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What's in a name? Perceptions and promotion of responsible research and innovation practices across Europe

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What's in a Name?

Perceptions and Promotion of Responsible Research and Innovation
Practices across Europe

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In this paper, we explore how 217 organisations across Europe understand responsibility in the context of research and innovation and how they seek to reinforce responsible practices. There are only limited differences in how public and private funders, companies, universities, and Civil Society Organisations (CSOs) perceive responsibility, but they promote responsible practices quite differently. While CSOs are outward oriented, seeking to influence policy, collaborate with others, and host science events and discussions, private companies are internally focussed on responsible product development, production, and staff. Companies are also more likely to formalise this work in strategies and internal guidelines. Universities resemble private companies, although a large proportion of them host science events. Private and public funders primarily use funding-specific tools to incentivise responsible practices. Most of the organisations are unfamiliar with the Responsible Research and Innovation (RRI) concept championed by the European Commission, but do employ several dimensions of responsibility nonetheless.

1. Introduction

*What's in a name? That which we
call a rose,
By any other word would smell as
sweet.*

Shakespeare, Romeo and Juliet

Building on approaches in technology assessment and evaluation of ethical, legal, and social aspects of scientific and technological development, the notion of Responsible Research and Innovation (RRI) emerged strongly in the European Commission's seventh Framework Programme for Research and Technological Development (Burget et al. 2016). It has since been promoted as a set of guiding principles for governing research and innovation. Broad objectives of 'aligning research and innovation to the values, needs, and expectations of society' (Italian Presidency of the Council of the European Union 2014; von Schomberg 2011) have come together with operational dimensions, or 'key' areas of public engagement, research ethics, gender equality, science education, and open access (European Union 2012) to constitute a framework for improving governance arrangements for research and innovation. A burgeoning academic literature has contributed to the refinement of procedural and substantive elements of RRI (Stilgoe et al. 2013; Pellé and Reber 2013). Over the past 15 years, EU-funded research has endeavoured to further examine, conceptualise, and define RRI (e.g. Gianni 2016; Lindner et al. 2016). Coordination actions have sought to implement change in research performing and funding organisations (e.g. Gurzawska et al. 2017; Yaghmaei 2018; Porcari et al. 2015), and to develop appropriate measures for evaluation and monitoring of RRI (e.g. Peter et al. 2018).

While significant efforts have been devoted to conceptualising and defining the notion of RRI (for a recent summary see Ribeiro et al. 2017), a growing number of studies also aim to empirically map the RRI landscape. Some of these focus broadly on presenting the individual and organisational actors and topical areas that are influential carriers of the RRI discourse (Timmermans 2017). Others take a cross-country comparative approach, notably the RRI-Practice project that developed national case study reports across 12 countries (cf. Damianova and Hajdinjak 2018) and the MoRRI project, which collected RRI indicators across all European Member States (cf. Peter et al. 2018).

At the meso- or organisational level, particular emphasis has been put on examining the saliency and manifestations of responsibility within research performing and funding organisations (Nielsen et al. 2016; Sánchez, Bolívar and López-Hernández 2012; Hennen et al. 20??). Though, attempts to examine the place of and for RRI in the business or industry sector have also emerged (see e.g. Lubberink et al. 2017 for a synthesis of empirical papers addressing issues of responsibility in the business sector). In combination, these studies demonstrate considerable variation in the ways responsibility is being practised across different sites.

In this paper, we add to this line of inquiry concerning empirical patterns of responsibility at the level of organisations using insights and data collected as part of the ‘Responsible Research and Innovation in a Distributed Anticipatory Governance Frame - A Constructive Socio-normative Approach’ (Res-AGorA) project. Our study is distinct from earlier work by taking a quantitative approach that covers and compares five different types of organisations, specifically public funding agencies, private research foundations, universities, private companies, and Civil Society Organisations.

At the time of writing, i.e. in the midst of the negotiations of the next European framework programme to succeed Horizon 2020, the future for RRI as a cross-cutting priority at the European level is challenged and uncertain (Simone 2018; Mejlgaard et al. 2018). The ‘Science with and for Society’ programme line which provided dedicated support for research and implementation activities concerning RRI will not be part of the next framework programme, and it remains unclear whether and how funding schemes for RRI will be made available from 2021 onwards¹. While the momentum, initially raised by supranational commitment, is declining, it is our contention that issues of responsibility in research and innovation remain extremely important, and that it is crucial to understand the mechanisms that are employed to advance responsible practices.

We have revisited 16 country reports produced by national correspondents of the Res-AGorA project capturing manifestations of RRI across core organisations that do, fund, and influence the directions of research and innovation. Inspired by the notion of *de facto* RRI (Randles et al. 2016), we argue that observed practices rather than terminology are important. Invoking Shakespeare, one might say that the potency of RRI is not in its name but in the actual practices. Our objective in this paper is to examine perceptions, prevalence, and patterns of responsible practices across core organisations within the ecosystem of research and innovation. Our approach is descriptive-analytical, and we believe that mapping out the manifestations of responsibility across the core sites in which research and innovation is being performed, funded, and negotiated can inform and inspire future efforts to bring science and society closer in useful ways – whether these are referred to as RRI or not.

2. Data and Methodology

The empirical basis for this paper is 16 country reports developed as part of the Res-AGorA project. Each report addresses the understanding of responsibility, the use of mechanisms to stimulate responsible practices, and the perceived hindrances to this effort across major organisations in the national research and innovation system. Res-AGorA was funded by the European Commission and ran from 2013-16. The project employed an extensive empirical research programme to investigate practices across Europe, used to inform the development of a ‘Responsibility Navigator’ with ten governance principles for making research and innovation more responsive, responsible, and sustainable (Lindner et al. 2016). As a component of the empirical programme, national reports were developed for Austria, the Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Lithuania, the Netherlands, Poland, Spain, and the United Kingdom. The

¹ See “Pathways Declaration” at http://pathways2019.eu/wp-content/uploads/2019/07/RRI_Declaration.pdf

selection was motivated by an ambition of capturing heterogeneity across Europe (Mejlgaard and Griessler 2016).

The country reports were produced by national experts, often researchers in science and technology policy, who were either members of the Res-AGorA consortium or recruited for the monitoring exercise. The country correspondents selected and analysed one prominent national public funding agency, one large private research foundation, ten universities, two larger research or innovation-driven private companies, and one Civil Society Organisation (CSO). The correspondents analysed strategic documents and interviewed one or two key representatives (e.g. an employee at senior level working with CSR and a senior employee in the R&D unit of a private company) for each of the organisations in their country, except for universities where the reports were based solely on document analysis (Mejlgaard et al. 2016a).

Data collection took place from 2014-16. The reports covered the following main themes: salience of RRI or related agendas around responsibility, the manifest and latent RRI or RRI-related ideas present in the organisation, initiatives in place to promote RRI or related principles within the organisation, and the perceived main hindrances to this effort. Importantly, the correspondents did not only search for references to the six keys of RRI as defined by the European Commission, but strived to unfold and analyse the organisations' current understandings of responsibility more broadly. To allow for consistency across the country reports, and thus enable cross-country comparison, the country reports followed the same set of guidelines for data collection, the same semi-structured interview protocol, as well as a standardised template for the write-up of the report (ibid; Mejlgaard et al. 2016b).

Despite standardised guidelines, the length of the reports vary between 19 and 52 pages. For the purposes of this paper, we translated these lengthy reports into a manageable number of binary variables in a collaborative coding process. First, the corresponding author did an initial segment-by-segment coding of three country reports: Denmark, Hungary, and the Netherlands, using the qualitative data analysis software NVivo (Charmaz 2006). Coding refers to “the process of sorting your data into various categories that organize it and render it meaningful from the vantage point of one or more frameworks or sets of ideas” (Loftland 2006: 200). While this was informed by the main themes of the country reports and the RRI-keys, which were expected a priori, the procedure remained open to capture the diverse understandings of responsibility and mechanisms to support responsible behaviour as they appeared in the data. The initial thematic coding was exploratory and resulted in no less than 156 codes. The initial codes were evaluated in a focussed coding; similar themes were grouped together, and less prevalent or unclear themes were omitted (Charmaz 2006; Miles et al. 2014; Bernard et al. 2017). This approach resulted in 13 different RRI dimensions and 22 different types of mechanisms to promote RRI, which were all assigned values as present (1) or absent (0) in each organisation. The use of the specific RRI term within organisations was also coded into a simple binary variable, i.e. yes (1) or no (0). Second, based on the initial coding list, the corresponding author developed a codebook, which she pre-tested on the Austrian country report and refined based on the results. The revised codebook, coding guidelines, and a standardised coding template were shared with the co-authors for thorough coding of the remaining country reports. To ensure sufficient reliability and consistency across our codes, we double-coded four of

the country reports to identify uncertainties and inconsistencies. This could for instance be similar variables that are hard to distinguish e.g. “unit” as a formal administrative body established to work with issues of responsibility inside an organisation and “network” as a more informal and social group. We discussed such issues and wrote an extension to the coding guide to make sure we had the same understandings.

The dataset includes information on 22 public funding organisations, 16 private research foundations, 134 universities, 30 private companies, and 15 CSOs, a total of 217 organisations across Europe². It is a unique dataset offering a wide overview of how responsibility is understood and addressed across Europe and allows for comparison of different types of organisations across the public and private sector³. It is important to note, however, that it is not a representative sample of organisations across Europe. The country reports focussed on large and well-established funding organisations as well as companies and CSOs that are already quite advanced in their work with responsibility-related activities (e.g. Corporate Social Responsibility activities). Furthermore, it should be recognised that the country reports are not exhaustive. They may not capture all initiatives to promote RRI or related concepts within the organisations in the sample. This is particularly true for the universities, which were examined using document analysis only, and often treated collectively as a sector rather than individually in the country reports. This made them hard to code, and throughout the following sections of the paper, we should stress the risk of underestimating the efforts of the universities.

3. Findings

3.1 Organisations work with multiple aspects of responsibility but are unfamiliar with the notion of RRI

The RRI concept is new to most of the analysed organisations; only 13 of the 217 organisations explicitly use the term in their strategic documents: four in the Netherlands; two in Denmark, France, and Spain respectively; and one in Germany, Italy, and the UK. A few of the organisations are indeed aware of the RRI concept and intend to use it in their future strategic work, others use comparable concepts such as Technology Assessment or Cooperate Social Responsibility instead of RRI.

Despite the limited use of the RRI concept, most of the organisations have worked with key components of responsibility in their innovation and research practices for years without using the exact term. In Table 1, we have summarised the most common aspects of responsibility that organisations focus on in their expressed values, goals, strategies, or the work that they do.

² See the full list of organisations in Appendix A.

³ Mapping the average number of responsibility-related dimensions and mechanisms used to promote responsible practices in different countries did not reveal geographical patterns. We attempted an agglomerative, average linkage, hierarchical cluster analysis using the Simple Matching Coefficient to explore national or regional patterns (Anderbjerg 1973; Ekström 2011; and Everitt et al. 2001). We found no such patterns in the data.

Table 1: Share of organisations focusing on given dimensions of responsibility	
Dimension of responsibility	Per cent
1. Education Organisations focus on education and training of pupils, university students, researchers, or employees, e.g. by valuing training, by teaching, contributing to curricula, or financially supporting educational activities.	85 %
2. Societal impact and challenges Organisations focus on their role in and impact on local community or society as a whole, and seek to create solutions that serve the needs of people, benefit citizens, or solve grand societal challenges.	73 %
3. Ethics Organisations focus on research integrity and on cultivating ethically appropriate research and business practices, e.g. by applying a Code of Conduct or complying with specific rules for animal testing and clinical trials.	68 %
4. Equality and diversity Organisations focus on equality, inclusion of minorities, and diversity in their organisation or in public debate, e.g. by publicly expressing such values, setting goals for the number of women in management, or working actively to fight discrimination.	55 %
5. Sustainability Organisations focus on environmental impact and sustainability, for instance by raising awareness about such issues, engaging in environmental protection, or seeking to reduce emission of greenhouse gases.	55 %
6. Governance of research practices Organisations focus on creating governance principles for research and innovation processes, e.g. by making their own RRI-related principles to guide their work, contributing to national rules or guidelines, or voluntarily adhering to international standards.	53 %
7. Public engagement Organisations focus on raising awareness and interest in research, on science communication, science education, or engaging the non-academic public (or non-university students) in research discussions, decisions, and processes.	41 %
8. Transparency and Open Access Organisations focus on transparency in the research processes and results or on Open Access specifically, e.g. by allowing the public to follow the research process and access trial results, by having an Open Access policy, or by hosting an Open Access platform.	39 %
9. Health and safety Organisations focus on health and safety internally or externally, e.g. through procedures to secure a safe work environment, awareness raising about diseases, or promotion of health consciousness as well as financing or implementing health care initiatives.	35 %
10. Interdisciplinarity Organisations focus on interdisciplinarity e.g. valuing it as a tool to further responsible research and innovation or actively facilitating interdisciplinary collaboration.	25 %
11. Stakeholder inclusion Organisations focus on including stakeholders, i.e. people who hold a direct interest in the research process or its outcomes such as employees, suppliers, customers, shareholders, or public authorities, in the research or innovation process.	24 %
12. Economy Organisations focus on contributing to economic growth, job creation, or welfare in their local community or country.	23 %
13. Culture Organisations focus on culture, cultural heritage, and cultural dissemination, e.g. by supporting, participating in, or facilitating cultural projects such as art, films, and music.	17 %

The sheer volume and diversity of different understandings of responsibility that organisations apply in relation to their work and the surrounding society is a notable result. Clearly, the implicit organisational concepts of responsibility are diverse and go well beyond the six keys of RRI.

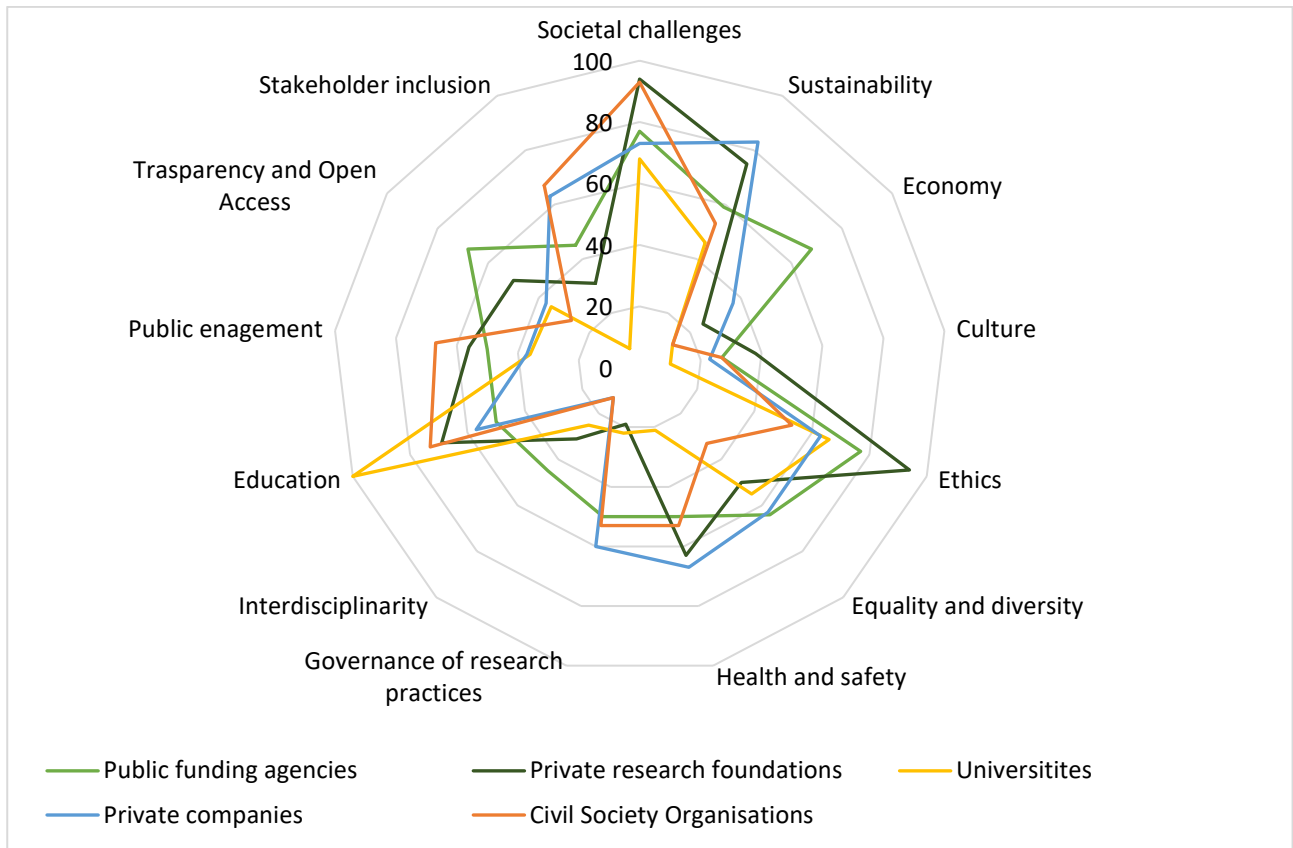
In the initial qualitative thematic analysis of the data, education generally appeared as a dimension of an organisation's responsibility both internally and externally. It is hard to imagine universities without educational activities, but due to the properties of our data on universities, this may not be captured correctly in our dataset. We have thus coded a focus on education for all universities as a default. Due to the large number of universities in our sample, education comes out as the most prevalent dimension of responsibility, which 85 % of the organisations focus on. Following education, a large proportion of organisations (73 %) specifically address societal impact, which largely encompasses the general idea of RRI: a concern for local community, for creating solutions that serve or benefit citizens, and solving societal challenges. This is closely followed by a focus on ethics (68 %), which includes specific principles for conducting research in an ethical manner, e.g. weighing benefits and harm, conducting medical trials in accordance with directions offered by ethical bodies, or abiding to specific principles in relation to animal testing.

Table 1 offers an impression of the breadth and diversity of the range of concerns that organisations may have in relation to their understanding of responsibility. We will not meticulously go through all the dimensions, but instead turn to the differences between types of organisations.

3.2 Only subtle differences in responsibility focus between types of organisations

Figure 1 shows the share of organisations across the five types that focus on each dimension of responsibility. Overall, the differences are modest.

Figure 1: Percentage of organisations across types focussing on a given dimension of responsibility



The funding organisations are very concerned with the aspects of ethics as well as transparency and Open Access. Overall, 94 % of the private research foundations focus on ethics, which is also important to 77 % of the public funding agencies. Similarly, 68 % of the public funding agencies find transparency in the research process and Open Access to be important markers of responsibility; this applies to half of the private research foundations. An interesting difference between the public funding agencies and the private research foundations is that half of the public agencies are concerned with the governance of research practices, whereas this only applies to 19 % of the private foundations. Another difference is that rather few (only 25%) of the private research foundations are concerned with responsibility in terms of contributing to the economy whereas 68% of the public agencies explicitly seek to strengthen growth, job creation, or welfare in their country. Many of these organisations are probably established with this specific goal, as is the case of the Austrian Science Agency, which aims to contribute with “cultural development, to the advancement of our knowledge-based society, and thus to the creation of value and wealth in Austria” (Griessler 2016: 1). The public funding agencies also stand out with a strong focus on interdisciplinarity compared to the other types of organisations.

While a high overall share of organisations focus on equality and diversity, this only applies to a third of the CSOs.

Lastly, it is notable that universities stand out with a limited focus on health and safety, which was only identified among 21 % of the analysed universities. Similarly, only 7 % of universities focus on

stakeholder inclusion. As already mentioned, we have to be very careful not to draw too strong conclusions regarding the universities in this dataset, due to the nature of the data.

3.3 Organisations use many different tools to promote responsible practices

The 217 organisations covered by this study exhibit a very diverse range of understandings of responsibility in the context of their research and innovation activities. We also find that the mechanisms they employ in order to cultivate responsibility are quite diverse. The organisations have developed many different initiatives aimed to strengthen responsible research and innovation practices. In Table 2 below, we present these initiatives in order of frequency.

Table 2: Share of organisations using given mechanisms to promote responsibility	
Mechanisms to promote responsibility	Per cent
1. Strategy Principles related to responsibility dimensions are included in the strategies, goals, or policies of the organisations, e.g. specific plans to reduce carbon emission by 20% in 2020 or implementation of a strategy to employ more women in management.	56 %
2. Guiding Organisations have <i>internal rules</i> guiding the work of researchers, students, and/or employees to be more responsible, e.g. an ethical code, code of conduct, rules for clinical tests and testing on animals as well as mechanisms to enforce such rules like a hotline for violations.	43 %
3. Cooperation Organisations collaborate (locally, nationally or internationally) with local authorities, NGOs, universities, or businesses in order to discuss or act on questions of responsibility, e.g. universities joining forces to make research more relevant to society.	35 %
4. Adhering to voluntary standards Organisations adhere to or support non-mandatory local, national, or international standards or principles regarding responsible behaviour, e.g. the United Nations' principles for responsible management education or the Berlin Declaration on Open Access to scientific knowledge.	28 %
5. Unit Organisations have a formal administrative body, staff unit, or an officer to discuss and/or act on issues related to responsible practices with a degree of decision-making power, e.g. a council, committee, or chair on gender equality or ethics.	26 %
6. Event Organisations host or support activities aiming to communicate science, research, or innovation and get people interested and engaged in these topics, e.g. educational events for children and youngsters, science fairs, festivals, researchers nights, science cafés, open house events, etc.	26 %
7. Supporting RRI-related research Organisations <i>as a whole</i> prioritise or financially support research into specific responsibility-related issues, e.g. promoting research in gender equality or by running a research centre that focus on RRI research.	26 %
8. Discussion Organisations host or support activities (internal and external) that bring people, e.g. stakeholders, together to facilitate discussion or dialogue about science and research priorities. These are <i>face-to face</i> meetings like conferences, discussion groups, seminars, and round tables.	23 %
9. Training Organisations conduct or support teaching, training, or education activities directly related to principles of responsibility, e.g. training researchers in communicating their work broadly, teaching employees ethics, or educating students in sustainability.	23 %
10. Funding Organisations offer or contribute to grants specifically for RRI or related purposes (e.g. for open access publishing) or otherwise offers funding based on responsibility considerations (e.g. grants for women to enhance equality in research).	21 %
11. Setting requirement Organisations require that researchers meet certain demands related to responsibility or discuss these when applying for funding. This could e.g. be requiring that half of the research team are women, or that researchers consider potential societal harms and benefit of their project.	13 %

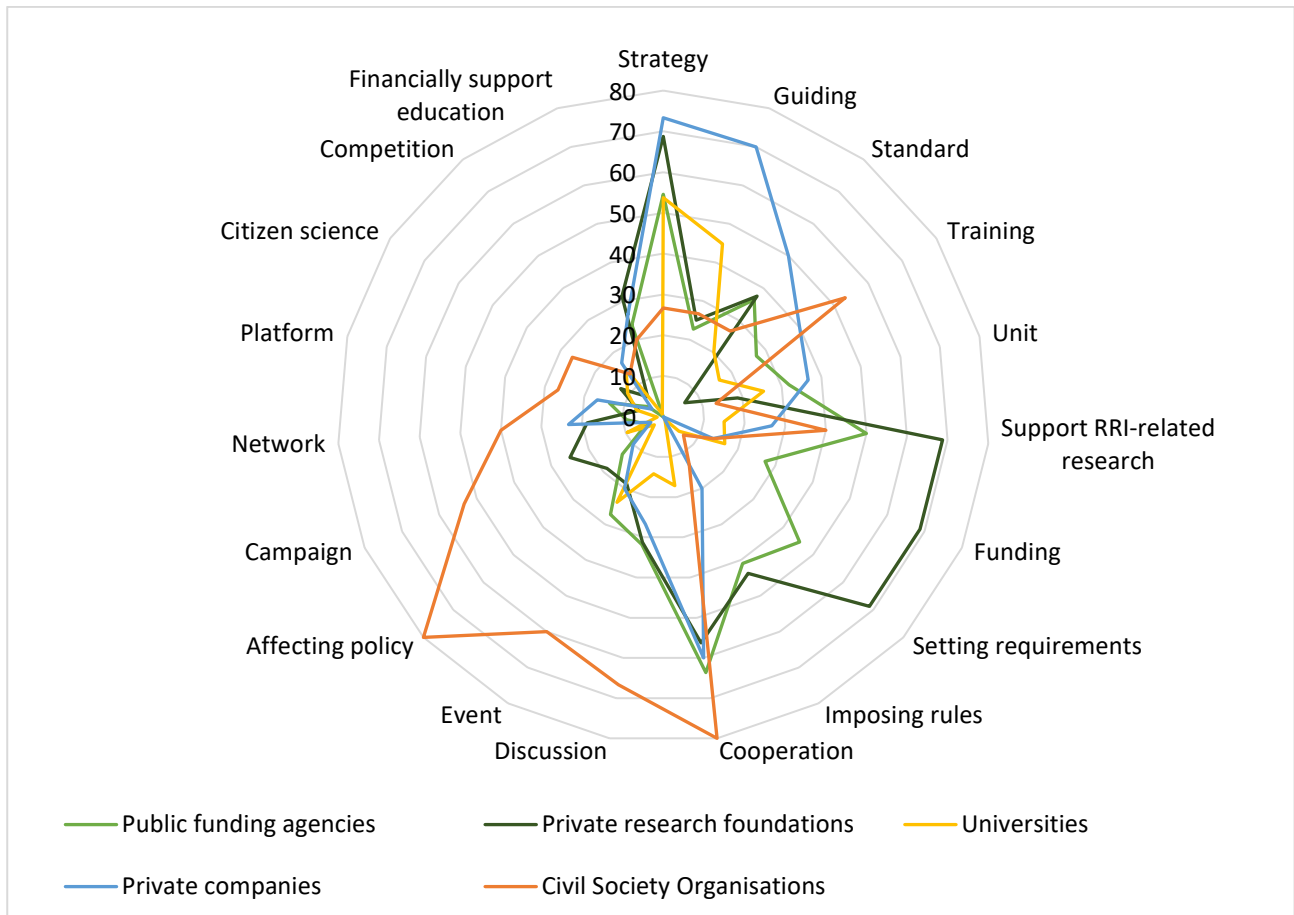
12. Competitions, prizes, or awards	13 %
Organisations host or support competitions, awards, or prizes related to responsibility principles, e.g. research competitions among pupils or high school students to get them interested and involved in science, or awards to excellent research by female scientists.	
13. Campaign	12 %
Organisations host or support public information campaigns or other activities to disseminate research results or facilitate public discussion about responsible science and technology. This is e.g. media activities, public appearances, writing for newspapers, or press releases.	
14. Imposing rules	12 %
Organisations impose rules or principles of responsibility <i>on others</i> , e.g. by requiring sustainable production, workers' rights for health and safety, anti-discrimination, or ethical guidelines by suppliers or partners.	
15. Affecting policy	12 %
Organisations work to affect policy, legislation, or public authorities on a local, national, or international level in a responsible direction. This can be lobbying or by representing certain interests in government bodies.	
16. Citizen science	10 %
Organisations host or support citizen science initiatives where the general (non-scientifically trained) members of the public conduct science, e.g. by collecting data.	
17. Platform	10 %
Organisations host or support an online platform for creating, communicating, or discussing research, e.g. an online Open Access platform, research blog, or open source forum.	
18. Financially supporting education	10 %
Organisations <i>financially</i> support educational activities.	
19. Network	10 %
Organisations facilitate informal groups or networks to enhance organisation, support, or social ties in certain groups or host events for these groups, e.g. women or minorities.	

Including principles of responsibility in strategies, policies, and goals is the most common way to promote responsibility in research and innovation practices. More than half of the organisations do this (56%). This includes for instance aims related to the environment, such as minimising the use of electricity or water, which may reflect a more general trend of an increased focus on sustainability over the past two decades (Benn et al. 2014; Linnenluecke and Griffiths 2010). Coming in second, internal guidelines are widely used among the analysed organisations (43 %); these are primarily codes of conduct and ethical guidelines, which are present at far most of the private companies and almost half of the universities. Roughly a third (35 %) of the analysed organisations focus on cooperation to promote responsible practises, i.e. collaborations with external partners or between distinct parts of their own organisations

3.4 Different types of organisations have different approaches to promote responsible research and innovation practices

In Figure 2, we illustrate the share of organisations across the five different types that apply a given mechanism to promote responsible practices. It is evident that there are more pronounced differences between the organisations in these matters of implementation practices than was the case regarding the patterns of perceptions of responsibility.

Figure 2: Percentages of organisations across types using given mechanisms to promote responsible practices



The CSOs are outward oriented in their efforts to promote responsible practices. Overall, 80 % of them engage in cooperation with other organisations to discuss or act on questions of responsibility. Moreover, 80 % also lobby their ideas and interests to policymakers and administration. Among the other types of organisations, this mechanism is rarely used. A large proportion of CSOs also facilitate discussions about science and research priorities, contribute to or host science events, and implement public campaigns. Moreover, a large share of CSOs also implement or support RRI training activities, host online platforms for dissemination of science, create informal groups or networks, and support or implement citizen science initiatives. It is interesting to note that the CSOs largely implement these initiatives without formalising them in official strategies, policies, or goals; only 27 % of the analysed CSOs include principles of responsibility in their strategies, which is substantially less than the other organisations. Similarly, only 13 % have established specific units within their organisation to discuss or implement this work.

The private companies have an almost opposite profile than the CSOs. They are more likely to formalise their work to promote responsible practices than the other organisations. 73 % of the private companies incorporate principles of responsibility into strategic goals and policies, 70 % of them implement and enforce internal guidelines for their work, and half of the private companies adhere to voluntary standards. Similarly, little more than a third of them have established units within their organisations to discuss or act on responsibility issues. 40 % of the companies also engage in RRI-

related training activities, which is primarily training of their own employees on areas including courses and workshops on ethical codes or specific rules and procedures in research. Most of these tools are oriented inwards at making the research and innovation process, the production, or the staff more responsible. However, 60% of the companies also cooperate with other actors or facilitate cooperation among distinct parts of their own organisation to promote responsible practices.

The private research foundations primarily use tools that are related to their role as funders to promote responsible research and innovation practices. Overall, 69 % of the private research foundations set responsibility-related requirements for applicants to achieve funding, provide financial support specifically for research in research integrity, RRI, gender equality, ethics or the like, and offer funding for particular responsibility-related purposes, such as Open Access publishing or public engagement events. They are also slightly more likely to financially support educational activities and impose rules on others to enhance responsibility. The public funding agencies generally follow the trend of their private counterparts. The mechanisms employed are rather specific to the funding organisations as they are primarily based on creating financial incentives to incorporate ideas of responsibility in research projects.

A noteworthy difference between the public and private funders is that 27 % of the public funding agencies implement responsibility-related training activities. This only applies to one of the private funders. One might argue that there is a risk that requirements become mere ‘tick-boxing’ in research proposals, if they are not backed by training on why this is important, how such requirements can be fulfilled, and how to implement them into daily work. With the current data, we cannot say if this is the case, but only encourage future research to look more into this question.

Similar to the private companies, the universities seem to be internally oriented and rather formalised in their effort to promote responsible research and innovation practices. About half of the universities have incorporated principles of responsibility in their strategies and policies. Likewise 45 % have implemented responsibility-related internal guidelines and 25 % work with these issues in internal units. However, almost one in four universities also host or support science events to communicate science. Overall, the universities seem to be less active in promoting responsible practices compared to the other organisations in our sample. This may indicate a trend, but because of data issues regarding the universities, this may not present a fair and accurate image but indeed underestimate the efforts of the universities.

In Table 3, we have summarised the differences between the organisations in an attempt to characterise their distinct features⁴.

⁴ We collected data on the number of employees in each organisation using Google-searches, the organisations’ websites, and the ETER Database (www.eter-project.com) to see if the differences found are merely a product of organisational size. We categorized organisations as ‘small or medium sized’ if they had less than 150 employees, ‘large’ if they had between 150 and 999 employees and ‘very large’ if they had 1000 or more employees. We ran the above descriptive analysis again but did not find significant differences in the mechanisms used to promote responsible research and innovation practices in organisations of different sizes.

Table 3: Overview of differences between organisation types

Funding organisations	Universities	Private companies	CSOs
Concerned with ethics and transparency/Open Access, although public funding agencies are also concerned with contributing to the economy.	Education appeared in our data as a dimension of responsibility, which is one of the primary tasks of universities.	Focussed on sustainability (in production), health and safety (of employees) and governance of practices.	Concerned with public engagement and stakeholder inclusion.
Primarily use funding specific tools to incentivise responsible research practices: setting requirements for funding, funding specific responsibility-related initiatives, and funding research in RRI or related areas.	Primarily internally oriented in their efforts to enhance responsible research practices: incorporating aspects of responsibility in strategies, establishing internal guidelines and units to work with such issues. Comparatively lower priority given to this effort.	Their work to promote responsible research and innovation is formalised and internally focussed with strategies, internal guiding and standards, units and training (of employees) as core mechanisms.	Characterised by an external focus in their efforts to promote responsible research and innovation practices by hosting events, discussions, campaigns etc. They are comparatively the most engaged organisations in this area, although the work is not formalised in strategies and designated units.

3.5 Several hindrances to promote Responsible Research and Innovation

The above analysis demonstrates that many initiatives have been set up across Europe to strengthen responsible practices. In the interviews with key actors in each analysed organisation (except the universities), the country correspondents also asked about hindrances to promote RRI specifically. We summarise these in Table 4. These are general reflections, concerns, and perceptions of a few individual interviewees across the organisations and we present them in these general terms and not at the organisational level as in the previous analysis.

Table 4: Main hindrances to promote RRI

1. Lack of funding

General economic pressure in research and development and a lack of funding specifically for initiatives to promote RRI hinder implementation. This cuts across all types of organisations.

2. Priority

Private companies seek economic growth, researchers seek to publish articles in high impact journals, and CSOs and funding agencies seek funding to uphold their activities. Often, these pressures and priorities do not allow room for implementing initiatives to strengthen responsible practices.

3. Scepticism

Lack of recognition of RRI and its potential benefits among key players in industry, scientific communities, or the public is a hindrance. Some informants expressed direct organisational resistance to its implementation.

4. The RRI concept

The RRI concept is unknown to many organisations, it is unclear how it differs from other ideas of responsibility, hard to define and operationalise, and there is a lack of criteria and tools for RRI evaluation.

5. Lack of political support

No or a low degree of political vision and will to further RRI from national policymakers, public funding agencies, or university administrators. This leads to a lack of funding and an absence of national regulation or requirements.

6. Difficulties in assigning responsibility

Assigning responsibility for the implementation of RRI activities and control procedures can be problematic. Some funding agencies, universities, and companies have difficulties defining their own role and hence pass the responsibility to promote change to others.

7. Lack of knowledge and skills

There is a general lack of information about RRI and its implications. This deficit can be detected both on the side of academics and on the side of broader publics.

The main obstacle to implementing initiatives to promote RRI is a lack of financial resources. A low degree of political support or will to allocate money for the area or direct cutbacks in public funding for research and innovation have left especially universities, funding agencies, and CSOs struggling to find funds for RRI activities, such as science shops and online platforms for science dissemination. Similarly, there are no operational financial incentives for researchers to engage with RRI. The deep economic crises in some countries (e.g. Greece and Iceland) have exacerbated these tendencies, forcing decision-makers to limit research activities to a minimum and thus leaving ad hoc projects without funding. The primary aims of research activities in these countries are economic stability and growth, and collaborations between industry and academia are thus rewarded due to their expected ability to create patents and jobs. This does not necessarily leave much room for RRI initiatives, as it was, e.g., uncovered in the country report on Iceland: ‘Moving towards an RRI mentality and tackling societal challenges when the basics of the research and innovation system are not fully functional is a bit like running before you learn how to walk’ (Jonsdottir and Thorkelsdottir 2016: 6).

In countries that have experienced economic crisis and cutbacks in public funding for research, public funding organisations have primarily focused on absorbing resources and maintaining their existing work, which is the case in Greece. This is also an issue in Lithuania, where CSOs are fighting for ‘economic survival’, not leaving resources to prioritise RRI initiatives.

A related issue is the way the funding system works. Temporary project funding for limited, specified activities makes it hard to plan, develop, and sustain RRI projects over a longer period of time and

creates instability. This is typical for most non-governmental organisations but also for organisations (e.g. universities) that heavily rely on private funding (e.g. from industry).

The financial issues do not just apply to universities, funding agencies, and CSOs. Private companies are also affected by a lack of funding. Ensuring an ethical supply chain, investing in cleaner technology, training employees, upholding outreach programmes, etc. are all subject to financial investments. In times of economic downturn or low prices, companies may carefully scrutinise the activities not considered ‘core business’, and thus RRI initiatives may not be their main concern. This of course has a lot to do with priority, the second major hindrance to RRI. Companies are, not surprisingly, driven by an aim for economic growth, and though that is not in contrast to responsible practices or e.g. CSR they might face trade-offs where they opt for economically advantageous decisions at the expense of for instance sustainability. In several countries, company interviewees highlighted that sales, marketing, or growth-based models can hinder RRI: companies only invest in projects if they can expect an economic return, and this concern sometimes overrules principles of RRI.

It is not only the private companies that do not highly prioritise RRI. There is a dominant conception across European universities that research excellence can be measured in terms of quantitative publication output and researchers’ abilities to publish in high-impact journals. Moreover, researchers are expected to secure funds for their work and institutions. Their careers depend on their ability to meet these demands, which does not leave much room for RRI initiatives. Some researchers may even find that RRI can interfere with their careers, and are reluctant to, for instance, engage in participatory or multidisciplinary approaches as they lack dedicated journals. Similarly, seeking to publish in high-impact journals does not always align with the RRI principle of Open Access.

While there might be difficulties related to implementing RRI principles and activities due to lack of funding or because organisations have different priorities, there are also signs of more profound scepticism or direct resistance when it comes to the RRI concept. Some key players in industry and especially in the academic communities in Europe do not see the benefits of science communication and public engagement. The main reservation exists in the scientific communities where academic freedom and autonomy of researchers are very strong values. Here, the dominant belief is that only scientists should make decisions regarding science; a serious hindrance to promoting public engagement at these universities. Some interviewees also claim that a similar scepticism exists among the broader public who are unwilling or uninterested in engaging in science and voice their demands on these issues.

In several countries there is no or only a low degree of political interest, will, or vision to develop plans for RRI either because the current political power structure does not favour more direct democracy or that policy is highly influenced by other concerns. In some cases, no one really takes responsibility for stimulating RRI initiatives or develop responsibility aspects of existing programmes. This may very well be a result of lack of political determination, hence resulting in a lack of legislation or requirements more generally. In Austria for instance, most of the initiatives on RRI concern gender equality, where legislation does exist, indicating that political priority and measures implemented top-down do matter. A few informants mention the distinction between soft

and hard governance and highlight that setting formal requirements and not just informal encouragements will be vital to promote RRI.

Another substantial hindrance to strengthen responsibility in research and innovation is the RRI concept itself. Key actors in CSOs, public research agencies, and private research foundations find the concept weak: it lacks support from well-founded literature, its definition remains unclear, and it is hard to operationalise and thus difficult to transfer into practice. This complicates cooperation between national and international partners who have a hard time finding common grounds on the understanding of RRI. Similarly, it is difficult to identify criteria or tools for RRI evaluations. Several organisations also raise concern about the actual need for the concept and find it, to some degree, redundant. Either because they are already working with keys of RRI without knowing the concept, or because they rely on more established concepts, like research ethics, which has a longer tradition. It is hard for funding agencies to explain to researchers why this new concept is important and there is a risk that the introduction of a new concept will be perceived as implying that former practices were not responsible – even if this is not the case.

The last of the hindrances that cuts across some countries and organisation types is a lack of information, expertise, and experience. Interviewees reported on lack of capabilities both among members of the public and within the scientific community when it comes to developing shared understandings and development of a common language around engagement and co-creation of research and innovation.

4. Discussion of findings

In this article, we have investigated how 217 research performing and funding organisations across Europe understand responsibility in relation to their work, which tools they apply to reinforce responsible practices, and what they perceive as hindrances to this effort. In this section, we present and discuss the primary findings and their policy implications.

Only 13 out of the 217 organisations in our sample use the RRI concept, despite the effort of the European Commission to mainstream it throughout the research and innovation communities of Europe in recent years (Owen et al. 2012; Zwart et al. 2014). Nevertheless, most of the organisations examined in this study employ multiple aspects of responsibility and have broad and diverse conceptions of responsibility in relation to their work, also beyond the six keys of RRI. Most frequently, such conceptions include a focus on education, societal impact, and ethics.

There are only subtle differences between the understanding of responsibility between public and private research funders, companies, universities, and CSOs. However, their implementation approaches to promote responsible practices are quite different. The CSOs are outward oriented and host or support discussions, events, and campaigns. They collaborate with other organisations to discuss or address issues of responsibility and they work to influence policy. They do not tend to formalise this work in strategies, internal guidelines, and in dedicated units within their organisations. The private companies are opposite; they primarily use such tools and are internally focussed around product development, production, and staff in their effort to be more responsible. The private research foundations and public funding agencies primarily use funding specific tools like setting requirements

to receive funding, offering funding for specific RRI-related purposes, or funding particular research areas to incentivise responsible practices. The universities are harder to characterise. They are, similarly to the private companies, quite formalised and internally focussed in their effort to promote responsible research, but a large proportion of them also host or support open science events.

Standing at the threshold to the next European framework programme for research and innovation, Horizon Europe, it seems obvious to raise the question of whether RRI is adequately mainstreamed to withstand declining attention at the supranational level. The immediate answer is ‘no, probably not’. As our results suggests, the concept is still poorly institutionalized, it is considered unclear, hard to operationalise and evaluate, and its unique contribution in comparison with related concepts, of e.g. research ethics, is not convincing to informants in our study. RRI is potentially a controversial issue, which requires a lot of deliberative consideration, debate, and practical changes within implementing organisations before it is accepted (Van Oudheusden 2014). Meanwhile, it is still an evolving concept and a social innovation where dissemination and adoption it expected to take a long time (Rip 2014). One might argue that more time is simply needed. In addition, our results suggest a more general challenge in the implementation of RRI through soft, multi-level governance. Soft governance is a decentralised processes of governing relying on complex collaborative networks (for policy-making and implementation), which are not directly steered by a centralised authority like the state (Rhodes 2007). Typical to these arrangements is also that steering takes place in the form of various informal guidelines, meetings, information dissemination etc. instead of binding regulation (Brandesen et al. 2006). The absence of regulation and non-ambiguous incentive structures add to the slow adoption across Europe.

However, ‘liberating the responsibility-agenda in the transition from Horizon 2020 to Horizon Europe might involve useful opportunities for adjusting the policy approach. Rather than imposing top-down a particular concept of responsibility in research and innovation, it might be helpful to refocus policy efforts towards established and prevailing notions of responsibility, tapping into the language that core actors in the research and innovation landscape already use, and to pursue schemes that create motivation around practices that are already familiar. The mapping of perceptions and activities, as in the present study, could be used to inform a more context-sensitive and flexible policy approach.

Likewise, mapping may help identify areas that are underdeveloped or lacking attention among certain actors in the research and innovation systems. For instance, only 24 % of the organisations covered in this study focus on stakeholder inclusion, an observation which is arguably at odds with aspirations for ‘opening up’ research and innovation processes to broader participation and co-creation (Stirling 2008; European Commission 2016). Another observation is that public funding agencies seem to lack behind their private counterparts when it comes to incentivizing responsible practices, which might point to a ‘responsibility deficit’ that could be addressed through targeted policies. Overall, exploring patterns across organisations, including perceived obstacles to responsibility, might be conducive to the making of new policies in this area.

This article offers a snapshot overview of the status of RRI and broader concerns about responsibility across research performing and funding organisation in Europe. We cannot, with the data that we

have at our disposal, provide any detailed explanations of the differences between types of organisations; neither can we investigate the relationships between dimensions of responsibility and mechanisms used to further them in greater depth. Our hope is that the mapping effort can raise questions, stimulate further research, and contribute to a policy discussion about the need for and approaches to enhancing responsibility across the European research area.

The future of the RRI agenda is uncertain, but we find it noteworthy and encouraging that while the RRI notion itself has had modest impact, there is a multitude of responsibility-related issues that are considered salient across core actors in the ecosystems of research and innovation and several initiatives already set in place to further the agenda. After all, the sweet smell of the rose is not due to its name: it is important to acknowledge the efforts devoted to fostering responsibility across European research and innovation organisations, whether these efforts are coined as RRI or not.

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