Chapter 5
Key Findings in the Organisational Study

Abstract In this chapter, we build on and extend the discussion on how we may further the implementation of Responsible Research and Innovation across types of organizations. We consider first the structure of universities as a driver and barrier for RRI, using Mintzberg's study on the structure of organisations with an emphasis on expert bureaucracies; second, we consider academic culture as a barrier and opportunity for RRI, using Schein's layered model of organizational culture; and third, we discuss isomorphism and the role of funding organisations as a salient environment for research performing organisations, using core insights from neo-institutional theory.

Keywords Responsible research and innovation · Organisational structure · Expert bureaucracies · Organisational culture · Organisations as open systems, isomorphism · Neo-institutional theory · Organisational change · Implementation

5.1 The Structure of Universities as Barrier and Driver for RRI

In Chap. 4 we discussed how structural organisational fragmentation operated as a barrier to RRI uptake. We also showed how norms and values of academic freedom and scientific autonomy may operate as a barrier to RRI, though the same professional culture can support aspects of RRI through convergence of ideals about the role of the scientist in society. The organisational structure of universities is in many ways the mirror image of norms and values of academic freedom. While the organisation may be fragmented by design, it also poses openings for the pursuit of RRI, we suggest. In this section, we explore this issue using Mintzberg's (1979) typology of organisations as a prism.

The Canadian management scholar Henry Mintzberg proposed five typologies of organisations organisational forms—or structures (Mintzberg 1979). One of these typologies is the 'professional bureaucracy,' that includes universities, professional consulting firms, government agencies and hospitals. Such organisations generally have a high degree of local discretion in organisation and decision-making, and the workforce a high level of autonomy. Although modern reforms have put

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this autonomy under pressure in the case of universities, the professional bureaucracy typically relies on standardised skills and professional norms for its organisation, rather than on the standardised organisation of work processes (Enders 2015). The professional bureaucracy depends on trained professionals, such as professors, lawyers, accountants, doctors, political scientists, and economists for their operation. Therefore, even though professional bureaucracies are hierarchical in structure, power to a high degree lies with these professionals (Hewitt 2015). These features make wholesale organisational reform and standardisation difficult, but it also creates pockets for RRI initiatives to flourish, precisely because academic professionals work relatively independently, with a high degree of discretion, and in a system where hierarchical control is blurred (Enders 2015). Mintzberg has identified 5 generic parts that all organisations comprise:

- The strategic apex
- The middle line
- The technostructure
- The support staff
- The operating core

The strategic apex comprises the broad of directors, the president, executive committee, and the president's staff. The middle line comprises managers in the traditional silos of organisations, such as operations, marketing, plant managers, regional sales managers, as well as middle managers of various units. In universities, these would be department and institute heads, leaders of laboratories and research centres, and managers of the technostructure and support staff (see below). In Mintzberg's terms, the technostructure is occupied by specialists overseeing the strategic planning, personnel training and HR personnel, finances, library services, and so on, whereas the support staff are conceptualized as the parts of the organisation taking care of indirect services, outside the operating work flow, such as payroll, public relations, reception, building maintenance, cafeterias, and in the case of universities also the university press, bookstores, and student services (Mintzberg 1979, p. 31). Whereas the technostructure in most organisations sets the standards for *how the organisation should operate and how work is organised*, the technostructure traditionally enjoys a low status among members of the operating core of professional bureaucracies (Mintzberg 1979). Additionally, in professional bureaucracies, the operating core is by far the largest and most important part of the organisation, and members of the operating core typically maintain personal relations with the main clients (such as students or client organisations in the case of research performing organisations). At universities, how one conducts research and teaching is governed less by organisational routines than by the training of academics, and other means of inculcating a professional ethos. To qualify as a member of a professional bureaucracy:

> [t]he initial training typically takes place over a period of years in a university or special institution.[…] There typically follows a long period of on-the-job training, such as internship […]. Here the formal knowledge is applied and the practice of the skills perfected, under

> the close supervision of members of the profession. On-the-job training also completes the process of indoctrination, which began during the formal teaching. (Mintzberg 1979, p. 350)

Universities are difficult to change in a top-down manner precisely because the strategic apex has a low span of control, the technostructure does not detail how the work should be carried out, and enjoys low credibility, and the work of the operating core is governed by academic ethos, rather than precise specifications of the work. Where organisational change in most organisations would be instigated through the technostructure, this is inherently difficult to obtain at universities, and in most cases will not be welcomed in the operating core:

> organisational change takes place mainly through continuous local adjustments, while major change is difficult to achieve. Central organisational policies are often responsive rather than proactive, and interventions on this basis may have only minor, local effects. (Enders 2015, p. 845)

Many authors of national reports cite fragmentation as a barrier to RRI in the organisations studied, and lament that activities are uncoordinated. Characteristically, the issue cuts across RRI keys and dimensions, though possibly less pronounced in the case of the Gender and Diversity key. However, professional bureaucracies are known for coordination issues, since coordination is obtained mainly through the professional ethos and the fact that: "*the system works because everyone knows everyone else knows roughly what to go on…*" (Weick 1976, p. 14). We suggest that the salient way to remedy issues experienced as coordination problems and fragmentation is not necessarily through top-down attempts at coordination, but rather through mobilization, broadcasting of ideas, and a distributed organisation. In organisational terms, such strategy entails:

- Clear anchorage with top management, wherever possible.
- Focused activities (which can later be scaled up), rather than broad-scale change.
- Lean centralized coordination with clear anchorage in the technostructure.
- Broadcasting of initiatives taken in the operating core to the organisation, as well as to the environment of the organisation (to create interchange pressure).
- Local organisation and anchorage in the operation core, commencing with initiatives in units favourable to the idea.

While such a recipe circumscribes ideal circumstances, it is equally clear that the organisation of universities can enable change to come from the operating core of the organisation, because institutes, departments, and research centres have significant latitude in their organisation. This is captured well in the US national report:

> For these interviewees, leadership could drive ethical debate, collaboration across centers, and anticipatory work. When asked if there were any turning points in the history of the Institute [Biodesign, a research unit at Arizona State University] in how issues of responsibility had been dealt with, the nearly universal response was to point to changes in leadership that had taken place in the past. Most pointed to an influential and charismatic previous institute director, who had particular vision and personal qualities that allowed him to do what no one since has achieved as far as vision and collaboration. (Doezema and Guston 2018, p. 49)

In the absence of line and command instigated change from the top of the organisation, the key to obtain change is mobilisation, not coordination (Soule 2012; Strang and Jung 2005). In designing successful initiatives, it is possibly advisable to keep in mind that an effective framing is key to the persistence of ideas on 'how to manage' an organisation (Benders et al. 2019). Based on findings in the RRI-Practice study, and our discussion of RRI as an umbrella concept in Chap. 4, we suggest that RRI initiatives in organisations are likely are best served by connecting the integrated RRI concept to the keys or dimensions that already have traction in the organisation.

5.2 Academic Culture as a Barrier and Opportunity for RRI

We have seen above how traditional elements of academic culture can curb the practice of RRI related keys and dimensions. However, we have also seen how academic culture can also support keys and dimensions. The barriers to RRI, found in academic culture, hinges on two main dimensions in our data: the protection of academic freedom to pursue research without outside intervention; and the pursuit of academic excellence, as currently defined by measures adhered to in the field, dominated by successful publications in top tier journals. These barriers inhibit the diffusion of all keys, and appear a potent cocktail in organisations where there is a high pressure against scientific freedom from the organisational environment; and where is a high workload and consequently no time for 'add ons' to current work commitments.

These findings set out three challenges for advancing RRI which, to date, have not been adequately answered in national or European policymaking:

1. How can RRI—or elements of RRI—be positioned credibly as compatible with academic freedom in ways that mitigate against a (mis)perception of the concept as posing a form of political interference and a threat to scientific freedom?
2. How can RRI be incorporated into definitions, framings, and accompanying reward structures of scientific excellence?
3. How can academic work be organised in ways that frees up resources for the pursuit of RRI keys and dimensions?

In ten out of twelve reports, academic culture is discussed as a driver for aspects of RRI (keys or dimensions), and all aspects are covered. For example, the Brazil national report states:

> The idea of public that pervades the institution is a powerful driver to seek institutional innovations towards more inclusion, more intense engagement, and increasing transparency. (Reyes-Galindo and Monteiro 2018, p. 49)

Discussing drivers for the gender equality and diversity key, the Italian national report notes: "*The refusal of any type of discrimination is part of the values of the University, both as described in the University's Bylaws and Codes of Ethics.*"

(Neresini and Arnaldi 2018, p. 38) Later, in discussing open access and open science, the Italian national report continues: "*Finally, respondents emphasize the ethical case for Open data and Open access. From this point of view, sharing data is seen as a constitutive part of the professional identity and deontology.*" (ibid, p. 40) And, as a final example, the Bulgarian national report discusses drivers for the Ethics key: "*Shared perception of ethics as a pillar of research excellence and research quality; internalised moral/professional responsibilities toward dealing with socially sensitive topics among management and research staff.*" (Damianova et al. 2018, p. 35).

We discussed in Chap. 3 that (organisational) culture is likely to be insufficient as a driver for RRI, and that combinations of structural, cultural and/or interchange related drivers are typically necessary to foster institutional change. This is captured in the Indian national report, in discussing the conditions for research ethics:

> The notion that funding for science should be done in a professional manner and should be free of biases is a cultural factor that gives legitimacy to such policies. The adoption of this policy is necessary but not sufficient. Only a comprehensive policy will make a difference and be a game changer. (Srinivas et al. 2018, p. 60)

We do find examples where cultural dimensions driving RRI are integrated into policy, such as in the Chinese national report (Zhao et al. 2018, p. 70).

> The openness and the transparency have been covered in the 13th Five-Year Plan of NSFC. The specific sectors are responsible for the open access. The fund sharing service network and basic research knowledge base have been built. So traditionally, the openness and the transparency are critical parts of the culture in NSFC.

Still we have seen examples where institutionalized reward systems act as barriers to aspects of RRI, as reported in the Dutch national report:

> There is a fundamental tension between WUR's institutional culture and its institutional structure when it comes to societal value. On the one hand, both WUR and its scientists are driven, often quite explicitly and vocally, by the desire to create societal value. On the other hand, formal reward mechanisms at WUR, while not disconnected from societal value, are not sufficiently aligned with it. As one interviewee put it, WU basically rewards its researchers for high-impact publications, and WR rewards them for project acquisition. (van der Molen et al. 2018, p. 53).

We hasten to say that this is by no means a problem only experienced at Wageningen University and Research, but rather a problem related to RRI being at odds with current governance and reward systems in academia at large.

We now dive deeper into Schein's (2010) theory of organisational culture as having three layers:

1. Artefacts.
2. Espoused Values and Beliefs.
3. Basic Underlying Assumptions.

Artefacts are visible and sentient structures and processes and observed behaviour. They are easy to observe but difficult to decipher. Espoused values and beliefs are ideals, goals, values, and aspirations, ideologies and rationalities. However, just as consumer attitude surveys tell us about preferences and not actual behaviour, espoused values in an organisations culture do not provide a coherent picture of what governs choices by organisational members. According to Schein, the choices are largely governed by basic underlying assumptions. These are often unconscious, taken-for-granted beliefs and values that determine behaviour, perception, thought, and feeling. An important point is that the three layers of organisational culture may not necessarily be aligned as a consistent whole. It is for instance possible to impose artefacts, while not changing basic underlying assumptions. Likewise, espoused values are susceptible to interchange pressures; organisational members may well support progressive values in society or new trends, without actually supporting those values as part of their taken-for-granted belief system, and unconscious reactions.

What we have surveyed in the RRI-Practice project with respect to organisational culture is largely at the level of the artefacts and espoused values and beliefs. We do, however, believe that some of the espoused values we have cited from national reports above, do in fact point to basic underlying assumptions in academic culture. In other words, we suggest that academic culture possesses some basic underlying assumptions that are drivers of RRI, while, at the same time, some elements of academic culture at the level of artefacts (including incumbent finance models and publication requirements), and espoused values (including goals on high impact publications as an indicator of excellence) act as barriers to RRI. We further suggest that current artefacts and espoused values in academia have themselves been transformed by external shocks, including new finance models in the wake of New Public Management reforms in the governance of universities and the research sector, and this has created tensions with traditional academic norms and values. Thus, academic culture may offer opportunities for advancing RRI.

Schein (2010) proposes that organisational cultures change in three stages. In Stage 1, the current ways of doing things in the organisation suffer delegitimation leading to anxiety or guilt, possibly from a scandal or a large-scale merger. During this stage, organisations need to create psychological security to overcome learning anxiety, to unfreeze current perspectives by developing strategies that may include the hiring of new staff with new perspectives. Stage 2 is characterized by the imitation of, and identification with, role models, or by scanning the environment for solutions and trial-and-error learning cycles. The important aspect of this stage is that new concepts are learned, and that old concepts—and ways of thinking and doing—acquire new meaning. Finally, Stage 3 entails the incorporation of newly acquired learning and ideas into organisational forms, including members' newly developed concept of self, role and identity. This new learning and standards are then embedded into on-going relationships, based on confirmation from experience that the change has been worthwhile.

Our data from the RRI-Practice project suggest that some organisations experience a disconfirmation of current ways of operating and mentions of scandals external to the surveyed organisations figure as drivers. However, a widespread disconfirmation

of the science system, not to speak of anxiety or guilt, does not currently appear on the horizon. The learning of new concepts by imitation of 'role model organisations', as well as the scanning of the organisational environment and trial-and error learning processes, do occur in some instances. For instance, the efforts to develop and introduce the RRI AREA framework at the British EPSRC funding organisation has served as an example to emulate for the Research Council of Norway. While the development of RRI in the Dutch NWO may have been spurred by several scandals in Dutch academia (see the Dutch national report), the Norwegian case appears driven by visionary internal change agents combined with external assessments pointing to a need for change. Conversely, developing the AREA framework at the EPSRC itself was to a large extent the outcome of a series of realizations connected to funded projects that created serious concerns for the organisation (Owen 2014; Macnaghten and Owen 2011).[1] Similarly, as we have seen, many reports mention international collaborations as pathways of influence, promoting new ideas that are aligned with RRI aspects. Learning through imitation and the wish to join the club of progressive research organisations adhering to RRI appears to have some currency. The EC (and European policies) is a label that has not lost its cachet—at least for countries that are not at the centre of European policymaking.

In contrast, the internalisation of new concepts, meanings, and standards appears embryonic in our data for most organisations studied. Even the EPSRC is still in a process of scanning and trial-and-error learning. Institutional change takes time, and—we suggest—still requires a significant and continuous policy pressure, if RRI is to succeed as an organisational concept in the science, technology and innovation (STI) system (Owen et al. 2019). Changing organisational cultures requires that the bulk of organisational members engages in what is known as 'double loop' learning (Schein 2010). In other words, organisational members must change their mental models, and come to question the way they have previously solved problems—in our case problems of relevance to the RRI concept. This is the fundamental requirement for changing what Argyris and Schön (1978, 1974) called theories-in-use (as opposed to 'espoused theories'), again in relation to actions and choices of relevance to the many aspects of RRI. It appears, there is still a long way before such change is widespread among organizational members in our sample of organisations and institutionalised in the science and innovation system.

5.3 Isomorphism and Funding Organisations as Environment

A core finding in our study is the extent to which organisations across typologies respond to policy signals. The most salient of these responses regards funding, in the sense that large scale universities, and other research organisations, depend on basic state funding (that may partly be indicator based) as well as competitive research

[1] Details of the ESPRC case can be found in the RRI handbook (Wittrock and Forsberg 2019).

funding. The requirements of funding organisations appear to have major import on the organisation and culture of research organisations. Therefore, the EC and national funding organisations have the potential to significantly alter the current landscape in the science system. In short, money talks, and our findings indicate that the values and logics promoted by the way funders organise their grants and calls for proposals, trickle down into research performing organisations beyond the people and organisational units directly affected.

This finding resonates with the central insight of neo-institutional theory, namely that organisations are influenced by their environments in profound ways. However, that the requirements of funding organisations appear to trickle down in research organisations is a potentially important finding. Neo-institutional theory views organisations as comprised of many actors, capable of semiautonomous action and decision-making. In our study, this is evidenced by the presence of many local, but scattered initiatives furthering RRI, even in cases where management may not promote RRI in any particular way. As Scott and Davis claim: "*The open systems view of organisational structure stresses the complexity and variability of the parts – both individual participants and subgroups – as well as the looseness of connections among them.*" (Scott and Davis 2007, p. 106). While organisational parts are interdependent, they are also at the same time loosely coupled. Therefore, the trickling down of funding providers' requirements are akin to organisational coordination, likely achieved through organisational (academic) culture, and peer to peer learning, as discussed above. Academic culture may be a barrier to RRI, but it is also a coordination mechanism, which appears to promote the type of ethos that funders communicate to their applicants.

Neo-institutionalism is traditionally concerned with various types of (perceived) pressures and how they play out in organisations of all kinds (Scott 2014). Such pressures drive organisational change, as the organisation adjusts to its environment. In their seminal paper, DiMaggio and Powell (1983) identifies three such types of pressures or mechanisms of change:

- Coercive mechanisms.
- Mimetic mechanisms.
- Normative mechanisms.

The distinction is an analytic one, in practice there may be overlaps between the three mechanisms. Since pressures stems from the environment of the organisations, being in the same institutional environment drives isomorphism. Hence, we would expect for instance large scale research performing organisations to be organised in more or less the same way, as they all respond to the global science system as their most significant environment, other than the particular nation in which they are situated, and—as shown in this book—to their national funding organisations. In the following we discuss the three forces potentially driving organisational change with respect to our findings. We pay special attention to the role of research funders as a salient influence on research performing organisations.

Coercive institutional forces stem from formal and informal pressures, political influence, cultural expectations and the legal environment (DiMaggio and Powell 1983). These pressures are premised on the organisations' need to obtain and maintain legitimacy. Such pressures either promote or work as barriers to a given concept. In our project, we see that national as well as academic cultural expectations have major import on organisations and sometimes hinder, sometimes further, aspects of RRI. We see that current definitions of, and measurement of, academic excellence institutionalized in the science system is a major barrier to all RRI keys, while political pressure furthers the implementation of keys in other ways. Crucially, absence of political or other pressures to adopt keys appears to be a significant barrier. Coercive mechanisms may be legally sanctioned. This is an important driver for RRI in the case of the Gender and Diversity key and the Ethics key. Legal frameworks and statutory instruments supporting open access and open science are nascent in some countries, whereas societal engagement and science education receive less pressure from legal frameworks. It appears that this trend is mirrored in most funding providers' attention to RRI keys and consequently in their requirements for funding applications. As funding providers in our sample most often are policy organisations, they organise in a way that supports national and/or EC frameworks. Therefore, research performing organisations may be both directly impacted by legislation, as well as indirectly through coercive forces from funding organisations.

> The main driver for preserving gender equality remains the legislation, although there is increasing awareness across the society about the need to actively uphold equal opportunities for women and men, often provoked by comparison with other EU member states. (Bulgaria report, p. 61).

This appears to be the case with respect to the gender equality and ethics in particular and is a strong driver for RRI aspects in general. The mimetic mechanism of diffusion is characterized by pressures of uncertainty. Uncertainty—when it is not clear what to do, or how to approach an apparent issue—lead organisations to copy behaviour, or use models, of other organisations. Typically, the organisations emulated are perceived to be more successful or more legitimate (DiMaggio and Powell 1983). Mimetic forces are also amplified under circumstances where it is clear that other successful organisations use particular strategies, concepts, or the like. This is also the case at country level between funding organisations:

> There is also pressure coming from the cooperation with other foreign institutions. Since the internationalization of the fund's management is one of the critical tasks for NSFC. To cater to the global gender equality movement, the level of gender equality awareness and attention has become a significant indicator for internationalization, which requires improvement on practical policies and measures. (China report, p. 66).

As mentioned above, it appears that the EPSRC in the UK has exerted significant influence on the way the Research Council of Norway has approached RRI. We also find descriptions of mimetic forces at play between research organisations, as discussed above. The perceived leaders in the global research system are being monitored and inspires organisations in other parts or the world. As such, gaining RRI

advocates within prestigious university networks, such as the League of European Research Universities (LERU) may be highly effective for spreading RRI through mimetic mechanisms. However, it is not clear that there is a high level of perceived uncertainty leading organisations to look for other organisations to emulate, as discussed above in the section on cultural change.

Normative institutional forces come from pressures to professionalize in accordance with normative rules of professional and organisational behaviour. Such normative rules and frameworks may be developed by transnational organisations (EU for instance). RRI is an example of such a framework, although it still lacks the cachet of a widespread fashionable concept:

> An external relevant driver is the way FAPESP values international connectedness to global practices. If RRI becomes part of a global discourse and is adopted as a global standard by internationally renowned funders, this would be a strong incentive for RRI to become more explicitly present in internal practices; more explicitly that is, as managers generally perceive that RRI keys as already being present in existing practices, albeit in local specific ways. (Brazil report, p. 66).

We also see that funding organisations influence research organisations in a rather direct manner:

> UNICAMP, for example, is in the process of establishing its own code of good practices and this was in part a response to FAPESP's demands, which shows the great impact of FAPESP's policies as a push towards specific forms of regulating science at the highest levels. (Brazil report, p. 69).

Note that the Brazil example shows the chain of influence: International norms impact funding organisations, which in turn impact national research performers. We have discussed elsewhere how the 'old industrialized' countries at the centre of European decision-making appear less concerned with external pressures from e.g. the EC. However, the normative influence exerted by funding providers over research performers is also present in these leading countries:

> Regarding research integrity, the guidelines of the German Research Association (DFG) to ensuring good research practice were the basis for the guidelines done by the HGF in 1998, which can be seen as a main driver in this area. (Hahn et al. 2018, p. 56).

However, all normative pressures promoting RRI aspects are competing with other frameworks providing normative pressure. These may stem from funding providers, or other stakeholders and actors in the science system. Other stakeholders and actors providing normative rules are ministries providing government basic funding and professional associations and networks (Scott and Davis 2007). Normative rules of e.g. good scientific conduct external to RRI may similarly be adopted by funding organisations. Throughout the data, we see tensions between excellence criteria, premised on maximizing grants and publications on the one hand, and making room for adherence to RRI aspects on the other. As funding organisations increasingly

adopt elements of RRI in the assessment criteria, while still adhering to the ruling definition of research excellence, the signals of normative forces to research performers are at times incoherent.

From the standpoint of promoting RRI, it is encouraging that we can identify coercive, mimetic and normative pressures in the data material. We hold though that RRI still has a week position among the many forces impacting research funding and research performing organisations in the science system, be they coercive, mimetic or normative.

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