Introduction

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In this volume, we explore methods and practices for the assessment of Responsible Research and Innovation (RRI). RRI aims to encourage societal actors to work together during all phases of the research and innovation (R&I) process to better align R&I and its outcomes with the values, needs and expectations of society (Owen et al. 2013; Stilgoe et al. 2013; European Commission 2014). It explicitly calls on all stakeholders to solve societal challenges and encourages the development and implementation of innovations and technologies that address grand societal challenges. RRI allows leading stakeholders to demonstrate how they help to innovate responsibly, both by minimizing negative impacts and maximizing positive impacts on people and the planet. Understanding the benefits of responsible innovation is crucial to furthering inclusivity, collaboration and transparency in R&I systems. This needs to be built upon, and to deepen understanding of whether and how responsible innovation leads to societal, democratic, scientific and economic benefits, and to provide stakeholders with user-friendly yet advanced tools that help their efforts to improve the outcomes of R&I.

Assessing the benefits and costs of RRI is thus crucial for furthering the responsible conduct of science, technology and innovation. However, until now there has only been limited academic work on RRI assessment. This volume aims to overcome this lacuna by bringing together recent work on this topic. With RRI assessment, we here refer to all those practices, methods and approaches that either assess the effects of certain RRI activities or RRI actions or that assess to what extent existing practices, processes or outcomes of innovation meet certain RRI criteria.

Depending on the context and the approach chosen, RRI assessment can take a range of different shapes and be aimed at different objectives. One possible objective of RRI assessment is to gain insight and to learn in order to improve RRI efforts and their effects. Another objective may be to increase (mutual) accountability. RRI assessment may, for example, help to show that certain RRI (performance) criteria are met, that certain innovations meet specific standards of responsibility and care or to show that money on RRI initiatives is well spent. In these ways, RRI assessment

may also be helpful to encourage or incentivize actors to take up RRI and to develop RRI initiatives.

Whereas many components of responsible innovation are well known, its concept is still to a limited extent applied in practice. To redress knowledge gaps about the benefits of responsible innovation in practice, this edited volume aims at assessing responsible innovation principles and aligning the assessment practices with the United Nations sustainable development goals (SDGs). The contributing authors describe several assessment strategies and methods to encourage different types of stakeholders to innovate responsibly and embed responsible innovation principles into their organizations and the operations of these organizations. We discuss the crucial factors for innovating responsibly, both in terms of what is already done and what could or should happen in the future. We discuss what the exact impact of those factors is on the innovating organization and why responsible innovation is important, and perhaps even inevitable.

In addition to the academic goal of bringing together scholarly work on RRI assessment, this volume has the more practical objective of helping to guide stakeholders on how they can align their strategies as well as monitor, measure and manage their contribution to responsible innovation. The edited volume provides different methods and practices for measuring, monitoring and reporting how well responsible innovation is done and what social, environmental, scientific and economic benefits are achieved by implementing responsible innovation principles. These assessment methods and practices are useful for mitigating risks, strengthening strategic planning and assisting stakeholders in increasing their contribution to responsible innovation. Stakeholders, depending on where they are on the course of implementing responsible innovation practices, can apply assessment methods and practices to increase their relevance and make optimal use of their established strengths.

More specifically, this book explores how responsible innovation can be assessed. This is achieved in the book by providing empirical evidence of the benefits of responsible innovation, by showing improvements in the monitoring system and by presenting proposed assessment schemes for responsible innovation where possible and useful. The edited volume is conducted with a focus on a range of different types of stakeholders and particularly is designed for use at organizational level, but may be applied at product, process, divisional or regional level as required.

Synopsis/overview of the contributions

The book consists of three parts. The first, and shortest, part presents some relevant reflections on responsible innovation, and sets the context for the topic. In the second part, we focus more specifically on responsible innovation in industry. This is a context in which assessment of responsible innovation is particularly important as many innovations originate in companies;

at the same time, until recently much of the literature on responsible innovation has mainly focused on universities, research institutes and the public sector. The third part forms the core of the book. It discusses several approaches and methods, either in use or being proposed, for assessment of responsible innovation.

The first part, “Reflections on responsible innovation,” starts with a contribution by Robert Gianni that provides a general introduction into the notion of responsible innovation, or Responsible Research and Innovation (RRI), as it is often called in the context of the European funding programs. Gianni explains the scientific and democratic relevance of RRI and, in this light, presents an interpretation of the six keys to RRI that have been proposed by the European Commission (EC): engagement, gender, open access, science education, ethics and governance.

The second chapter in Part I provides a reflection on the work of the EC workgroup on Policy Indicators for Responsible Research and Innovation by Roger Strand, who chaired this working group, and Jack Spaapen, the rapporteur of the working group. This reflection helps to set the stage for the later contributions, particularly in the third part on assessing RRI. It shows some of the challenges that come with assessing RRI, and defining policy indicators. For example, how can we do justice to the underlying “philosophical” or “intellectual” notion of RRI while at the same time coming up with a set of indicators that are practically applicable? Or, how do we develop a comprehensive notion of RRI while doing justice to existing operationalizations of RRI, for example in terms of the six keys of RRI defined by the EC?

The second part focuses on a specific context for RRI and RRI assessment, namely corporate settings, or “RRI in industry.” The reason for including this specific focus in this book is twofold. One is that most of the RRI literature until recently has tended to focus on governmental actors, research funding and universities and has relatively neglected corporate settings, which are nevertheless one of the main contexts in which actual technical innovations are developed and brought to the market (Lubberink et al. 2017; Van de Poel et al. 2017). Second, the call for assessing, monitoring or measuring RRI seems particularly strong in this context. One reason might be that the profit motive is believed to be particularly strong for companies, so that without explicit attention for incentivizing RRI, for example through monitoring or assessing RRI performance, RRI will not get off the ground (cf. Gurzawska et al. 2017).

In Chapter 3 on strategic responsible innovation management (StRIM), Agata Gurzawska discusses how innovations in companies can be linked to corporate social responsibility (CSR). She notes that there is no strategic model yet that links CSR to corporate innovation. In proposing a model to do so, she also proposes a way in which RRI can become better integrated in companies.

Chapter 4, by Cristina Covello and Kostantinos Iatridis, discusses challenges and drivers of implementing responsible innovation in

foodpreneurial small and medium-sized enterprises (SMEs). They discuss the case of 19 foodpreneurial SMEs operating in London and find such obstacles to RRI as lack of awareness, time, labor and money, while they find drivers such as personal values, and a concern for societal and environmental well-being. They focus on the inclusion dimension of RRI and find that SMEs practice inclusion through informal channels, and that trust and reciprocity are particularly important rather than that companies prioritize stakeholders in terms of salience based on legitimacy, power and urgency.

Andrea Porcari and colleagues in Chapter 5 discuss how RRI uptake in industry can be supported by a qualitative and multi-criteria approach to analyzing the costs and benefits of implementation of RRI. Their contribution is based on outcomes of the PRISMA project, funded by the EU, that piloted RRI in eight companies. The issue they address is that for companies it is often not evident what the benefits of RRI are, while the costs, in terms of time, labor and money, might seem considerable. Moreover, the costs would seem to be immediate while the benefits of RRI will only materialize after some time. Nevertheless, the pilot studies in the PRISMA project showed that it was possible to find specific RRI actions that are perceived as valuable by companies if one focuses on the specific company and the specific challenges that company faces. On the basis of this experience, they propose a more general approach that can help companies to identify possible RRI actions, and to make a first qualitative assessment of the expected benefits of such RRI actions, that is helpful in devising an RRI strategy at the company level.

In Chapter 6, Edurne A. Inigo and her colleagues discuss whether voluntary standards can support responsible innovation implementation and reporting in industry, with a focus on the European food sector. Voluntary standards can trigger reflection on values like health in food and support the translation of such values into more concrete product requirements that can guide the innovation process. Moreover, front-of-pack labels that signal that products meet certain standards can help to incentivize RRI in the food industry. However, voluntary standards also have their drawbacks; they may lack legitimacy because the process of standard formulation is often not fully transparent or not fully inclusive with respect to all the relevant stakeholders. Some of these drawbacks may be overcome by a larger role of the government, without necessarily switching to a more traditional approach of top-down regulation through legal rules.

The third part, on “Responsible innovation assessment,” presents different approaches, methods and metrics that can be used to assess responsible innovation practices.

In Chapter 7, “Monitoring Responsible Research and Innovation in the European research area: the MoRRI project,” Ingeborg Meijer and Wouter van de Klippe stress how indicators and metrics for RRI play a central role in monitoring systems of innovation practices. They discuss the benefits of RRI in four categories: societal, democratic, economic and scientific. While the primary output of the MoRRI project was the creation of a

monitoring system highlighting changes at the national level, the successor project of MoRRI, SUPER MoRRI project, envisions an alternative future for monitoring and evaluation of RRI in which monitoring happens at the institutional level with local and context-dependent methods.

Following the monitoring and evaluation of RRI at the institutional level, Adele Tharani, Katharina Jarmai, Norma Schönherr and Patricia Urban introduce, in Chapter 8, a diagnostic self-assessment tool to support companies to adapt responsible innovation by drawing on insights from organizational learning. In the context of innovation, self-assessment can enhance organizational learning with a view to foster an organizational culture and innovation capabilities that in turn have a positive effect on innovation performance measures. They aim to enable learning by translating the concept of responsible innovation into concrete corporate practices and policies, ascribing them to specific business functions, so aligning responsible innovation with business realities.

In Chapter 9, Pim Klaassen, Lisa Verwoerd, Frank Kupper and Barbara Regeer present reflexive monitoring in action (RMA) as an interactive methodology for monitoring and assessing RRI that simultaneously facilitates enacting it. They argue that the RRI monitoring framework is most useful when adopted by actors who take part in R&I processes to carefully and systematically reflect on what “responsible” means in their given situation. The chapter illustrates the potential role that RMA can play to promote learning to act in a more responsible manner across researchers, innovators and organizations.

In Chapter 10, “A future-oriented evaluation and development model for Responsible Research and Innovation,” Mika Nieminen and Veikko Ikonen examine a future-oriented evaluation model with a systemic view and multi-actor approach for integrating RRI into the innovation activity. A focal point of their model is co-creation, which helps to define values and operational goals for innovation processes and supports the assessment of the success of these. Similarly to previous chapters, the authors present the assessment process as a loop of continuous learning in which participating organizations and individuals learn from each other during the evaluation process and reflexively develop their activity. To assess the desirability and acceptability of an innovation, the authors propose a dialogic process of anticipating the impacts and outcomes of the innovation from the very beginning. They argue that judgments on the desirability and acceptability of an innovation are supported by creating shared visions for the innovation.

Claudia Werker, in Chapter 11, shows the need for a system approach to assess RRI. She addresses the opportunities and challenges emerging from the digital transformation which changes the playing field of RRI systems. Her chapter, “Assessing Responsible Research and Innovation (RRI) systems in the digital age,” examines shared values for the innovation activity. She believes that it is crucial that stakeholders from all sectors, i.e. government, academia, industry and civic society, have a clear picture of their own values,

how they change in time, what the values of other stakeholders in their RRI system look like and which opportunities and ways there are to develop shared values. Finding jointly acceptable directions and intensity of innovative activities, Werker suggests that we apply shared values as a cornerstone to assess the components and activities of RRI systems.

In Chapter 12, “RRI intensity: a proposed method of assessing the requirement for responsible innovation in ICT projects,” Martin de Heaver, Marina Jirotko, Margherita Nulli, Bernd Carsten Stahl and Carolyn Ten Holter propose the concept of RRI intensity level (RIL) as a method of selecting what type and how much RRI activity is feasible, appropriate and effective. Through asking the question, “How can the level of RRI activity be aligned with the requirements of the innovation project?” the authors develop an approach for defining the desirable RIL based upon assessments of both the anticipated technology readiness level and the innovation potential of the research.

In Chapter 13, “The responsible side of innovation: towards the measurement of a new construct,” Robert Verburg, Laurens Rook and Udo Pesch provide a measurement scale for assessing RRI of employees in business contexts. They focus on the creative behavior of individuals in organizations when it comes to innovation. This stimulates study of the responsibility of employees in international contexts and a comparison of employees from different levels and backgrounds against RRI principles. As such, the RRI measure could also be applied in practice as this will enable companies to compare different departments on their level of RRI. The measure could also feature as an outcome for training and development efforts in the area of RRI or be used for the assessment of employees or managers.

In the final chapter, Chapter 14, “RRI measurement and assessment: some pitfalls and a proposed way forward,” Ibo van de Poel identifies potential pitfalls of measuring RRI and related practices of monitoring and reporting. Two main categories of pitfalls are discussed in this chapter, i.e. pitfalls in measuring RRI and pitfalls that arise from the strategic setting in which RRI assessment is applied. These two categories of pitfalls may reinforce each other and may escalate the danger of window-dressing rather than internalization of the underlying motives of RRI. Van de Poel argues that distinguishing more clearly between different rationales for doing RRI assessment helps to understand better the RRI measurement pitfalls. He distinguishes three such rationales – learning, accountability and incentivizing – and argues that these three rationales are by and large in tension with each other. He suggests that, if one wants to develop and deploy RRI assessment, one should make an explicit choice for one of the rationales rather than trying to serve all three at once.

Overview of best practices

Society’s grand challenges cannot be solved by academic articles alone. We believe that a mixture of sharing successful practices along with research

results may help leading organizations and institutions to foster responsible innovation practices. We offer thus a set of best practices that help organizations and institutions cut through the complexities of implementing responsible innovation and understand the benefits and positive impact of it for themselves and their stakeholders, communities and the environment.

The best practices are presented between the various chapters in Part III of the book. They provide various perspectives of how we can assess responsible innovation within stakeholders from different sectors, i.e. government, academia, industry and civil society.

Beginning with “The B Impact Assessment,” Joey van den Brink from B Lab, a non-profit organization, presents the B Impact Assessment tool, which provides companies with the opportunity to evaluate their impact performance through a holistic framework that covers all aspects of the company’s operations. The company’s impact performance is captured in five key impact areas: governance, workers, community, environment and customers.

In best practice II, Tung Tung Chan and Ingeborg Meijer present the Societal Readiness Thinking Tool (SR TT), which aims at cultivating researchers’ knowledge on RRI, and stimulating integration of RRI in their research project. The SR TT provides questions to guide researchers to reflect on the societal alignment of their work at critical stages in the project lifecycle.

Datamaran company applies natural language processing (NLP) in best practice III to quantify narrative disclosures in annual financial reports, sustainability reports, Securities and Exchange Commission filings, mandatory and voluntary regulatory documents, social media and online news. Donato Calace and Adriana Farenga present Datamaran’s data-driven approach, by which companies can stay in charge of their materiality and risk processes and identify trends that are concealed in unstructured data.

Best practice IV, “PRISMA KPI analysis tool,” provides a basis for discussion about RRI in corporate innovation contexts, and explores the links between RRI and innovation management-related key performance indicators (KPIs). Steven Flipse recommends collecting data in a qualitative manner, in conjunction with this tool, for projects at the beginning, middle and end of their runtime, in order to make sense of the scoring patterns.

Andrea Porcari and Elena Mocchio, in best practice V, introduce a standard for responsible innovation in industry. The standard under development (formally named as workshop CEN/WS¹ 105) aims to provide practical guidelines for organizations to approach and evaluate the most significant ethical, legal and social impacts (ELSI) expected by the development of their innovative products, and to identify an RRI vision and operative RRI actions (roadmap) to address them.

Assessing corporate performance on the SDGs, Lisanne Urlings, in best practice VI, shares the World Benchmarking Alliance (WBA) benchmark approach to drive the private sector’s engagement in the SDGs. The WBA

benchmark envisions a future where companies, investors, governments, civil society and individuals can quickly and easily compare businesses and motivate a “race to the top.”

In the final best practice, Charlotte Portier describes how the Global Reporting Initiative (GRI) practical guide enables businesses to disclose SDG-related information and manage their impact on sustainable development. She argues that, by empowering business to report on their impact on sustainable development and the SDGs, GRI realizes its mission: to empower decisions that create social, environmental and economic benefits for everyone.

Note

- 1 A European Committee for Standardisation (CEN) Workshop (CEN/WS) is a flexible working platform open to the participation of any company, organization or interested expert for rapid elaboration of CEN Workshop Agreements (CWAs). A CWA is a technical document agreed by the participants of a CEN/WS, which can be the basis for future standardization works.

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