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Towards regional responsible research and innovation? Integrating RRI and RIS3 in European innovation policy

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Abstract

This article develops a model for a regional responsible research and innovation (RRI) policy, integrating existing European Union policies on RRI, and on research and innovation strategies for smart specialisation (RIS3). RRI and RIS3 are central concepts in the EU's innovation policy agenda, but there are tensions between the two approaches. The place-based approach inherent in RIS3 is missing from RRI, which has a fuzzy concept of geographical scale and is vulnerable to mismatches between the scale of innovations and of the associated governance networks involved in the innovation process. Meanwhile, the multitude of visions, values and stakeholder perceptions embodied in the RRI concept is countered by the more optimistic and unitary imagining of a regional future in RIS3. We highlight that Europe's innovation challenges can only be resolved by leveraging the strengths of both types of innovation policy.

Key words: smart specialisation, responsible research and innovation, innovation policy, regions, European Union policy

1. Introduction

Innovation has increasingly become a core ambition of both research and regional development policy (Landabaso 1997; Soete 2007) in Europe, resulting in the development of innovation policies with different genealogies. As a consequence, there have been two conceptually different policy ideas central to the European Union's (EU's) innovation policy in recent years, each predominantly associated with a different part of the European Commission organisation. On the research policy side, the Directorate-General for Research (DG Research) implemented Responsible Research and Innovation (RRI) as a cross-cutting action in the Horizon 2020 research and innovation programme at its establishment in 2014, foregrounding the responsibility of researchers and innovators towards society. In parallel with this, on the regional development policy side, the Directorate-General for Regional and Urban Policy (DG Regio) introduced the instrument of Research and Innovation Strategies for Smart Specialisation (RIS3) in 2011. It is a place-based policy which foregrounds the role of regions and emphasises research and innovation policy building competitive advantage based on regional strengths and potentials. Indeed, in the programming period 2014–20, regions have been required to develop so-called 'smart specialisation strategies' as a condition for access to European Structural and Investment Funds, making RIS3 a key part of EU cohesion

policy. As innovation policies, both RRI and RIS3 share some similarities, arguing for a broad stakeholder involvement in the development of innovation policy and of innovations. Likewise, both these approaches emphasise the need for research and innovation to be oriented towards solving grand societal challenges.

However, despite the apparent similarities between RRI and RIS3, there are substantive differences in their design and implementation, notably in the theories on which they build, and the networks, norms, and practices with which they have become associated. From the side of RRI, it is possible to see a number of lacunae, in that neither the theory, policy nor practice of RRI pays attention to the spatial dimension of innovation processes (which is central in RIS3 approaches). This causes it to ignore the various ways in which regional context affects not only the development of innovation but also the perception of what is responsible and socially desirable. From the innovation studies literature, we know that innovation processes are socially and spatially embedded, as the regional context around the innovative agent creates conditions for knowledge acquisition and learning (Laursen et al. 2012). This context provides the knowledge and resources which are necessary for innovation, as knowledge spillovers are much more frequent among co-located agents (Jaffe et al. 1993). Likewise, labour mobility, R&D collaboration, and various other conduits for interactive learning are frequently embedded within functional regions due to

social constraints on these processes (see e.g. reviews by Feldman and Kogler 2010 and Howells and Bessant 2012). Indeed, the foundational notion of RRI—that innovation should benefit society—takes a definition of society in which its scale and the attendant social relations are unclear. A responsible innovation policy may look quite different depending on whether it aims to benefit regional, national, European, or even global societies. The understanding of what is 'responsible' or 'socially desirable' is not objectively given, but is subject to political negotiations at every level of government (Benneworth et al. 2016).

Conversely, RIS3 policy is primarily oriented towards regional competitiveness and therefore does not fully incorporate notions of social value or choice. The idea of 'public value' may be reduced to a sometimes simplistic economic reading of profitability and employment numbers. RIS3 strategies must conform to the overarching Europe 2020 strategy for smart, sustainable and inclusive growth, although there is clearly a prioritisation of its economic aspects, mainly building regional economic strengths and potential competitive advantage.

This raises the possibility of an unproductive fissure emerging in European innovation policy at a time when—according to the Europe 2020 agenda—innovation should be at the heart of ensuring public policy improves citizen welfare. To bridge this gap, we explore these two concepts to ask whether they can usefully be combined in an integrated innovation policy framework. This article explores the theoretical underpinnings of RRI and RIS3 policy, highlighting how the core idea in each approach remains a lacuna in the other. It then discusses what an integrated framework incorporating key elements of each—a responsible regional research and innovation policy—would look like.

The article is based on two premises: First, social responsibility is always constructed towards a community ultimately able to arbitrate upon what is considered responsible and social behaviour. Meanwhile, communities also have responsibilities towards other communities, creating a need for mediation across communities—a moral spatial interdependence. Secondly, innovation processes also take place in a community: the interaction of knowledge and experience of community members is crucial to developing new knowledge and innovation, but simultaneously these communities require non-local knowledge inputs to advance their innovation processes—a functional spatial interdependence.

We propose a regional RRI that combines the two approaches into a responsible and regionally embedded innovation policy. This approach recognises the regional community's role in defining what RRI means, in granting researchers and innovators a licence to practice, and in developing the innovations themselves through a networked innovation approach. It also explicitly recognises the links to non-local communities both in terms of regions' moral and functional responsibilities to—and interdependencies with—other communities. In doing so, this article makes an original contribution to the literature by introducing a framework that may assist policymakers in designing and implementing RIS3 strategies that not only promote smart (i.e. competitive) but also inclusive and sustainable regional economic development.

2. European innovation policy: caught between two complementary logics?

Innovation policy has emerged onto the European policy agenda through the somewhat unusual mechanism of the absorption of an innovation rationale into other policy fields (Zomer and Benneworth 2011). European research policy emerged from attempts to foster corporate competitiveness by stimulating large firms to undertake more pre-competitive research and development (Sharp 1990). RRI emerged out of a dissatisfaction that corporations were increasingly extracting value from those investments, sometimes reducing the creation of public benefits in their own private interest (Von Schomberg 2013). Regional policy was originally concerned with providing aid to less successful regions, from 1989 onwards seeking to ensure that the new single market did not undermine itself by exacerbating regional inequalities (Brunazzo 2016). However, since the 2000s, there has been an increasing emphasis away from redistribution to stimulating new growth opportunities through innovation (Van den Broek et al. 2018). There are therefore two different policy networks where innovation policy is defined in Europe, and these two policy networks have different views on what matters—different policy logics (Konrad et al. 2019). Therefore, any conceptual notion of regional responsible research in Europe has to situate itself within these two different policy networks and their corresponding policy logics.

2.1 Responsible research and innovation

The aim of RRI policy is that research and innovation should have a societally beneficial impact (Owen et al. 2012). RRI emerged from a particular concern in European policy circles that increasing expenditure on research and innovation was not lifting up general welfare levels. The policy agenda for RRI, therefore, focuses on both mitigating the negative effects of research and innovation in areas with potentially adverse societal effects, as well as actively supporting research in areas where the societal benefit is high, for instance, in addressing grand societal challenges. RRI envisages that responsible researchers and innovators actively construct their 'responsibility', reflecting the need for researchers to communicate and discuss their results to build social support for and permit social guidance of their research efforts (Owen et al. 2012). The operationalisation of RRI sets out a clear perspective on how to achieve this, notably by involving key stakeholders at an early stage of the research and innovation process.

The RRI concept emerged mainly from the European Commission (Von Schomberg 2011), starting as a policy more than an analytical concept. Zwart et al. argue that 'this neologism is not introduced by the research field itself ("bottom-up"), but rather by science policy makers and funding agencies (notably within the European Commission) in a top-down manner' (2014: 2). One of the key architects of the EU's RRI policy, René von Schomberg, defines RRI as

> a transparent, interactive process by which societal actors and innovators become mutually responsive to each other with a view to the (ethical) acceptability, sustainability and societal desirability of the innovation process and its marketable products. (Von Schomberg 2011: 9)

RRI regards being responsible during research and innovation processes as being as important to the production of responsibility as the outcomes of that activity. This reflects the fact that in a research and innovation process, the end point and even the desirable goals may be uncertain and change over time. Further developing the theory underlying RRI, Stilgoe et al. (2013) identify four dimensions of a responsible innovation process, namely anticipation, reflexivity, inclusion, and responsiveness. Stilgoe et al.'s framework states that

RRI projects must systematically aim to anticipate all potential outcomes and implications of the project. Secondly, researchers must reflect not only on the practicalities of the project, but also on the value systems and theories which underpin it. Thirdly, they must involve stakeholders in the project and allow for meaningful participation by those stakeholders and fourthly, that involvement must bring with it the potential to affect the project's overall trajectory, organisation, goals, and values.

Complicating the matter, the EU Commission has adopted various different approaches to RRI, creating further conceptual confusion about what RRI actually is. Prominent among these is the 'keys to RRI': gender, ethics, open science, education to science, and engagement of citizens and civil society—an approach which according to some observers has 'more to do with the bureaucracy of maintaining [RRI] as a cross-cutting theme [in the Horizon 2020 programme] than with the conceptual foundations of RRI' (Rip 2016: 292).

RRI can be regarded as the latest of a sequence of policy agendas that have aimed to reconcile scientific progress with societal interests to avoid the loss of legitimacy of science posed by scandals. Several attempts have been made at building societal considerations as a governance norm into scientific decision-making. Approaches such as Technology Assessment (Schot and Rip 1997) and Bioethics (Engelhardt 1996) were prominent in the 1980s and formed the backdrops for the formal establishment of the Ethical, Legal, and Social Implications (ELSI) of genetic and genomic research programme in the US in 1990. In Europe, 'implications' was swapped with 'aspects' to create ELSA. RRI can be regarded in many ways as the successor to ELSA, although it reflects the additional pressures faced by innovation to be profitable. This also broadens its scope to include perspectives from management and innovation studies (Zwart et al. 2014).

Underlying RRI policy is a fear that society has lost control over science and innovation despite the increasing sums of direct and indirect public funding that stimulate and facilitate research and innovation. Research policy has become increasingly oriented towards scientific excellence (Hallonsten and Silander 2012), and innovation policy increasingly oriented towards competitiveness (Bristow 2010). In this process, there is a risk that the social value of research and innovation is lost, or at least is increasingly up to researchers and innovators themselves to preserve. RRI proponents contend that these policy arrangements create governance frameworks which are insufficient to control the development of research and new technology in potentially ethically problematic areas, such as genetics, biosciences, and information technology. In these fields, the pursuit of new knowledge creates opportunities to develop new technologies, but technology should not be created for its own sake. Societal voices must also influence discussions concerning which knowledge will be developed in which directions for which purposes.

2.2 Smart specialisation as a focus for European innovation policy making

The origins of smart specialisation strategies lie in the history of European regional technology policy, which from the 1950s onwards was dominated by exogenous growth theory. For less successful regions, this involved creating growth centres to generate regional multiplier effects that would drive growth in these places (Holland 1976). These were not necessarily high-technology projects, but sought to create large-scale employment and economic activity, supporting the development of local supply chains and ultimately productive regional industrial clusters, such as through

steel mills (Hospers 2004). However, from the 1980s increasing interest emerged in so-called third wave growth theories (Bradshaw and Blakely 1999). These held that the key to regional growth was to create endogenously based local specialisations which would increase the region's global competitiveness (Piore and Sabel 1984). As mainstream policy-making lagged this wider conceptual realisation (indeed, industrial location grants remain to this day a popular tool in the regional policy armoury), it was left to more isolated experiments in developing appropriate interventions to stimulate those dynamics.

With hindsight, one of the most influential of these experiments was the European Commission's Regional Technology Plan (RTP) in 1989 (Morgan 1992). It was launched by the Directorate General responsible for regional policy within the 1989 structural reforms that sought to localise regional policy away from national governments. At the heart of the RTP pilot was the idea that a group of regional partners would together identify gaps in their regional technology networks and identify projects (to be funded with European structural funds) that could help local firms access those technologies (Lagendijk 2000). This one-off policy intervention was funded out of a tiny Structural Funds experimental reserve, but was highly successful, with the final evaluation noting its key contribution being capacity building:

> Regional Technology Policies first of all had an important impact on the policy formulation process, i.e. creating a policy planning culture where innovation & RTD are well embedded in the overall regional development strategies. (Boekholt et al. 1998: 1)

In the period that followed, three DGs launched their own similar programmes, using European investments to stimulate territorial technology networks. The aim was to build regional technology transfer capacity between key regional partners.[1] Following this experimental period, a meta-analysis of these three schemes identified that the central issue for regional innovation policy was balancing the need for science investments to be located in areas of excellence with the need to make investments in future excellence in less successful regions (Socintec/INNO 2004). Effective technology policy—particularly in less successful regions—involved a functional interdependence with those places that had complementary knowledge resources to help a region develop new industries and sectors.

The EU structural fund reform from 2007 introduced a substantive shift towards innovation. All regions were supposed to develop innovation strategies as an integral part of their use of European funding. However, this occurred at precisely the same time as the Barroso Commission had noted that all this activity was not paralleled with an expansion of innovative activity outside Europe's high-technology core. Analyses looking in detail at the implementation of this new innovation policy noted that the mechanisms promoted in the extended RTP methodology (mapping, consulting, peer reviewing, and planning) tended to produce uniformity across regional strategies, reinforcing the advantage of core regions. Whilst the hope for these policies was that regions would target particular clusters or sectorally-specialised areas, what had emerged was a one-size-fits-all approach where all regions opted for the same high-technology clusters. These were often clusters in which they themselves had no real identifiable strengths, typically encompassing electronics, Information and Communications Technologoes (ICT), biotech, and nanotech.

By this stage, mainstream industrial policy-makers had also identified the phenomenon of increasing regional economic differentiation driven by persistent imbalances in innovation capacity. In

particular, multinational agencies such as the Organisation for Economic Cooperation and Development (OECD) and the World Bank woke up to this problem (Barca 2009; McCann and Ortega-Argilés 2013, 2015). A group coalesced around these actors, blending existing understandings of the processual dimensions of mobilising regional innovation partnerships with evolutionary economic geography. They sought to explain why some places could change their economic development trajectories, by promoting new combinations of existing knowledge (Asheim et al. 2011). The policy concept that emerged, smart specialisation, used the accepted methodology of regional partnerships, but oriented these to fostering the emergence of new combinations through what it termed the 'entrepreneurial discovery process' (Foray et al. 2012; Foray 2014). Specifically, the entrepreneurial discovery process sought to take control of the regional strategy process out of the hands of supposedly cautious and incrementalist regional bureaucrats and put it into the hands of those actually interested in making new combinations—the local actors with an entrepreneurial mindset (i.e. innovative, Schumpeterian entrepreneurs in firms and start-ups as well as institutional entrepreneurs in universities and public agencies).

The heart of the entrepreneurial discovery process remained, as with the RTP methodology of the 1990s, the mobilisation of a regional coalition of those involved in knowledge generation, exploitation, or transfer (Nieth and Benneworth 2018). These coalitions would seek to identify existing regional strengths, and bring together those actives in innovative firms in those fields. These entrepreneurial representatives would then interact to scope out potential new combinations by which new sectors could emerge, building on related and unrelated variety effects (Boschma 2013; Asheim et al. 2017). These newly created sectors would, therefore, in principle be specific to the regions in which they emerged and also unique in terms of the ways that they were articulated by a bottom-up entrepreneurial process rather than by a top-down bureaucratic process, thereby avoiding the one-size-fits-all problem. These would be written up into a new form of strategy, a RIS3.

In general, the EU considers RRI partly as a key action of the 'Science with and for Society' objective and partly as a 'cross-cutting issue' in Horizon 2020.[2] Specifically, with respect to RIS3, a project called Mainstreaming Responsible Innovation in European S3 (MARIE) is funded by the Interreg Europe programme 2014–20, which, by inserting the RRI concept into RIS3 policy-making, aims at creating greater awareness among regional stakeholders and the wider public on the potential of S3 policies to promote responsible growth. Concretely, the expected output of the project is to improve regions' policy instruments to create a Quadruple Helix regional innovation system that is socially and environmentally responsible in addition to promoting regional competitiveness.[3]

3. The tensions between RIS3 and RRI

Fundamentally, both RRI and RIS3 represent a common form of governance where various kinds of societal influence co-determine together with scientific judgements the overall development trajectories of science and technology (Gläser 2012). However, the concrete forms of governance arrangements that have emerged around each of them involve very different dynamics. RRI envisages a well-informed deliberative dialogue between societal partners seeking to shape the direction of research and innovation towards what is ethically desirable at the European scale. RIS3 envisages a creative imagining of potential futures as the basis for primarily economic

growth involving a region's dominant knowledge actors. But individual researchers, research teams, and institutions do not themselves choose to undertake either RRI or RIS3. Rather, they take small-scale decisions in research and innovation that in turn affect in various ways the resultant socio-economic impacts. They are engaged in specific research or innovation projects with their own goals and ambitions, for which broader policy agendas related to RRI or smart specialisation may be only a minor consideration. Understanding the meso-level impacts of regional effects cannot only be purely inferred from the macro-level of European policies, but also requires an understanding of the way these policies have micro-effects on individuals. We, therefore, reflect on the ways in which these two macro-scale concepts may play out at the micro-scale in terms of knowledge creators' (researchers and innovators) experiences.

3.1 What is the regional dimension of RRI?
Viewing RRI from a regional perspective, there are a number of ambiguities which undermine its transposition from the macro-scale to the regional context. First, the RRI approach is not clear as to what is the 'society' for which an innovation should be desirable. Secondly, it is not clear about which 'societal actors' should be involved in governing research and innovation. These ambiguities reflect that geography is lacking from the current understanding of RRI.

3.1.1 What is society in RRI?
Society can be conceptualised at various scales,[4] from the local to the global. In the theory underlying RRI, there are competing conceptualisations of the scale at which the normative foundations of RRI rest, as well as the scale towards which researchers and innovators are responsible. This reflects the various different, and often disconnected, theoretical contributions that have informed RRI policy. However, the notion of scale remains implicitly articulated in ways that allows particular *scales* to dominate over others, most often the European or the global scale—or in some cases a multitude of societies.

3.1.1.1 The European Society. Emerging from the EU Commission, RRI was anchored in European and, in particular, EU understandings of what constituted RRI: 'For Von Schomberg, the EU Treaty provides the "normative anchors for this process" ' (Zwart et al. 2014: 14). Similarly, de Saille (2015: 161) holds that 'the shared norms of RRI are presumed to enshrine "European values" [...] through the *Charter of Fundamental Rights* and the *Treaty on European Union*'. Continuing this tradition, many other papers on RRI take as their starting point the notion of shared EU values or refer to core EU documents (e.g. Mali et al. 2012; Owen et al. 2012).

3.1.1.2 The Global Society. Other contributions go beyond this purely European conception, seeking to extend the concept beyond the global North to offer a sense of global responsibility (Macnaghten et al. 2014). Stahl (2013) looks to universal human rights and other global declarations for the normative foundations for RRI (Stahl 2013: 711). An earlier paper referred to RRI as an attempt 'to deal with the uncertain, *global* and fragmented nature of research and innovation' (Stahl 2012: 208, emphasis added). While primarily discussing EU policy, Owen et al. (2012) also noted 'the sometimes profound, *global* (and intergenerational) impacts of innovations in contemporary society' (Owen el al. 2012: 752, emphasis

added) and the 'ambition at a policy level to support "the best science *for* the world," and not just "the best science *in* the world"' (Owen et al. 2012: 753, emphasis in original). By anchoring definitions of responsibility in these imagined and legally encoded communities, these readings of RRI assume an international or global scale.

3.1.1.3 Multiple Societies. However, Stilgoe et al. (2013) were later to reject the notion of a common normative foundation of RRI entirely, noting that

> 'in different cultural contexts, different values will be more or less pertinent, and they may be conflicted. In our analysis, we have therefore been reticent to explicitly define the normative ends of responsible innovation. (Stilgoe et al. 2013: 1577)

Similarly, Stahl acknowledges the presence of multiple societies by referring to them in plural: 'societies rely on research and innovation to solve their problems' (Stahl 2013: 709). On this basis, the paper discusses the presence of multiple visions of what constitutes social value. However, it does not resolve how this plurality will be dealt with or the issue of responsibility when different societies take different attitudes to a particular research or innovation activity.

3.1.2 Which stakeholders should be involved?

These ambiguities regarding the definition of the 'society' for which research and innovation should be desirable spill over into discussions about which 'societal actors' or stakeholders should be involved in the governance of research and innovation. While RRI has emphasised the need to involve stakeholders in research and innovation processes, it has left the identity of these stakeholders entirely unclear.

While many RRI approaches have defined 'society' at the European or global scales, they have often looked to lower scales to identify stakeholders. Various papers discuss RRI implementation at the national scale (e.g. Schaper-Rinkel 2013; Simakova and Coenen 2013), whereas Lee (2012) and van Oudheusden (2014) extend the discussion further to also incorporate the regional scale. In a specific case study from Flanders, van Oudheusden (2014) argues that the project managed to move beyond abstract European principles to foster interactive learning processes involving researchers, policy-makers and stakeholders at the local level. Lee (2012: 114) explicitly discusses the appropriate scale for RRI, arguing for a 'complex, multilevel governance of science and technology' to handle the contradictions between increasingly globalised markets for new technology and local variations in values and societal preferences. Fisher and Rip (2013) also argue for multilevel governance of RRI in a conceptualisation which includes the European and national level, intermediary organisations and individual labs. However, in this case, there is no mention of the local and regional scale. Zwart et al. (2014: 12) highlight that there is often a kind of growth fallacy embedded within RRI: '[r]esponsible innovation is *better* innovation, is the general adage, and innovation is expected to strengthen the competitiveness of core Dutch industry.' Science and technology policy typically aims to promote national competitiveness, and this is also a key ambition behind Horizon 2020 and other policy programmes where RRI has been implemented.

There is an inherent contradiction between this implicit national scale in policy aims and the notion of a global normative foundation for the RRI concept. Stilgoe et al. (2013) allude to this, discussing a case in which national research councils operated in service of national (scientific) competitiveness, whereas supranational policy bodies were urging caution (Stilgoe et al. 2013: 1575). Competitiveness is fundamentally a non-global concept which only makes sense in the context of competition between entities at a lower scale. The race between nations or regions to develop the best science in the world is at odds with the Polanyian notion of scientists as citizens of the Republic of Science (Polanyi 1962), and may not necessarily breed responsible behaviour.

The definition of appropriate scales is also pertinent for the identification of stakeholders for the RRI process. Again, this is vaguely defined in the core RRI literature as 'publics and diverse stakeholders' (Owen et al. 2012: 755), 'stakeholders and wider publics' (Stilgoe et al. 2013: 1575), 'various societal actors' (Stahl et al. 2014: 815), or 'stakeholders and other interested parties'—later specified as 'actors from industry, civil society, and research' (Von Schomberg 2013: 65–67). Some contend that RRI, compared with earlier approaches such as ELSI or ELSA, places more emphasis on collaboration with industry and on socio-economic benefits of science and technology, pushing 'researchers into close proximity to their private–public "objects" research' (Zwart et al. 2014: 3–4). Other contributions get closer to identifying specific bodies to involve in RRI processes, for example, Mali et al. (2012) focusing on national ethics advisory bodies, or Fisher and Rip (2013) on a range of councils and committees at different levels.

This partly arises because of a lack of treatment of the question of power in RRI. In particular, RRI has largely overlooked the ways in which power may operate indirectly to shape access to decision-making forums, defining what constitutes legitimate and admissible arguments in those forums and indeed setting those forums' agendas (Lukes 1986). RRI tends to focus on procedural aspects, emphasising talk and deliberation, while ignoring the various faces of power and interest representation within those procedural arenas (van Oudheusden 2014). The vague definition of stakeholders leaves it partly up to researchers or funding bodies who to include—and to exclude—from the decision-making process—and partly also up to the most resourceful and/or interested stakeholders to engage with the process. RRI lacks a procedure for legitimate dispute resolution in the presence of diverging interests, which is a feature of most other democratic decision-making. Instead, it portrays society as a unified body with common interests—even if these may be contrary to those of the researchers. Governance relationships, which may be tense, contested, and problematic, are reduced to a sense that if researchers are just inclusive enough, and responsive enough, to these stakeholders, the outcome will by definition be 'in the societal interest'.

A final element emerges in the practical construction of the consultative networks implied in the RRI methodology. Despite RRI's global (or at least European) normative foundations, stakeholder involvement to achieve this often turns out to be national or even local. Most university collaboration with societal stakeholders takes place at the local level, where geographical and social proximity provide plentiful opportunities for researchers and external stakeholders to meet (Fitjar and Gjelsvik 2018). While researchers often collaborate with other researchers at considerable geographical distance, they are much less likely to bridge geographical distance when collaborating with partners from industry or civil society (Gertner et al. 2011). If researchers are left to identify stakeholders for their own research, the outcome will often be mainly the involvement of local stakeholders. The frequent stakeholder involvement and interaction stipulated by RRI further create a need for geographical proximity to facilitate this. The question then becomes

how these groups of local or national stakeholders will ensure that the research takes place in accordance with universal European or global norms, and in the interest of a wider public beyond the region.

3.2 What is the responsible dimension of smart specialisation?

If the RRI concept is not equipped to deal with the complexity and apparently small size and opportunistic nature of the 'regional scale' in scientific governance processes, then RIS3 is equally ill-equipped to deal with two challenges foregrounded in RRI, namely (1) the nature of inter-territorial dependencies and (2) moral-ethical considerations in shaping public investments in research and innovation. Although smart specialisation strategy processes are implemented in 'regional' contexts, the processes that set 'rules of the game' for creating smart specialisation strategies are determined centrally by the European Commission. RRI repertoires are potentially time-consuming, involving reflection, deliberation, and dialogue, whilst smart specialisation strategy processes are framed as being 'entrepreneurial' in their nature, dynamic, and creative but with little space for the meaningful exercise of social control over those processes. This is obscured by the fact that that exclusion is of the second-order—nowhere is it said that regional smart specialisation strategy processes cannot be responsible (on the contrary, they aim for sustainable and inclusive specialisations), but they carry an urgency that makes that all but impossible in practice.

The Lisbon Agenda had committed the European Union to creating 'the most competitive and dynamic knowledge-based economy in the world capable of sustainable economic growth with more and better jobs and greater social cohesion'. Following the rather negative outcomes of the 2005 mid-term review, a strong steering apparatus was built up around the European Commission to address the 'implementation gap' which was deemed to be responsible for the failure to deliver in practice the goals established in 2000 (Kok 2004). This was strengthened as part of the post-crisis recovery plan, with the creation of a set of National Reform Programmes to compel member states to deliver the key elements of the Lisbon Agenda. This approach was continued and indeed deepened with the Europe 2020 strategy from 2010 onwards, which aligned access to European resources to these national reform programmes. Cohesion Policy—and smart specialisation strategies—remains geared towards creation, action and absorption of funding, rather than deliberation, reflection, and the potential refusal of inappropriate funding.

Although Europe 2020 notionally prioritised creating smart, sustainable and socially inclusive growth, the continuation of coordination mechanisms such as 'Ex ante conditionality' were to prove decisive in the way that smart specialisation strategies were implemented in practice. 'Ex ante conditionality' made access to European structural funds dependent upon demonstrated compliance with or working towards a number of European operational targets, including targeting investments in research as well as promoting the digital economy. This framing linked smart specialisation to the requirement of having a strategy, and having that strategy was a precondition for accessing funding. Countries, often with very little experience in creating regional innovation strategies, were required to develop a bundle of such strategies for all their regions in one calendar year (2013) to avoid being sanctioned by the Commission for the programming period 2014–20. These smart specialisation strategies had to be demonstrably based upon an entrepreneurial discovery process where key regional stakeholders identified new combinations to create regional innovative competitive advantage, with the clock ticking.

This subjected the smart specialisation strategies to three kinds of simultaneous pressures. First, they were regulated by an implementation apparatus that had been given its strongest powers at the time of economic crisis, when creating economic growth at all costs was the priority. Secondly, there were huge practical time pressures, which left little time for the luxury of the anticipation, reflexivity, inclusion, and responsiveness repertoires that characterise RRI. The timescale (in practice ten months to create the RIS3 strategies for all regions) and the importance to national governments drove substantive opportunism in policy behaviours to ensure that something was produced that could be presented as RIS3 strategies that complied with the ex ante conditionality requirements. The third issue was that for those countries having problems meeting their substantive ex ante conditionality requirements (such as around environmental protection/ waste treatment), RIS3 was something that could be relatively easily complied with. Under these circumstances, it is not surprising that regional partners often simply rehashed existing innovation strategies with a touch of entrepreneurial discovery (Pugh 2014).

Smart specialisation is a policy concept in the sense that it has been developed as an ideal type to shape policy practice, but at the same time its evolution has been shaped by the emergent practices and processes by which RIS3 strategies were created. In many regions, the experimental idea of smart specialisation strategy became fixed into a set of standard behaviours, in which responsibility repertoires devoted to providing inclusionary access to traditionally neglected groups were rendered absent or invisible. While the entrepreneurial discovery process prescribes the involvement of a broad set of stakeholders from different spheres, in many regions these remain largely drawn from elites in the private, public, or not-for-profit sectors.

In general, there is often a long road from intent to implementation, especially so in the case of smart specialisation with its multi-scalar dimensions of governance and decision-making. The ideal picture of how RIS3 should be designed and implemented might be described as a double top-down/bottom-up logic between the EU (DG Regio) and the individual regions, as well as within each region (or between the national and regional level within each country). The explicit intent of DG Regio is to promote smart, inclusive, and sustainable growth, where DG Regio provides the overall framework and principles and leaves the specific design and implementation of RIS3 to the regional level. However, the actual design and implementation of RIS3 in each and every region in the EU is very much dependent on the capabilities, capacities and competences of actors and agencies within the regions (or at the national level). The net effect of this has been to exclude responsibility repertoires and underlying deliberative processes from smart specialisation strategies, and by this practical unintentional exclusion, prevent them from becoming incorporated into the norms and practices of contemporary European regional innovation policy.

4. Towards an integrated framework

These two positions do not determine that the RIS3 and RRI approaches are incompatible, rather that these two positions come from quite different perspectives. RRI is rooted in an orderly, deliberative view of the world of rational planned action, whilst

entrepreneurial discovery seeks to unleash bottom-up local creativity and channel it towards competitiveness and innovative growth. These two epistemologies may in practice conflict, thereby hindering the development of responsible regional innovation. We therefore turn to reflect on where there might be the potential to integrate these two approaches to create the intellectual basis for the subsequent development of an operational policy tool at the regional level.

4.1 Adding geography to RRI

First, we address the geographical dimension which is missing in RRI. A natural starting-point for this discussion is the question of which is the appropriate geographical scale for governance networks comprising societal partners to guide research and innovation projects. The RRI framework fits most neatly for projects with only a local impact, where participation can be limited to local stakeholders. This would allow for frequent contact and meaningful involvement. However, such projects are most likely relatively rare in the real world. Involving stakeholders at the national, rather than the local, scale will already make it quite expensive and impractical to meet and interact as frequently as the RRI framework entails. Of course, this issue becomes more severe the larger the country. As we move up to a European scale, frequent communication is even harder to achieve, and cultural and language differences further add to the challenges of communication. At the global scale, involving a truly global set of stakeholders would be a daunting and almost impossible task. Furthermore, inclusion of stakeholders at more aggregated scales implies to a greater extent the involvement of peak interest groups representing different imagined communities. This already presents a potential conflict with the notion of direct contact with the wider public, which RRI typically highlights.

One geographical problem that emerges within RRI is where there is a mismatch between the spatial scale of the interdependencies and the spatial scale of the governance network within which these various dimensions of RRI are exercised. We anticipate that problems might arise in driving meaningful RRI when there are two kinds of mismatch between interdependencies and governance networks. The first is an oversight mismatch: the (potential) impact of the innovation exceeds the geographical scope of the governance network around the innovation process. In this case, meaningful stakeholder representation cannot be achieved without oversight by a higher governmental level representing the scale of the innovation's impact, whether nationally, at the EU level or even globally. The second is a subsidiarity mismatch: the scope of the innovation governance network exceeds the geographical scope of the innovation. This creates issues of representation, and violates the principle of subsidiarity—that decisions should be made at the closest geographical scale which is feasible. A typical example of this is the kind of innovations which permit environmentally destructive extractions of mineral resources, such as steam extraction of heavy oil, which have very localised impacts but are justified in terms of national and European geopolitical and economic benefits ([Velderman et al. 2018](#)). This issue of mismatch is shown in [Figure 1](#), and provides a means to reflect on whether there is indeed congruence between the spatial scale of the potential impact and that of the innovation governance network.

4.2 Adding an RRI framework to smart specialisation

As RIS3 depends on research and innovation to achieve a smart, sustainable and inclusive economy at the regional level, it must also
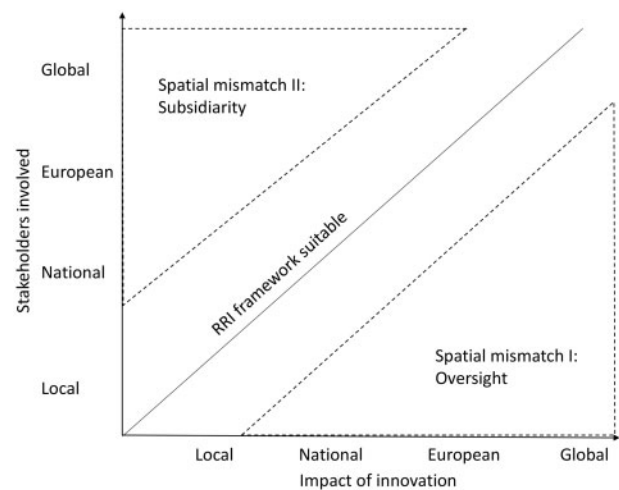

Figure 1. A geographical approach to RRI.

ensure the responsibility of this research and innovation process. The success of achieving this depends to no small extent on the way the entrepreneurial discovery process is practiced, or, more precisely, the organisation of the governance process around smart specialisation. Linking this more explicitly to an RRI framework, [Stilgoe et al.'s (2013)](#) approach based on four dimensions of RRI can serve as a starting-point. By applying the dimensions of RRI—anticipation, reflexivity, inclusion, and responsiveness—to smart specialisation, we can assess which dimensions are already covered in current RIS3 practice and which require further adjustments. This helps to bring the discussion from the general level to specific dimensions of the concept.

In [Table 1](#), we reflect on how these might potentially be applied formally within the smart specialisation framework to ensure responsibility towards societal stakeholders in the process. *Anticipation* is already at the core of the smart specialisation process, as entrepreneurial discovery is fundamentally about anticipating future outcomes. However, participants in the entrepreneurial discovery process need to consider outcomes beyond regional competitiveness, including how the various strategies will affect social and environmental outcomes. The *reflexivity* dimension in smart specialisation would require explicitly reflecting on the various potential outcomes of the process, notably its impacts on other regions, on the environment and on different groups of citizens in the region. It furthermore requires moving beyond the intended or wished effects to consider possible unintended and undesirable effects of the policy. *Inclusion* entails, as mentioned above, ensuring that the entrepreneurial discovery process involves a governance network that has genuine capacity and opportunities to shape the agenda and the content of the strategy and is not excessively dependent on demands and interests externally imposed. In that sense, the interests of ordinary citizens must also be substantively represented in the process and not merely added as an afterthought to be easily dismissed. Finally, the process must be *responsive* towards criticism. There is potentially a risk in smart specialisation that decision-making is moved away from elected bodies towards less accountable and transparent groups of entrepreneurs. To alleviate this, the results must be anchored in ordinary political bodies, or even more broadly in civil society organisations, where other stakeholders are represented.

Table 1. A responsible approach to smart specialisation

Anticipation	Inclusion	Reflexivity	Responsiveness
RIS3 predicated on anticipating effect of innovations on regional competitiveness—also need to consider effects on social and environmental outcomes Entrepreneurial discovery of solutions to grand societal challenges	Entrepreneurial discovery process needs to include wide range of stakeholders, not just entrepreneurs in the narrow sense Ensure representation of citizens in the process	Smart specialisation strategy needs to reflect on the strategy's impact on other regions, the environment and different groups of citizens in the region	Smart specialisation strategy must be responsive to criticism by all affected, for example, citizens in the region and stakeholders beyond the region

A key issue here is the way in which external demands become mediated into regions, and the constraints that they impose on regional partnerships. The roots of RIS3 are an attempt to extend innovation to drive competitiveness and recovery at the regional scale, and its embedding within a relatively restrictive coordination approach. The new strategy for Europe, Europe 2020, embeds grand social challenges of energy, public health, ageing, and climate change. This may see new external logics imposed on regional partners when they revise their strategies. There is a risk that these become framed and channelled in rather reductive ways that prevent citizens having meaningful input on the long-term choices, and find themselves restricted to choosing between the lesser of different evils for their locality. It is pivotal to reach a balance between demand-oriented and supply-led strategies, in which place-specific context matters and innovation policy can be attuned to and embedded in the particularities of the regional and national economies it claims to target.

4.3 Towards a conceptual integration of the two approaches

To assemble the two approaches into a single unified framework, we build on the stages of the smart specialisation process as identified in the EU's RIS3 Guide (Foray et al. 2012): analysis, governance, vision, prioritisation, policy mix, and monitoring. These stages have been central in the practical implementation of smart specialisation in European regions. We discuss in the light of the considerations offered above how the four dimensions of RRI could be used to enhance the responsibility of the process at each stage (Table 2).

4.3.1 Analysis

The analysis stage in RIS3 focuses on identifying regional assets, its position in the global economy, and the dynamics of the entrepreneurial environment. From an RRI perspective, regional and societal needs should also form part of this analysis, focusing upon not only nurturing regional assets to improve competitiveness, but also on addressing pressing regional needs. This calls for analysis of how innovation can solve grand challenges as well as contribute to competitiveness. The RRI approach implies involving a wider range of stakeholders also in the analysis process. As any analysis rests on a specific value system, participants must reflect upon and explicate these perspectives and seek to include other perspectives. Finally, the analysis itself should not be treated as infallible, but need be responsive to new knowledge emerging throughout the process and to other perspectives and opinions on where the potential for innovation lies.

4.3.2 Governance

The RIS3 approach is compatible with RRI in its focus on including a wide range of stakeholders in the process (which is part of an ex ante conditionality requirement). However, appropriate stakeholders are not objectively given, or even always clear, and hence the process of identifying stakeholders also requires anticipating who might be affected by the subsequent process. This might reveal new groups of stakeholders not traditionally included in regional innovation policy-making or who have not hitherto felt that they needed to express their voice in these arenas, for example, user groups or civil society organisations representing citizens. From an RRI perspective, it is important to recognise that these participants may have diverging interests, demanding conflict-resolution mechanisms. The RIS3 approach downplays this issue, reducing it to a need for 'boundary spanners' to moderate the process. Instead, the issue of power in such relationships must be recognised and addressed. From a RIS3 perspective, RRI involves extending the innovation process to include a spiralling number of potential veto points that risk derailing the entrepreneurialism of the process. Yet, ignoring these dissenting and critical voices can only lead to an irresponsible and potentially overly optimistic policy process.

4.3.3 Vision

The elaboration of a vision for the regional future need to extend beyond developing competitiveness to address what residents would regard as an overall good future society. As different stakeholders will have different values and norms, this requires mediating among multiple potential and valid visions for the region. This in turn necessitates an open attitude towards critical concerns, finding ways to include critical and dissenting voices without derailing the emergence of a vision. This issue is addressed in the innovation literature regarding innovation journeys (cf. Van de Ven et al. 2008). RIS3 emphasises the broad involvement of stakeholders with an entrepreneurial mindset in the entrepreneurial discovery process, including institutional entrepreneurs and actors and agencies executing place leadership, emphasised in RIS3. However, in many regions, involvement is limited to the traditional Schumpeterian innovative entrepreneur (Grillitsch and Sotarauta 2018). This clearly creates a tension with the inclusion of potentially more critical stakeholders in the RRI approach, which needs to be addressed. The implicit RIS3 notion that the vision should be a comprehensive scenario shared by all stakeholders serves to encourage the ignoring of dissenting perspectives and rejecting potentially negative or unintended outcomes from the consultation and envisaging processes.

4.3.4 Prioritisation

Following the same logic, identifying priorities need to be based on more than considering where the region can excel. Participants

Table 2. Integration of responsible innovation and smart specialisation processes

		Stages of the smart specialisation process					
		Analysis	Governance	Vision	Prioritisation	Policy mix	Monitoring
Dimensions of RRI	Anticipation	Identify societal needs	Identify all potential stakeholders	Consider potential negative or unintended outcomes	Consider impact of priorities on social and environmental outcomes	Consider unintended outcomes of policy	Evaluate broader effects, beyond narrow policy aims
	Reflexivity	Reflect on value system on which analysis is based	Consider potentially diverging interests and reflect on differences in power	Allow for different perspectives on vision for future	Reflect on impact beyond the represented stakeholders—and beyond the region	Reflect on diverging interests for different policy mixes	Reflect on value system of evaluators
	Inclusion	Engage stakeholders in analysis	Include a variety of stakeholders in management	Include a variety of visions and opinions	Have an open process around prioritisation where different voices are heard	Keep policy-making in democratic for a	Include stakeholders in evaluation
	Responsiveness	Respond to new knowledge and other perspectives	Respect all opinions, including from minority and less powerful groups	Be responsive to critical concerns about the vision	Allow for criticism of prioritisation and accept that chosen priorities may be wrong	Let dissenting voices be heard	Allow for change in evaluation criteria and results in response to feedback

should endeavour to anticipate the impacts of different priorities on a wide range of outcomes, including social and environmental ones. Furthermore, taking responsibility at the global scale requires reflecting on the impact of the selected priorities beyond the region itself. It is important that the prioritisation process is not moved away from the open and participative fora where the rest of the process takes place, and again it is important to include stakeholders' views, including dissenting voices.

4.3.5 Policy mix
The definition of a policy mix primarily needs to take place using ordinary democratic channels with adequate representation of citizens' opinions. Any policy mix produces costs and benefits that vary across actors and different stakeholders will therefore have diverging interests. It is important to realise that such differences cannot be resolved objectively through expert advice, rather policy-makers need to reflect on the potential for diverging interests, allow a range of opinions to be heard, and resolve the conflicts using democratic mechanisms. Here, the issue of critical voices becomes crucial. The uncertainty around innovation policy and its goals sometimes encourage grandiose thinking by policy-makers. Citizens can only influence this with difficulty even where they are able to perceive shortcomings which remain invisible to policy makers.

4.3.6 Monitoring
Finally, monitoring must also be carried out in a responsible way. Much like the analysis stage, this is a process which is often left to external experts or consultants. However, the RRI approach would argue for a broader perspective. The opinions and perspectives of a variety of stakeholders should be represented even during the evaluation of the project, and the evaluators themselves need to be reflective of their own roles and their own value and belief systems. Furthermore, the monitoring and evaluation should extend beyond the project's own self-identified goals to consider the broader effects

of the project on a wide range of outcomes, including possibly unintended ones. However, the possibilities of solving these tensions between the RIS3 and RRI approaches to obtain a well-functioning, integrated policy framework that can guide and inform the design and implementation of a responsible smart specialisation policy comes very much down to how the multi-scalar governance and decision-making of the double top-down/bottom-up logic works.

5. Conclusion: towards regional RRI policy?

In this article, we have asked the question of how RRI and RIS3 approaches can usefully be combined in an integrated innovation policy framework. EU innovation policy aims for a smart, sustainable and inclusive Europe. RIS3 policies have a larger potential for achieving this than previous linear EU innovation policies due to their application of a broad-based approach to innovation, taking the existing strengths and competitive advantage of regions as a starting point for the design of RIS3 priorities. This makes it possible to extend beyond high-tech sectors, which will only benefit already well-developed regions and only provide high-skilled jobs. Hence, RIS3 policies can promote more inclusive as well as smarter growth. The 'inclusive' dimension, which relates strongly to key parts of the cohesion policy, also points towards a RRI approach. Here, promoting an economically and socially sustainable society has priority by working towards the ambition of all citizens and regions benefiting from economic growth and prosperity. In a Europe still suffering from stubbornly high unemployment, especially of young people in Southern and Eastern Europe, this is a huge challenge. Consequently, an economic and innovation policy in the EU has to be 'smart' also in the sense that it can provide good, stable, and well-paid jobs to all of its citizens in all its regions, and policy frameworks must provide citizens with the time, resources, and platforms to provide appropriate shaping here.

We argue that RIS3 and RRI approaches need be combined to generate any kind of approach to innovation that can drive both growth and build better societies. The two approaches are certainly complementary as each has the potential to address particular weaknesses in the other. A lack of attention to geography in RRI is matched by the embeddedness of RIS3 policies in regional processes, whereas the lack of attention to broader societal interests in RIS3 is matched by RRI policies' emphasis on innovators' responsibility to stakeholders. We sketch out an integrated framework where four dimensions of RRI (anticipation, reflexivity, inclusion, and responsiveness) are applied to each stage of the RIS3 process. This helps to identify how the RIS3 process can be further developed into a responsible innovation policy which integrates the broader perspectives of societal stakeholders into the development of innovation policies for European regions.

We are aware of the limitations of this article in presenting a primarily conceptual argument, and clearly further research is required to explore the ways that regional RRI practices emerge or do not in particular places. There is a need for work to extend and comprehensively taxonomise the responsible regional innovation repertoires set out in Table 2, identifying the ways in which regional partnerships are able to construct the kinds of protected governance spaces where innovation networks can reflect upon the wider societal desirability of particularly economically desirable courses of action. In Section 3, we have highlighted the tensions between the policy areas. A second area where more work is required is in creating a more systematic empirical analysis of the tensions and pressures arising when attempting to stimulate RRI in regional economic development contexts. A final area where more understanding is required is of the geographical sensitivity of responsibility, and the ways that different versions of responsibility (and RRI) become enacted and used within different regional contexts, thereby allowing a development of an RRI concept that is more strongly rooted in specific practices and less aspirational and general in its scope.

The application of this framework in practical policy will not be without challenges. While many will share the ideals of a more responsible smart specialisation policy, the development of such policies in each region is ultimately subject to ordinary political and democratic processes reflecting more immediate concerns and interests of the actors involved. These may not always be interested in opening up for competing visions, new stakeholder groups and dissenting voices. On the flipside, there is a risk that an all-inclusive, considerate approach to smart specialisation will lack the clarity and hard priorities required to target investments towards new diversified specialisations. At the European level, there is also a question of how to develop RRI from a somewhat fluffy and open-ended concept into the realm of practical policy—in particular, if the approach is to move beyond research policy into other EU policy areas, such as regional policy.

Arguably, the greatest challenge to achieving effective regional RRI remains the fundamental issue that the common good for Europe is not good for all. There is a need to ensure that 'left-behind places' can also shape technologies to benefit themselves and they are not forced to accept downgrading of living standards simply to create high-technology jobs in European hotspots (cf Rodríguez-Pose 2018). Indeed, we are here minded to perhaps somewhat speculatively ask Massey's (1978) question 'in what sense is this a regional problem?'. The challenge of delivering RRI in regional contexts is not something that can be addressed at the purely regional level. There remains the need for a mechanism to articulate European public values, and a willingness to allow economically less powerful places to express those values in a way to shape technological futures, if RRI is to achieve its regional potential.

Notes

1. DG XVI launched the Regional Innovation Strategy, DG XII launched the Regional Innovation & Technology Transfer Strategy scheme, and DG XIII launched the Regional Information Society Initiative.
2. Work Programme 2018–2020 (http://ec.europa.eu/research/participants/data/ref/h2020/wp/2018-2020/main/h2020-wp1820-swfs_en.pdf)
3. https://keep.eu/project/19483/mainstreaming-responsible-innovation-in-european-s3
4. By scale, we here refer to the distinction between various kinds of social aggregate which vary in terms of the amount of direct contact members have and the extent to which their coordination is dependent on more symbolic and imagined shared properties (following Raven et al. 2012, we distinguish dimensions of time, territory, and relations). The smallest scale is the local level, where members regularly meet and interact, allowing them to directly negotiate behaviours, expectations, norms, and values in the course of these interactions. The national, international, and global scales are far more dependent on peak interest organisations mobilising to articulate positions within a politically constructed space, allowing them to achieve collective settlements which balance these interests and coordinate actions.

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