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Research heuristic and key concepts

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Content

List of Figures

Res-AGorA – A brief project overview

The EU seeks to become a genuine Innovation Union in 2020 striving for excellent science, a competitive industry and a better society without compromising on sustainability goals as well as ethically acceptable and socially desirable conditions. Europe thus needs to develop a normative and comprehensive governance framework for Responsible Research and Innovation (RRI). This is the major goal of Res-AGorA.

The Res-AGorA framework will build on existing RRI governance practices across and beyond Europe. It will be reflexive and adaptable to enable the inherent tensions in all governance of RRI to be actively addressed by procedural means aiming to facilitate constructive negotiations and deliberation between diverse actors.

The project will achieve these objectives through a set of work packages providing an empirically grounded comparative analysis of a diverse set of existing RRI governance arrangements and their theoretical/conceptual underpinnings across different scientific technological areas (WP2 and WP3), a continuous monitoring of RRI trends and developments in selected countries (WP5) and, based on the cumulative insights derived from these work packages, co-construct with stakeholders the central building blocks and procedures of an overarching future governance framework for RRI (WP4).

This governance framework will deliver cognitive and normative guidance that can be applied flexibly in different contexts. Res-AGorA will thus have direct impact on RRI practices (science, industry, policy), and strategic impact in terms of the political goals (Horizon 2020) and competitiveness (Lead Market through growing acceptance of new technologies).

Res-AGorA will ensure intensive stakeholder interaction and wide dissemination of its tangible and intangible outputs in order to maximise impact, including comprehensive and interactive stakeholder engagement, liaisons with other ongoing RRI activities funded by the SiS Work Programme, and a final conference.

For more information and updates on Res-AGorA's activities, please visit www.res-agora.eu.

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Preface: Objectives of the deliverable

This deliverable is an internal working document that describes the preliminary research heuristic and key concepts of the Res-AGorA research approach. The research heuristic specifies the basic analytical steps taken in conceptual development (WP 2), informing the first round of case studies (pilot cases) in the empirical program (WP 3). Following the Res-AGorA research strategy of developing key concepts in an iterative manner, the heuristic thus should be read as a first step in developing a productive search strategy rather than a scholarly exercise. In a next step the research heuristic will be further refined by the analysis of the pilot cases as well as by further positioning in literature.

Update February 2014: the present document includes a refined heuristic for use in Stage 2 of the empirical program. The most important improvement in the research model, is that we now specify how to capture particular aspects of the de facto *governance of RRI and how to assess in what degrees the* de facto *governance of RRI is 'doing well'.*

Karlsruhe and Twente, February 4, 2014

1. Introduction

The Res-AGorA research project seeks to develop a governance framework for Responsible Research and Innovation (RRI). The concept of RRI has been put forward by the European Commission as a key element of the Horizon 2020 programme, in which the trifold ambition of 'excellent science, competitive industry and a better society' calls for a normative and comprehensive governance framework for RRI. However, the objectives under the heading of RRI are not new and already institutionalised in a vast and heterogeneous collection of governance arrangements. Think of evaluations of societal relevance for research, corporate responsibility schemes, health and environmental safety regulation, ethical reviews, stakeholder and public dialogue, education, open access instruments, sustainability policies, gender policies, etc. While concepts like RRI do add an integrative perspective to the wide array of societal goals, it will be to these **manifold modes and styles of governance** to which a **RRI governance framework has to relate**. The Res-AGorA project takes this observation as a starting point and focuses on what can be learned from the *de facto* governance of RRI.[1] This document discusses a preliminary research heuristic which will inform the design of the empirical program.

Content and aim of this deliverable

Research and innovation (R&I) are creative social processes in which many actors and governance arrangements are involved across a wide range of scientific and technological fields. Consequently, the governance of research and innovation is made up by a wide and heterogeneous mix of governance arrangements and actors involved. This heterogeneity requires a careful crafting of our research strategy, the more as the enormous area of R&I governance does not allow for drawing a full picture, at least not within the scope of a FP7 research project. We thus need a smart research strategy which contributes to the objective of Res-AGorA: building on what is going on already, by designing a flexible framework capable of framing anticipatory and constructive interventions. To this end conceptual development (WP 2) will happen in an iterative process alongside the empirical research on *de facto* governance of RRI (WP 3) and the design of a RRI governance framework (WP 4). This document serves as a first step in developing Res-AGorA's 'meta-governance' approach by discussing:

- Key observations and hypotheses with regard to our problem diagnosis, which we have shortly introduced above

- A step by step development of a preliminary research heuristic as to enable a precise understanding of our research strategy in response to the problem diagnosis

- Translating the research heuristic into empirical program design

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1 By this particular perspective the Res-AGorA project is well positioned in a broader set of FP7 projects, of which the research project GREAT focuses on substantive integration of RRI objectives and the coordination projects Progress and Responsibility facilitate dialogue on RRI in global context.

2. Problem setting: RRI and de facto governance of RRI

Responsible innovation recently has gained a lot of attention, notably within the European Commission, where it has been framed as Responsible Research and Innovation (with capitals, abbreviated to RRI). The emerging discourse on RRI can be understood as a response to the widespread concerns about anticipating the societal impact of emerging technologies (which in particular has been invoked by the controversies about GMOs, has resulted in a number of governance experiments in the field of nanotechnology and is now spreading to new fields like synthetic biology, ICT and geo-engineering), as well as changes in the social contract between science and society, which have led to the strategic orientation of research to applications and an increasing emphasis on contributing to solutions for grand societal challenges.

What is new in the recent articulations of RRI is the integrative attempt to capture the wide range of societal issues related to research and innovation, thereby also responding to diagnosed shortcomings of earlier framings and frameworks. For example, the definitions and subsequent operationalisation by Von Schomberg (2011) and Owen et al. (2013), can be read as Responsible Governance moving beyond individual/organizational role responsibility to notions of prospective and collective responsibility, and shifting the focus from the governance of risk (and wider issues) to governance of innovation (as reflected in upfront positioning of grand challenges). It is in this context that the European Commission has issued a call for a normative and comprehensive governance framework for RRI. In response, we will conceptualise RRI in Res-AGorA as an object of governance, linking 'Responsible' to 'Research' and 'Innovation':

> RRI is supported by governance that is facilitating research and innovation processes and achievements following particular normative principles, objectives and outcomes.

With the above conceptualisation of RRI we emphasise the existence of multiple governance arrangements working towards objectives as stated in definitions of RRI, but which can be articulated under different headings. This is an important perspective in our analysis, as the discourse on RRI is still in an early phase and open to various interpretations and evaluations. We expect the 'success' of any new RRI governance framework will depend on the way it relates to already existing governance practices, the more when these already explicitly deal with responsibility, for example in CSR schemes such as the Responsible Care® program of the chemical industry. In fact, the already existing governance arrangements do make up a RRI governance landscape, characterised by heterogeneity and horizontal co-existence of (RRI) governance arrangements in which the 'responsible' of research and innovation is continuously negotiated, if not contested. The manifold organisations involved in R&I policymaking have learned to play their games in the various arenas for negotiation. Already existing governance arrangements thus should not be treated as being structures or procedures imposed on actors, but co-constructed within governance practices, up to a co-production of norms (Bartoloni 2011). While new ideas about RRI may challenge this *de facto* **governance** of RRI, it will be through modulating the already existing governance arrangements by which such new ideas have to be realised.

Learning from de facto governance of RRI

In Res-AGorA we seek to learn from the heterogeneous and *de facto* governance of RRI, not by opposing *de facto* to *de jure*, but by acknowledging that governance in the end is constructed in practice(s) and seeking how to productively build these processes. We therefore cannot resume to a particular mode or style of governance, but first have to learn from the dynamics in *de facto* RRI governance, by using a '**meta-governance**' approach. In short this concerns the analysis and organisation of the **conditions** for governance. This we will spell out in more detail in the next section. Before doing so, we will address the question in what way our approach is responding to the call for a 'normative' and 'comprehensive' governance framework for RRI.

By focusing on learning from *de facto* RRI governance we envision our approach as '**socio-normative**'; i.e. by using a meta-governance approach we will not depart from any normative understanding of RRI, but instead analyse tensions, barriers and opportunities in *de facto* governance of RRI. That is not to say that our analysis will not be informed by conceptual notions, nor that there is not any normativity involved, but that the normativity in our analysis originates in the attempt to 'learn' from *de facto* RRI governance dynamics by designing (and discussing) a framework capable of modulating these dynamics 'productively'.

With regard to comprehensiveness, we have argued above that the broad scope of RRI as well as the even broader range of RRI governance arrangements in no way allows for a 'full picture' analysis. Apart from being not feasible, such an approach would also ignore the real world conditions under which our framework has to be designed, discussed and taken up by others. Instead, in choosing our set of cases to analyse dynamics of *de facto* RRI governance, we have to ensure that our picture is rich enough to capture the main elements of RRI governance as actors are currently confronted with. This will be further specified in WP 3.

3. The Res-AGorA research heuristic for analysing *de facto* governance of RRI

In discussing our objective of 'learning from *de facto* governance of RRI' we have argued for a research strategy which does not depart from any normative framework. Our 'socio-normative' approach can however neither be fully open-ended or purely inductive. We will inform our research strategy by conceptual notions. Moreover, we will work towards a governance framework. Within the scope of a FP7 project this requires a deliberate order of steps. We therefore capture our research strategy by developing a **heuristic**, to be understood as:

- A means to facilitate creative research, thought and theory-building in unstructured empirical or conceptual fields;

- A search strategy, delineating the scope of search, providing guidance and the lenses through which to search and study;

- The search strategy is informed by research questions and conceptual targets, summarised in (provisional) assumptions (e.g. on factors, actors, interactions, rules, configurations, agency);

- Heuristics can be revised or adapted in the course of research, i.e. they draw on learning;

- Heuristics build a bridge between unstructured research fields on the one hand and achievement of empirical and conceptual or theoretical insights on the other.

A first step in developing such a heuristic is provided by distinguishing two main steps in the project flow of Res-AGorA:

- Analysis of *de facto* governance of RRI (WP 3, with input from the monitoring in WP 5)

- Design of a governance framework for RRI (WP 4, linking up to dissemination and engagement activities in WP 6).

In this section we will develop a heuristic for the first step, thereby already guided by preparing for the second step. Below, we will first delineate our conceptualization of governance, followed by positioning two overarching research questions and a research model. In doing so, we will further reflect on the analytical steps in our meta-governance approach and its possible outcomes. Finally, we will delineate the elements of the research heuristic and the concepts used to describe these. The next section lists a number of examples, illustrated through application to a preliminary case study.

3.1 Analyzing *de facto* governance of RRI as 'RRI in the making'

In the previous section we have defined RRI from a governance perspective: "*RRI is supported by governance that is facilitating research and innovation processes and achievements following particular normative principles, objectives and outcomes.*" In this section we will first briefly discuss how we conceptualize 'research and innovation' and then proceed with discussing the notion of 'governance'. By these discussions we will further delineate our object of analysis as 'RRI in the making'.

Research and innovation are both broad terms, for which we will limit ourselves to research based practices of technology development and related innovation, often referred to as 'emerging technologies'. It is with regard to these practices that the discourse on RRI has emerged, on the one hand responding to the ongoing 'production' of societal issues related to technology development, and on the other hand reinforcing the strategic orientation of research to applications which are expected to provide solutions for societal challenges. The latter is resting in the firm belief that human progress and economic prosperity to a large extent are enabled by technological innovation. In Res-AGorA we will be sensitive to this social (cultural, political, historical, economic etc.) organization of innovation. Innovation is not just invention, or the adoption of new technologies. Innovation rather should be seen as a 'journey to users' of new products, new services, new business models and so forth, through networks of actors crossing worlds of science, worlds of research and development, of finance, of marketplaces, media and other intermediaries. That is not to say that these journeys are all well-organised travels. Innovation journeys (Van de Ven et al. 1999) often are explorations and experiments, full of contingencies.

Our understanding of **governance** links up with above conceptualization of research and innovation. Governance is a broad term as well, figuring in diverse strands of literature in descriptive as well as normative ways. In Res-AGorA we are not interested in capturing all perspectives to RRI governance as such, nor will we analyze the governance of R&I in general, but we are interested in those practices in which the participating actors work towards legitimate normative objectives and outcomes. These normativities become performed, qualified and institutionalized through various means and strategies and can stabilize into hard and soft regulatory instruments, but can also become 'unhinged' when political contexts shift. Therefore we conceptualize governance as "*the dynamic interrelation of involved (mostly organized) actors within and between organisations, their resources, interests and power, fora for debate and arenas for negotiation between actors, rules of the game, and policy instruments applied helping to achieve legitimate agreements*" (Kuhlmann 2001; Benz 2006; Braun 2006).

The objective of Res-AGorA to learn from *de facto* governance of RRI thus concerns the purposive aspect of working towards legitimization and decision making within institutional settings. For example, in the attempts to steer R&I towards solutions for 'grand societal challenges', we understand governance of RRI as the mechanisms by which private and public actors involved in and affected by innovation interact in order to define a normative direction of

innovation that is seen as legitimate, in light of potentially contested normative orientations. In many cases this will happen in ongoing, not stabilized practices. Taking the purposive element in these ongoing processes into account, we can further identify our object of empirical analysis: we will analyze *de facto* governance of RRI by looking for processes of '**RRI in the making**'.
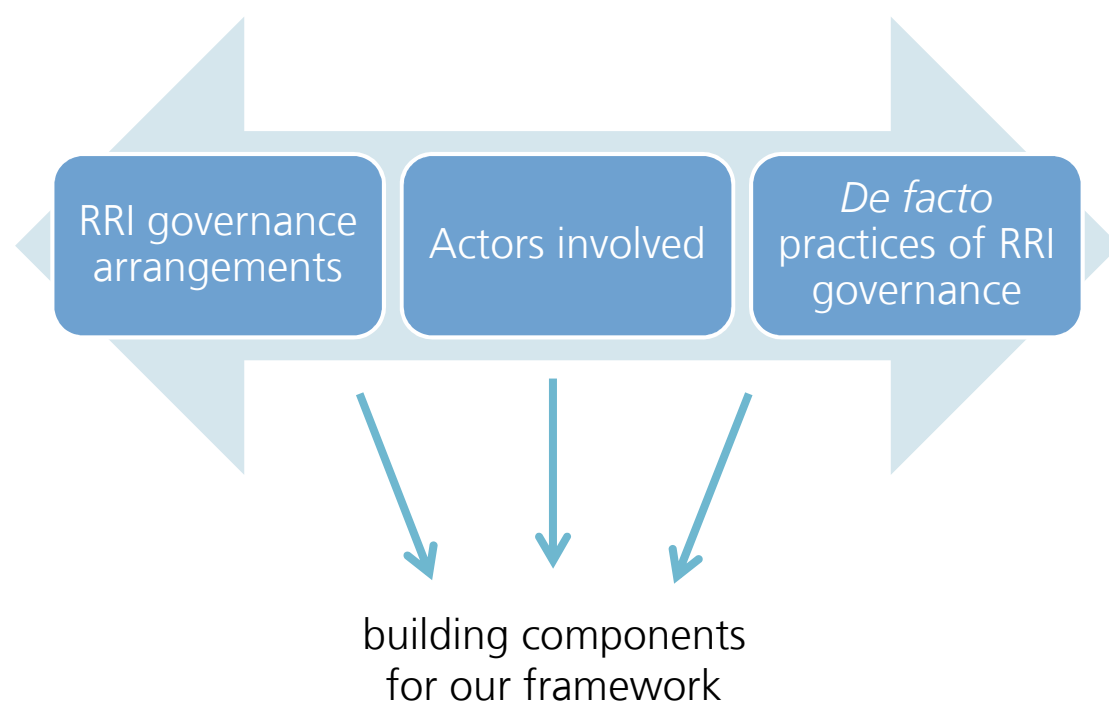
3.2 Research questions and model

When we say that we will be looking at processes, we are interested in achievements and how these are conditioned. We also want to learn from these conditions in light of our envisioned socio-normative framework. Hence we pose two main research questions:

1. How is 'RRI in the making' conditioned?

2. Are there building components for a socio-normative governance framework?

We will elaborate on both research questions by drawing up a research model. The model reflects the *de facto* element of RRI governance in distinguishing three overlapping dimensions conditioning 'RRI in the making', proximate to the notions of **structure**, **agency** and their dynamic interplay in governance **practices**, see figure 1 below.

Figure 1: Research strategy in search of components for the RRI governance framework

Research question 1: 'conditioning of RRI in the making'

The model depicted in figure 1 has to be read as follows: in exploring a set of cases of 'RRI in the making' our **unit of analysis** is '**RRI governance arrangement**'. By this we refer to RRI policies as these are characterised by structural aspects - such as modes of regulation (e.g. hard/soft) - type of responsibility (e.g. prospective/retrospective), type of (ethical principles), or the relative position within the broader landscape of R&I and RRI governance arrangements. Such structural aspects condition the related process of 'RRI in the making'. In the next section we will list 'descriptors' (a set of guiding questions and examples) for these characteristics.

RRI governance arrangements are initiated, negotiated and implemented (translated) in ***de facto*** **RRI governance practices**. With the notion of 'practices' we refer to those places and spaces (**loci**) where the conditioning of 'RRI in the making' takes shape, i.e. the "fora for debate and arenas for negotiation" in our conceptualisation of governance at the start of this section, but also the **procedures** and **communications** through which the shaping of governance arrangements takes place. So, whereas RRI governance arrangements capture formal aspects of governance instruments, the dimension of *de facto* governance practice captures how instruments actually work out.

These shaping processes do not just happen mechanistically (i.e. solely conditioned by structural aspects), but are enacted by sentient **actors**, responding and contributing to the dynamic interplay of 'RRI in the making'. They do so by acting according to their interests and power, again not mechanistically, but in (self-)reflexive understanding (in different degrees) and ability to frame the issue at hand. In the next section we provide guiding questions to operationalise features of *de facto* RRI governance practices, such as the construction of responsibility, modes of participation or the ambition and interest of key actors and how discursive aspects will be discerned in the empirical program (WP 3).

The overlapping dimensions of arrangements, actors and practices are not meant for resolving ongoing discussions in social theory about structure and agency. Which position in these discussions is appropriate depends on its utility for our search strategy. At this stage we depart from the basic understanding that the conditioning of 'RRI in the making' will be related to structure and agency as well as to the dynamic interrelation between both. The dimensions in the research model (after operationalisation in the next section) then provide further guidance in where to look for when investigating the first research question. However, we have to keep in mind that we will explore *de facto* governance of RRI, not the governance of R&I in general. So, while the dynamic interplay of RRI governance can be shaped/conditioned by all possible elements in the governance of R&I in general, we will take such conditions **only** into account in so far as these are significant to the **shaping of RRI governance arrangements**. Such an approach requires sensitivity for relevant aspects within cases as well as learning across cases.

For example, one of the important distinctions made in the empirical program is how governance arrangements, as being our unit of analysis, can be differently 'followed' in the empirical

investigations. In our conceptualization of RRI as supported by governance (section 2) we deliberately include already existing governance arrangements, such as safety regulation or ethical review, which maybe do not resort under explicit RRI articulations, but nonetheless are meant to facilitate R&I following normative principles, procedures or outcomes. We then are interested how governance dynamics unfold within the governance practices related to these arrangements. In other cases however, we will be particularly interested in how new framings, such as the recent discourse on RRI, are taken up in *de facto* RRI governance practices. Quite likely one may encounter both in the same case. We therefore encourage the analyst to single out the most interesting perspective in an iterative manner.

Research question 2: 'building components for a socio-normative framework'

In Res-AGorA we do not only want to learn from the conditioning of 'RRI in the making' as it is, but also to design a framework by which the effectiveness of the governance of RRI can be improved. In the empirical research we will be looking for building components for this framework. These will be related to the conditions as traced under research question 1, but most likely not in a one-to-one relation and thus requiring an interpretative step. The building components will be linked to the demonstrated 'success' or 'failure' in the case studies, i.e. what can be learned from *de facto* RRI governance with respect to the 'fate' (shaped by as well as shaping) of RRI governance arrangements in *de facto* RRI governance practices. For example, what could improve the games by which actors try to align different claims of effectiveness and legitimacy? This can be ways in which RRI governance arrangements can be modified, about better positioning of RRI governance arrangements in the heterarchical landscape, or about the need for different understandings (framings) of what RRI is about.

In the next chapter we provide a list of descriptors and key questions by which the three dimensions of the research model are operationalized for use in the case studies. In the remainder of this chapter we focus on the dimension of 'de facto RRI governance practices', concerning the actual governance dynamics evolving over time. This is linked to, but differing from the governance arrangements, which capture the 'formal' aspects of instruments and procedures. For analyzing and assessing the de facto governance of RRI we are interested in the actual 'arenas' (places and spaces) in which and by which the modes and qualities of interactions are defined and hence the conditioning of 'RRI in the making' takes shape. Think of processes of agenda setting, the articulation of ambitions and translations into instruments. It is in these processes that strategic behavior occurs and certain frames gain dominance, while other perspectives can be silenced.

The challenge for Res-AGorA is to capture in what aspects and to what extend the de facto governance of RRI is 'doing well', *in relation to* how the de facto governance of RRI is conditioned by the characteristics of the arrangements, actors and practices involved. To this end we will specify how to understand 'well-doing' in the next section.

3.3 Understanding 'well-doing' of (*de facto*) governance

So far, we have used 'well-doing' as an overarching notion for assessing the de facto governance of RRI in the same way as, for example, the notion of 'good governance' is used. The difference is that while 'good governance' criteria can be part of RRI governance arrangements and procedures, we are interested in how these are played out in de facto practices. However, as for 'good governance', we have to specify what 'well-doing' of the de facto governance of RRI entails. We will do so in two steps:

a) Discussing what is of our specific interest in the governance of RRI, so as to better understand what the specification of well-doing should be about. We will argue that key factors contributing to the well-doing of the de facto governance of RRI can be grouped under the headings of 'responsibilisation' and 'managing contestation'.

b) Understanding 'well-doing' in the context of *de facto* governance as emerging from or produced by *interactions*, which in turn can be assessed to what extend these are 'constructive' and/or 'productive'.

Conceptually, both steps translate into a matrix, displayed in the table below. In the remainder of this section we will explain how the items in the table have to be understood. However, this discussion first of all serves the conceptual understanding of how the different elements of a multi-faceted concept like 'well-doing' are related to each other. In the case studies the set of descriptors for well-doing can be used 'list-wise' (see next chapter). In a next step we have to identify which relations are relevant and useful for feeding into the construction of an overarching framework for the governance of RRI.

Table 1: Specification of factors contributing to 'well-doing'

	Constructive (input requirements)	Productive (transformation)
Responsibili-sation	3. Actor inclusion 4. Robustness of the knowledge base 5. Capacities for learning 6. Embedding of responsibility	7. Actors change behavior / attitude in line with new understandings of responsibility
Managing contestation	8. Procedures and 'rules of the game' 9. Transparency 10. Trust in the de facto governance process	11. Governance arrangements align with or are changed towards input requirements (constructive)

Ad a) Responsibilisation and managing contestation

In Res-AGorA we look to RRI as an object of governance, linking 'Responsible' to 'Research' and Innovation': "*RRI is supported by governance that is facilitating research and innovation processes and achievements following particular normative principles, objectives and outcomes.*" So, we do not focus on what RRI is, but by what processes and mechanisms it is thought to be realized. Consequently, our 'well-doing' is related to processes and instrumentation in relation to the dynamic interplay of actors and factors, i.e. their resources and interests, arenas for debate and fora for negotiation[2], rules of the game, etc. In the case studies this can apply to 'multi-actor' settings, such as stakeholders deliberating over fracking or sustainability certification, but also to multinationals with their internal divisions of labor and coordination and responses to external actors and claims.

However, what makes our focus specifically challenging is that not only governance is a dynamic process, including strategic games, but that RRI is a moving target as well. While actors may agree on normative principles, objectives and outcomes in general terms, these have to be (re)articulated and specified in relation to the novelty produced by research and innovation as well as in relation to concurrent objectives, or to be reinterpreted in response to change in the societal context.

In close connection, the effectiveness and legitimacy of the governance arrangements by which the normative objectives of RRI have to be realized is often challenged. Contestation can arise from conflicting logics, polyvalent valuation, overlapping if not competing arrangements (heterarchy), incongruent framings or ambiguities in proposed solutions. While such tensions occur as much within organizations, these can be more visible *between* organized parties, up to (public) controversy, thereby bringing along its own dynamics, for example when it is about the (perceived) direction of a scientific field or technological domain field.

In this context the emerging discourse on RRI has to be understood as a quest, on the one hand for urging actors to be what they understand as truly responsive with regard to normative principles, objectives and outcomes, while on the other hand (re-)designing procedures and institutions to align competing claims of responsibility, effectiveness and legitimacy. We will group the range of factors that are said to be essential for coping with these challenges under the headings of 'responsibilisation' and 'managing contestation':

- **Responsibilisation** is about the governance of (self-)stimulating actors to care for their duties of being anticipatory, reflexive, responsive, etc… by drawing on a clear understanding of their responsibilities and un-coerced application of values. This stimulating can take the form of facilitating, equipping and rewarding of actors to take their responsibilities seriously.

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2   We use the term arenas to mean a more loose and informal gathering of actors, while fora are more formal and organised/moderated.

- **Managing contestation** is about the governance of deliberating and negotiating competing claims of responsibility, effectiveness and legitimacy, being the result of different understandings, framings and evaluations of the need for and processes and instruments by which normative objectives are to be accomplished (whether or not specifically articulated as RRI).

It is to these two groups of factors that we will specify 'well-doing' as outlined in table 2. In doing so, we will also gain a better understanding of how responsibilisation and managing contestation are related to each other.

Ad b) 'Well-doing' as constructive and productive interactions

Having discussed what the governance of RRI is about, we now turn our attention to the meaning of 'well-doing' in this respect. Actors in RRI governance certainly will require that is arrangements are 'legitimate' and work 'effectively'. Indeed 'effectiveness' and 'legitimacy' are frequently (and in various understandings) used to assess characteristics of governance, our interest is in *de facto* governance, sensitizing to the conditions by which legitimacy is constructed and effectiveness is accomplished. In fact, as mentioned above, claims about legitimacy and effectiveness are a prolific source of contestation in the governance of RRI. That's why we have discerned 'managing contestation' as capturing an important group of factors contributing to well-doing next to 'responsibilisation'.[3]

The clue to understanding well-doing in relation to de facto governance, is that the de facto governance of RRI is conditioned by how the characteristics of governance arrangements, the actor landscape and previous achievements, *interact*. In the research model we analyze the governance dynamics resulting from these interactions as being produced in de facto governance practices. In relation, we can conceptualize well doing on the one hand as adequately relating to what goes 'in' (in terms of characteristics), and on the other hand on what is resulting from the interaction. We will label these sites of qualification as 'constructive' and 'productive' interactions.[4]

Constructive interactions can be characterized by an adequate (evaluated by the actors themselves, and evaluated by the researcher) treatment of the issue(s) under discussion (including the framing of the problem)) and mobilization of resources (from mental to financial) and by process requirements perceived as legitimate by the involved actors, whereby "adequate" is

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3 Legitimacy will thus, for the sake of the empirical analysis, first captured through understanding how legitimate stakeholders think the processes were. We as analysts can, when prompted, refer to legitimacy as the acceptance (of our interviewee) of the governance processes due to input (who involved, how involved), throughput (rules of the game, transparency, fairness) and the perceived outcome (effectiveness). For effectiveness we again can ask the interviewee about her/his perception, but should have in mind effectiveness in the sense of our concept, see below (productive and constructive interaction). These dimensions are captured under pint 6) in section 3 below.

4 This phrasing has been inspired by the notion "productive interactions" introduced by Spaapen, J. and van Drooge, L. (2009): Introducing 'productive interactions' in social impact assessment, *Research Evaluation*, 20 (3), 211–218.

not simply an objective measure, but set in context of the nature and distance between actor perceptions of what the RRI 'problem' is, and how to resolve it in governance terms (including the mobilisation of, or reference to, a particular voluntary governance instrument, and its effective utilisation.

When we apply this understanding of 'constructive interactions' to 'responsibilisation', defined above as the governance of (self-) stimulating actors to take up responsibilities, we can specify the 'well-doing' of the de facto governance of RRI by the following factors:

- Having the 'right' set of actors involved (think of different problem types requiring different modes and scope of participation), in a way that is perceived as meaningful and fair. This aspect will be conditioned by the governance arrangements, for example in providing the capacity to have actors with different stakes, power, etc… involved in a meaningful way, while in the de facto governance this doesn't have to be the case, depending on how key actors – consciously and unconsciously – put the arrangements in practice.

- Developing a shared (or a sufficient level of complementary) understandings of the governance challenges and how these have to be addressed. For example: think of how to cope with uncertainties. So, next to actor representation, there has to be an adequate 'problem representation' across the actors involved, in order to not have only participation, but also deliberation. Related to aspects of managing contestation (discussed below) we can also qualify this aspect as the robustness of the knowledge base underpinning the governance arrangement.

- Next to representation and understanding, the constructive quality of interactions critically depends on the capacities for learning and embedding of responsibilities (e.g. think of addressing various levels within organizations instead of only having 'spokespersons' involved). We can expect both to be related to the capabilities of actors, but the characteristics of the governance arrangement(s) are important as well, notably in providing for the spaces and capacities to stimulate reflexivity and responsiveness, and in the institutionalization of commitments.

With regard to 'managing contestation' we can think of constructive interactions as being typified typified by the existence of:

- Accepted procedures or 'rules of the game', which is important to the extent in which the inclusion of actors is perceived to be meaningful and legitimate.

- Transparency, which contributes to the legitimacy of procedures and inclusion as well as to the robustness of the problem framings.

- Trust in the de facto governance process, which depends on transparency and procedures, but also on the way how actors are involved (their behavior and commitments).

Productive interactions bring about **transformation**, either in the behavior or attitude of actors[5], in line with new understandings of responsibility, working towards a higher level of shared understanding of responsibility or in responsive/reflexive improvement in the governance arrangement itself (which then defines and supports specific goals . Consequently, we can expect that the de facto governance of RRI becomes more constructive, in one or more of the aspects specified above. Again, we can discern such effects as contributing to responsibilisation or to managing contestation, as has been depicted in table 2.

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[5] Transformations of behaviour is not necessarily equal to 'compliance' (to a certain regulation), but already start with changing attitudes and commitments, which in turn improves the possibilities to hold actors to account.

4. Operationalisation for the pilot case studies

In the following we operationalize the various dimension of the research model to take into consideration for the case work.[6]

4.1 RRI governance arrangements

The dimension of 'RRI governance arrangements' sketches the institutional coordinates and relative role of the RRI governance arrangement within the larger system in relation to the objective/purpose being served. This starts with an analysis of the specific situation.

1) Situate the R&I characteristics in your case. Is it about

   - Research (public and/or private),

   - Experimenting with new technologies in public settings (e.g. fracking, products entering practices or market introduction), or

   - Regulating market dynamics or value chains?

   - Etc.

2) Describe the governance arrangement(s) [i.e. the set of institutionally related instruments, fora and procedures that are central in the case study:

   - Purpose (e.g. outcome objectives such as ensuring safety, protecting equity, increasing societal relevance; or principal/procedure objectives such as ethical acceptability, (public) participation or stimulating reflexivity. Note that the purpose itself can, of course, be multiple and contested)

   - (Policy) instruments (e.g. law, soft regulation, codes of conduct, hybrid (organised) fora and arenas organising actors from plural and diverse settings

   - Systems of enforcement (procedures, informal/formal institutional structures)

3) Describe how the RRI governance arrangement(s) are positioned in the wider R&I & RRI governance landscape (in as far as relevant):

   - Vertical: relation to overarching frameworks or treaties

   - Horizontal: relation/competition to co-existing RRI arrangements

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[6] Please note that the numbering here does not necessarily mean that you analyse the case in this order, it is simply an ordering device for the analysis later on and for our internal communication.

4.2 Actor landscape

The actors involved can be the 'stakeholders' in a regulatory or political setting, or the various sub-divisions within a company or research organization.

4) Describe the (key) actors involved, in terms of:

- Organisation (e.g. Single Companies, Universities, CSOs, Ministries, business associations, professional associations, charitable foundations, media, …)

- Roles and relations (e.g. (in)formally, hierarchical, in competition, collaborative, … Note: pay attention to 'hybrid' roles and how different roles are linked within organizations)

- Relevant problem frames (ethical, economical, etc…), related interests (values, normativities) and power (resources, capabilities to frame the problems in de facto governance practices)

- Capacities and capabilities of actors to relate to the dimension of responsibility and to engage in debates and negotiations (level of awareness, underlying training, ability/readiness to learn, resources to be invested etc.)

4.3 De facto practices of RRI governance

The dimension of de facto RRI governance practices reflects the actual situations in which RRI governance arrangements are put into practice. As discussed in the previous chapter we are interested in the de facto governance dynamics and effects resulting from the way in which characteristics of arrangements and of the actor landscape, interact, and in what aspects the de facto governance of RRI is 'doing well'. These elements structure the case study narrative and analysis.

5) Describe how de facto governance dynamics are influenced, in terms of the framing and the nature and significance of the problem (as resulting from how values and normativities are 'voiced' by actors and whether contestation is about these values, or about the strategies and instruments to address the problem, or the modes of implementation). Analyze how these aspects are related to:

- Characteristics of the places and spaces of interaction, whether or not linked to the RRI governance arrangements

- How actors are mobilized: agenda setting, resource provision, capacity building

- How responsibilities are constructed, negotiated and taken up (including modes of enforcement / incentivisation) Note: pay attention to how individual and organizational role responsibilities are linked to collective responsibilities (the normative outcomes, principles or procedures at stake) in the context of the RRI governance arrangements.

- If actors use the (soft and hard) instruments incorporated in the governance arrangement and if so in which ways (e.g. to comply with or as conversational/reflexive tool; to implement or to experiment, etc…)

- How are interests played out, value clashes modulated and competing claims about effectiveness and legitimacy aligned

6) Assess to what extent responsibilisation and managing contestation are 'doing well':

- Describe and assess the actual transformation:

  - Is there a development of shared (or a sufficient level of complementary) understandings of the governance challenges (as for "responsibilisation") and how these are to be addressed.

  - Is there a change of behavior and attitudes, if so in how far is there a change their behavior in line with new understandings of responsibility (not only compliance, but also change of attitudes)

- What are the constructive quality of interactions, i.e.

  - the capacities for learning (reflexive actors) and

  - embedding of responsibilities (think of addressing various levels within organizations instead of only having 'spokespersons' involved).

  - Are the 'right' set of actors involved (think of different problem types requiring different modes and scope of participation), in a way that is perceived as meaningful and fair.

  - What level of trust is built up as regards the governance arrangements and practices, in how far are procedures or 'rules of the game' accepted (including issues of transparency and inclusivity) and what is the stakeholder's acceptance of (contested) outcomes

  - What is the level of (perceived) robustness of the knowledge base (as far as the level of uncertainty of the issue allows, social acceptance of including the state of the art knowledge and accepting its limitations?)

Note that , the degree of well-doing shall be elaborated by the explanations and perspectives put forward **by the actors themselves** (in interviews) **supplemented by analysis of** the case in terms of 'well-doing' **by yourselves** as case workers. We seek your explanation as to what extend certain aspects of well-doing are found to be present or not in each case in relation to the characteristics described by the descriptors in this chapter (e.g. think of characteristics of arrangements, such as institutional incentives. Or actor landscape characteristics, such as asymmetries of power or vested interests of various kinds dis-incentivising productive interaction).

4.4   Situating your case

When and how the governance of RRI can be considered as 'well doing' will differently manifest itself according to different circumstances, contexts, and situations of RRI. For example considering situations such as organizing and orienting research and innovation content, processes and outcomes towards societal problems; or engaging wider constituencies of societal actors in deliberations about the ethical and sustainable dimensions of the inception, production, distribution, consumption/use and disposal of artifacts which involve new and emergent technologies; or the outcomes and impact of organized reflections (arenas which are more loose and informal, hybrid fora which are more formal) and reporting (Nano-safety experts group in NL, Bio-ethics committees in Austria and Germany,) or the distribution and communication of responsibilities through global value chains through the use of standards or accreditation schemes; or the inclusion of ethical , environmental, safety, health, and responsible and ethical conduct reflections within research settings, or citizenship (public engagement, lay perspectives, and gender balance) dimensions in the training and formation of young scientists/engineers.

In addition to the governance dimensions, we therefore have a preliminary list of dimensions that characterize specific case situations. It is important to understand those in each case, as later on we will need to develop a simplified understanding of how certain situations and the governance challenge they pose relate to governance arrangements.

7)   Situate your case in terms of:

- Level of perceived locality vs globality

- Research vs. innovation

- Technoscience domains / cross-domain issues

- General purpose technology vs specific application

- Range and variety of actors involved

- Uncertainty about (the kind of consequences), e.g. market uncertainty, regulatory uncertainty. etc.

5. Drawing lessons and assisting transversal analysis

Here we give a first idea of lesson drawing across cases, to guide case work early on. We expect one page of main lesson drawing in your final report in May. More discussion on this to follow, these are first thoughts only. The following list is slightly redundant to the above, nevertheless, it gives an idea of the cross-cutting issues for ResAGorA. How can/are RRI governance arrangements initiated? (including immediate history i.e. taking RRI as emergent, and shed further empirical light on 'RRI seeds' ; 'RRI in the making' etc.

8) How can they be modified, extended (internal view, organisation & coordination)

9) How can RRI governance arrangement better be positioned in heterarchical landscape (external view, meta-governance)

10) When/how would RRI need to be differently understood? (framings, in relation to construction of responsibilities)

11) We then can expect building components to be found in all sorts of 'conflict management' strategies, playing out at different levels (think of conflicting logics, framings, interests, …).

12) In addition, do we see common dominant values and normativities related to the emerging technologies domain we are focusing on (e.g. strong democratic principles), reflected in the empirical cases? Or are they underpinned by other dominant values and normativities?

13) What are lessons in terms of the interactions and inter-penetrations of multiple-level analysis:

- EU (policy and programmes)

- Member states institutional framing conditions

- Hybrid (multi-stakeholder) fora.

- Single organization types (Such as multinationals, universities, charitable foundations),

- Individuals (formation of more reflexive and societally conscious/learning individuals, presence/absence of Champions/Institutional Entrepreneurs)

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