“So, this would be the social bit of our business, and probably a non-profit part. This would be in such a way so that they could maintain it themselves and give them access to the rest of the world. The second part would be the profit part – Something that could really add to the matrix, to the whole scope of renewable energy sources.” (1)</p> | Separate the profit and not-for-profit parts | Separation |
| <p>“So, at that point of time, we tried to balance the two objectives. Let’s call the MacDonald’s potato, and all the work we do for Europe and the US ‘luxury’ and everything else we call ‘life’.” (4)</p> | Separate the products | |
| <p>“We always started with the [environmental] problem. But now my investors are starting to push a little for starting with the problem for the customers. Not the problem of the [environmental impact]. So, now the challenge is to shift and think about the value for the customers.” (3)</p> | First the grand challenge, then the business | |

Table 13.3 Data structure showing first order codes for concept of ‘barriers’

| Illustrative quote | Codes |
|--|--|
| <p>The aim is on sustainability, so not ethics. It’s more about sustainability rather than ethics. Ethics is broader. And we are more focused. (1)</p> <p>So, for me, I am a practical guy, I am not a theoretical guy. It is not important for me; I just want to build a prototype. I am pushing technology. (9)</p> | Lack of moral orientation |
| <p>Well, I think we need to go more in-depth with the intervention. It was just an introduction. We need more depth. (9)</p> <p>While it is good to be aware, this isn’t enough. It’s only a first step. I need a clear plan and targets. (13).</p> | Complexity |
| <p>The inputs that we worked with were not up to standard, it turned out. So, we have had to find different products, other suppliers, stuff like that. (17)</p> <p>I think they (stakeholder) are very focused on economics and processes. So, a little less on [issues around doing good or avoiding harm]. (3)</p> | Lack of stakeholder support/ alignment |
| <p>So, the test run of the process did not go the way it was supposed to. So, we got a delay of half a year and no product that met the required specifications. (3)</p> <p>So, we realised that the measurements we want to do with the smartphones, well, it seems that the current smartphones are still not capable of doing the accurate measurements. (17)</p> | Technological factors |
| <p>While as a start-up, you iterate quite fast, and what you offer may now change quite a lot in a month. So, there is a trade-off in how much time you give up to this kind of abstract thought around the impacts and societal point of view. (17)</p> <p>There is a balance in trying to learn from this, versus being viable and successful. To make a good choice. (15)</p> | Speed and nature of the entrepreneurial and start-up process |

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Chapter 14

Conclusion: Implementation of Responsible Research and Innovation by Social Labs. Lessons from the Micro-, Meso- and Macro Perspective



Erich Griessler  and Vincent Blok 

Abstract In this concluding chapter, we want to take a broader perspective and, based on the contributions to this book, identify the key lessons from the NewHoRRIZon project about RRI implementation in general and via Social Labs in particular. From a bird's eye perspective, the NewHoRRIZon Social Labs can be seen as interventions that depend on and are affected by several interrelated levels which might be separated roughly in the micro-level of Social Labs, the meso level of organisations, and the macro-level of national and European research and innovation systems and policy making.

14.1 Introduction

This volume is one amongst many results of the NewHoRRIZon project. As has been mentioned several times in this book, the aim of NewHoRRIZon, in a nutshell, was to promote the uptake of Responsible Research and Innovation (RRI) within the Eighth Framework Programme for Research and Technological Development, Horizon 2020.¹ To that end, NewHoRRIZon adopted and adapted Zaid Hassan's

¹The NewHoRRIZon project ran from May 2017 to September 2021. Coordinated by Erich Griessler from the Institute for Advanced Studies, Vienna, it involved 20 organisations from research, research funding and civil society. The European Commission supported NewHoRRIZon in the "Science with and for Society Programme" (SwafS) with 6.8 Mio Euro (Grant agreement ID: 741402). Project partners were Aarhus University, Teknologian tutkimuskeskus VTT Oy, FFG, Fraunhofer Gesellschaft, Wageningen University, Fondation Nationale des Sciences Politiques,

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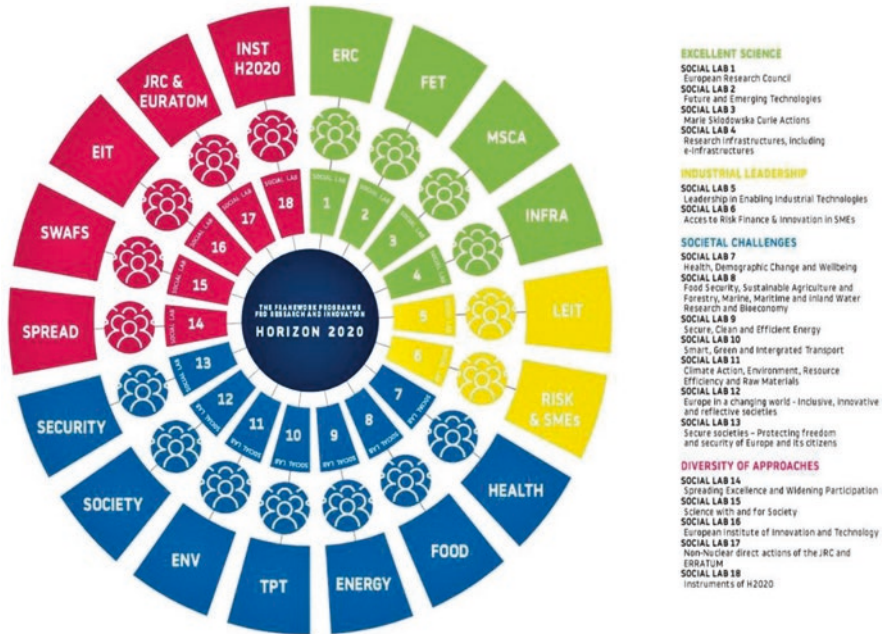


Fig. 14.1 The NewHoRRIZon social labs. (Source: NewHoRRIZon)

Social Lab concept, an approach of bottom-up-, stakeholder engagement to solve complex societal problems (Hassan 2014; Timmermans et al. 2020). After stakeholder mapping of Horizon 2020 and the analysis of the state of RRI in all its Programme Lines (Akca Prill et al. 2018; Bernstein et al. 2018; Griessler et al. 2018; Novitzky et al. 2018, 2020), NewHoRRIZon established 19 Social Labs that covered all programme lines of the European Framework Programme (Fig. 14.1).

The Social Labs were guided by a shared manual developed by the project partners in an iterative process (Griessler et al. 2021) and engaged altogether more than 720 stakeholders from across Europe, stemming from research, and research funding, civil society, policymaking and business. Over about two years, three successive workshops were organized in each Social Lab, in which participants developed and engaged in so-called pilot actions to address RRI challenges in their working environment. The NewHoRRIZon Social Labs developed altogether 59 pilot actions that covered all five RRI keys and were directed at researchers, research funders,

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policy makers, representatives from business, civil society, and citizens. The pilot actions can be explored in the virtual exhibition “RRI.Ex”² as well as in a Pilot Action Booklet (NewHoRRIZon 2021). The pilot action process for each Social Lab is documented in individual reports (Griessler and Hönigsmayer 2021a, b, c; Daimer et al. 2021), and a Guide to Good Practice is available for practitioners (Cohen and Loeber 2021).

In this concluding chapter, we want to take a broader perspective and, based on the contributions to this book, identify the key lessons from the NewHoRRIZon project about RRI implementation in general and via Social Labs in particular. From a bird’s eye perspective, the NewHoRRIZon Social Labs can be seen as interventions that depend on and are affected by several interrelated levels which might be separated roughly in the *micro-level* of Social Labs, the *meso level* of organisations, and the *macro-level* of national and European research and innovation systems and policy making.

On the *micro-level*, NewHoRRIZon sets out to engage relevant and knowledgeable individuals in research and innovation to reflect on responsibility in their work, identify deficits in their practices and create pilot actions to address them. From this perspective, we want to probe whether NewHoRRIZon and its Social Lab approach were able to achieve these aims.

The Social Lab participants, however, are not free-floating individuals, but represent various types of organisations that provide opportunities for, but also pose constraints for RRI implementation. This raises the question, to what extent were the Social Labs, as temporary interventions outside these organisations, able to generate change on the meso-level.

Finally, on the *macro level*, the NewHoRRIZon Social Labs are confined by national contexts of research and innovation systems and national and European policymaking, e.g., the way RRI is promoted within national and European research and innovation funding. This volume provides contributions to the answer to these questions on micro-, meso- and macro levels.

14.2 What Are Social Labs Able to Accomplish on the Microlevel?

Cohen and Gianni set the stage for this volume by conceptually anchoring Hassan’s original idea of Social Labs (Hassan 2014) and Timmermans et al.’s (2020) adoption of John Dewey’s pragmatist philosophy. Admitting current shortfalls of RRI implementation, they “side” with Nordmann’s (2019) reconceptualization of RRI as a collective “experimentation strategy” (Cohen and Gianni 2022: 83). In doing so, they connect with Dewey’s pragmatist approach that perceives democracy, not as a form of government but an “ethical way of life in which members of communities

²<https://newhorizon.eu/rri-ex/>

are able to develop their potentiality through cooperative processes of experimental social inquiry embedded in social practice” (ibid. 84). As a “process of social inquiry” RRI should include a diversity of publics and should guarantee the “social, experimental and public nature of such a process” (ibid.).

Moving on from these normative assertions on to the micro-level, Marschalek and colleagues (Marschalek et al. 2022) show how the Social Lab approach worked well in terms of input and output. Based on the 19 Social Labs that cover all H2020 funding lines and that were populated with adequately large and adequately diverse groups of participants, they identify common problems of public engagement activities in Social Lab implementation, e.g., recruitment of participants, sustaining their motivation and securing funding for pilot activities. They show the success factors of the approach as promising experimentation for RRI implementation. The further establishment of the Social Lab methodology requires further practice and analysis. Social Lab implementation also must find a balance between possible standardization and necessary freedom of improvisation to be able to address individual challenges in different Social Labs. Still, an open question was the impact of pilot activities on the meso-level of organisations, a problem common for research projects which run for a limited time.

The Social Labs showed that diversity of group composition requires special attention since the degree of heterogeneity of participants has an impact on the Social Lab output. Yorulmaz and Bühner (2022) categorized types of output of Social Labs in (1) tangible output, (2) institutional change, (3) awareness, (4) practical cases, and (5) websites and examined whether diversity in terms of gender, stakeholder groups and countries of residence relate to types of output. They considered tangible outputs more, and awareness raising as less original and found that in “social labs with greater heterogeneity (...) across the three examined diversity dimensions, the frequency of tangible results increases with increasing group diversity” (ibid. 132). Their findings underscore that managing and coordinating Social Lab’s diversity is particularly significant.

Braun and Starkbaum (2022) investigate the theme of diversity in Social Labs as well. They look at stakeholder recruitment and engagement and focus on two instances of Social Labs - one of them from the NewHoRRIZon project - where a single and strong stakeholder tends to dominate the Social Lab. The European Commission’s Joint Research Center (JRC) accepted after some reluctance to support and engage in a Social Lab on the JRC. Although the selection of stakeholders in this Social Lab was broad, the sustained inclusion of stakeholders was low, and the JRC as initiator dominated goal setting and mission orientation within the Social Lab. Braun and Starkbaum concede that “broad stakeholder inclusion and participatory social impact assessment” are very important, but they also emphasize the significance of “building structures that guarantee shared mission and goal determination as well as mitigating the impact of potentially dominant stakeholders” (Braun and Starkbaum 2022).

Frankus and Hönigsmayer (2022) also focus on the micro-level of Social Labs and take a single case study approach to clarify whether “the Social Lab approach

can be used (...) to integrate RRI in the EURATOM³ research field and (...) ensure that relevant stakeholders are included to the R & I process” (Frankus and Hönigsmayer 2022). In general, they conclude that the methodology was “valuable in getting different stakeholders together to co-create solutions for their defined societal challenges in EURATOM”. However, they also identify major limitations. First, the Social Lab was rather homogenous as concerns variation of gender and stakeholder groups. The only voice, critical of nuclear energy, a civil society organisation’s representative, left the Social Lab after the first workshop because this person did not feel the power and agency to generate institutional change in the Social Lab. Attempts to integrate other civil society organisations were not successful because of the same arguments. The resulting low heterogeneity of the group impacted the pilot actions which became small-scale and short-term. Future research should indicate whether an agonistic approach to stakeholder engagement (Blok 2019) in social labs can contribute to more heterogeneity of the group and will generate larger scale impact of the pilot actions. Second, Social Lab participants felt that they had limited agency, power, and financial resources within their organizations to make a change toward RRI. Frankus and Hönigsmayer conclude that personal motivation and interest in which Social Labs build are not enough to implement “long-term institutional change connected to RRI” (Frankus and Hönigsmayer 2022).

14.3 What Are Social Labs Able to Accomplish on the Meso-Level of Organizations?

Schoisswohl et al. (2022) report on experiences that representatives of research funding organizations had when engaging in the Social Lab. They investigated how RRI can be operationalized within three research funding institutions from Austria, the Czech Republic, and the Netherlands. They experienced that openness to the implementation of RRI was not a problem for these organizations, particularly because RRI could be linked to the increased call for mission- and challenge-oriented research and innovation funding that necessitates multidisciplinary and broad stakeholder engagement. Subsequently, they describe examples of already existing de-facto RRI in their three funding organizations, which provides important lessons for the implementation of RRI on an institutional level. Institutionalization of RRI expertise within the funding organisation was considered a strong instrument for implementing RRI. However, the authors also identified barriers to RRI implementation in research and innovation funding organizations, such as a clear and agreed upon concept of RRI. In addition, funding bodies are themselves constrained by political objectives and financial means set by their political principles.

³Within Horizon 2020 EURATOM is “a complementary research programme for nuclear research and training” (<https://wayback.archive-it.org/12090/20220124160217/https://ec.europa.eu/programmes/horizon2020/en/h2020-section/euratom>, 19.06.2022).

The authors identified in particular the “discontinuity of the SwafS programme”⁴ as particularly detrimental. This “had an irritating effect on those parts of the agencies open to participatory elements in R & I and weakened the inclination to seriously consider RRI”.

Long and Blok (2022) as well look on the meso-level and investigate how Dutch agri-tech start-ups manage responsibility. They define responsible innovation (RI) as a combination of “doing good” and “avoiding harm” and several strategies these firms used to tackle RI. These approaches include (1) balancing demands, (2) separating business and non-profit parts, (3) openness and engagement as well as (4) an integrative approach, that considers social and environmental objectives at the same time. However, the authors also identify barriers to RI in these firms such as (1) complexity, (2) lack of moral orientation and (3) stakeholder alignment and support, (4) technology factors, and (5) the speed and nature of the innovation process. Long and Blok advocate, and here they meet with findings in the earlier chapters, to align, complement, and bolster the earlier mentioned bottom-up approaches with top-down approaches such as “legislative guidance (...) as well as actions to create level playing fields by making unsustainable and non-desirable business practices less competitive” (Long and Blok 2022). In other words, bottom-up approaches such as pilot actions and the ones identified in Dutch agri-tech start-ups are not enough. They need support from the macro-level of policy making to stabilize on the meso-level of organisations.

Loeber et al. (2022) focus on the question of how to implement RRI at the meso-level. However, different from Long and Blok (2022) they look at how the Social Lab approach aligns with the overall policy approach taken by the European Commission within Horizon Europe. They perceive the Commission’s approach to implementing RRI policies in the tradition of New Public Management that tries to generate a centralized policy with a coherent narrative. They contrast this only modestly successful policy approach (Novitzky et al. 2020) with a bottom-up, action-oriented, and learning by doing approach that does not prescribe what RRI is, and how it can be measured and implemented. Often, they observe, standard practices of research and innovation (policy) making, hinder the implementation of RRI. Instead, bottom-up strategies like the Social Labs motivate participants to “design and execute” (Loeber et al. 2022) pilot activities that connect to their ambition for RRI and are meaningful in their working environment. Loeber et al. (2022) perceive the Social Lab approach within the tradition of New Public Governance. As the contributions of their colleagues in this volume (Braun and Starkbaum 2022; Yorulmaz and Bühner 2022), highlight the importance of heterogeneous teams (Blok 2019). “By cutting across organizational and institutional boundaries, die interlinkages

⁴The “Science with and for Society Programme” had the specific goal to implement RRI and “to build effective cooperation between science and society, to recruit new talent for science and to pair scientific excellence with social awareness and responsibility” (<https://wayback.archive-it.org/12090/20220124160325/https://ec.europa.eu/programmes/horizon2020/en/h2020-section/science-and-society>, 19.06.2022). The SwafS unit was discontinued during Horizon 2020 (see Griessler et al. 2022).

between various aspects of research (funding) came to the fore. In principle, this formed a starting point for actually and practically enabling the uptake of RRI across diverse substantive and administrative contexts of the H2020 funding programme and the European Research Area. The Labs showed that for such actions to be effective, coordination between the actions and various realms of actions is also required” (Loeber et al. 2022: 156).

Warnke et al. (2022) look at the connection of RRI to the meso-level from a different perspective. Their focus is on one of the main keys of RRI - public engagement (see also Cohen and Gianni 2022) - and how it links to established practices of involving actors who are not professional researchers in research. They focus on two research areas, health, and environmental research, and identify four research traditions of public engagement of particular importance, i.e., participatory design, user-led innovation, participatory research, and systemic instruments. Public engagement activities inspired by RRI should engage with the communities and practices of these existing research traditions to enhance their impact.

14.4 What Are Social Labs Able to Accomplish on the Macro-Level of Policy Making?

Just like Loeber et al. (2022), Daimer et al. (2022) embark to explain the limited success of RRI mainstreaming in Horizon 2020. For that, they take up Randles’ (2017) concept of deep institutionalisation and transfer it to the implementation of the RRI concept within Horizon 2020. Deep institutionalization comprises the (1) evolution of a dominant narrative; (2) maturation process; (3) Systemic consolidation and (4) vertical multilevel alignment. Daimer et al. (2022) conclude that RRI implementation on the H2020 level fell short in all these dimensions. First, there are several competing RRI narratives that are not yet translated into a “pragmatic approach that paves the way for a broader paradigm shift within the European Commission and the R & I community”. Second, there was “no phase of experimental embedding into funding practices” and thus, third, no “preconditions for the systematic consolidation of RRI within the European Framework Programme. As for vertical, multilevel alignment, the fourth element of deep institutionalisation, the MoRRI project showed large disparity in Europe with regards to RRI implementation, with a few forerunners who provide interesting learning examples and, country clusters with less RRI experience.

Griessler et al. (2022) also focus on the ups and downs of RRI as a policy concept within European research funding. They use Sabatier’s Advocacy Coalition approach and identify a fragility of the policy concept of RRI with interrelated conceptual, legal, financial, and institutional elements. They identify several competing advocacy coalitions, the main being ‘Pro RRI’ and ‘RRI critics and actors unaware of RRI’. RRI lost ground because of the internal division on conceptual issues within the ‘Pro RRI’ advocacy coalition and opposition of the ‘RRI critics’, made

up of powerful actors “holding top positions in policymaking, administration, and industry and thus control(ing) institutional, legal and financial resources” (Griessler et al. 2022) who are committed to the dominant innovation paradigm.

Tabares and Bierwirth (2022) also take up the disparity between EU countries in the operationalization and institutionalizations of RRI and zoom in on the Spreading Excellence and Widening Participation” (SEWP) countries. They observe that “socio-ethical, geo-economics disparities and cultural particularities that can be found in this group of countries seem to play a role” and that “SEWP countries have not greatly benefited from (the) effort” to promote RRI (Tabares and Bierwirth 2022). These cultural differences relate to understanding gender and gender equality, public engagement, or the role and (unequal) distribution of formal and informal social capital. The authors advocate for considering the different cultural particularities and applying a differentiated approach when implementing RRI in these countries and not falling into the trap of taking them as a single and homogeneous cluster of countries.

14.5 Conclusions

The Social Lab approach used in the NewHoRRIzon project showed convincingly the great potential of bottom-up policy implementation. Starting from ‘weak’ adoption of RRI, the pilot actions strengthened RRI first and foremost on the micro-level. The Social Labs unlocked participants’ creativity which generated pilot actions that accomplished RRI, generated awareness for, communicated, formalized, and created capacities for RRI. However, the Social Lab also showed that it is insufficient to act on the micro level only. They showed that RRI needs support on the meso-level of institutions to mature single pilot activities; to anchor them in organisational rules, norms, and routines. Finally, it showed that RRI implementation needs strong and continuous political and financial support from the macro-level of national and EU policy making to protect RRI implementation from the ever-changing winds of policy fashions. Thus, the current Framework Programme must continue the work that has been done in NewHoRRIzon and many other research projects on RRI in particular since the concept no longer has as central a role as in Horizon 2020.

In the new framework program, Horizon Europe, there is no room anymore for a dedicated Science with and for Society (SwafS) program line. A shift is observed from RRI towards OOO (Open Access, Open Innovation, Open to Society), Citizen Science, and Mission Oriented science and innovation. Although these new focus points of R & I policy are promising, they run the risk of comparable implementation problems as we faced with RRI (Novitzky et al. 2020). In this regard, the Social Lab methodology that is explored in this volume could contribute a complementary bottom-up strategy to contribute to the institutionalisation of citizen science and mission-oriented research and innovation. Furthermore, as the mission orientation gives rise to a solution strategy that presents responses of dominant actors (Ludwig

et al. 2022), social labs can facilitate agonistic strategies that focus on reflection on the global challenges and the often-conflicting responses involved (Blok 2019). Agonistic strategies seem to be more suitable in current societal debates, ranging from climate change to the corona pandemics, as the trustworthiness of science is increasingly challenged.

Restoring trust in science and innovation through responsible research and innovation does not only require social labs as a bottom-up approach to change science policy but also require another mindset of institutions and of researchers working in these institutions. For instance, research has shown that Open Innovation in industrial Research and Development (R & D) can be aligned with Responsible Innovation objectives but require an explicit normative ethical orientation next to their economic orientation (Long and Blok 2018). The same holds for Quadruple Helix Collaborations to collectively work on grand challenges, that can easily turn from agonism to antagonism (Popa et al. 2021), as the emergence of conspiracy theories and increase of populism across Europe shows. In the past few years, research in RRI has increasingly paid attention to the individual level competencies of practitioners involved in research and innovation, for instance the European projects HEIRRI and ENRICH. It shows the importance to invoke a sense of care and societal obligation in science and innovation, the role of individual competencies for the twenty-first century, and the role practical wisdom may play to increase responsibility in Research & Innovation practices (Meijlgaard et al. 2018; Blok 2018).

Social Labs are all but a panacea. But they might be a powerful remedy to the nowadays allegedly increased distrust in science. The Social Lab's characteristic of bringing stakeholders from very different areas and fields together which otherwise might never had met and motivating them to work together to address a common problem might help to generate mutual understanding between actors and a research and innovation that is truly beneficial to society and the environment.

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