2012

A Trans-Atlantic Conversation on Responsible Innovation and Responsible Governance

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Abstract. How can innovation be balanced with responsible governance? Responsible innovation and responsible governance are broad concepts which mean different things to different groups. This paper presents the results of a roundtable held at the S.NET 2011 conference with academics and policymakers from Europe and the US. The results of this roundtable discussion raise issues of definition, lack of consensus, and the role of philosophy versus practical intervention.

Keywords. Responsible Innovation, Responsible Governance, Emergence, Concepts, Practice, Policy, Principles, Decisions

Introduction

How do actors conceive of, and importantly operationalise, a notion of 'Responsible Innovation' and arguably the twinned and inseparable notion of 'Responsible Governance' (RI-RG). Questions of responsibility in the face of inherent uncertainty, risk, and unanticipated consequences – the fundamental characteristics and governance challenges of emergent science and technology - are not new and there is a history of practice and policy in this area: mature on both sides of the Atlantic. However, recently we have witnessed a renewed flurry of policy and academic interest , investment in related research calls , and in the US a sense of pausing to both review ten-year progress; and assess the current State of the Art in the area of responsible governance of emergent technologies [1]. Furthermore, as nanotechnologies move from lab-settings to commercialisation, we see social science academic attention and policy responses moving away from polarised polemics of pros and cons; to more plural, middle-ground, and empirically-informed analyses of the governance implications of fields of technologies which are actually with us: real-time responses to real-time diffusion of technologies into societies, and to studies concerned with the real-time

capture and monitoring of commercialialisation and governance responses. The session aimed to reflect, and reflect upon, this attention to real-time responses evidenced in practice, policy, and decisions.

This paper presents the results of a roundtable held at the S.NET 2011 conference with academics and policymakers from Europe and the US. The roundtable was designed to consider the outcomes of recent regulatory decisions. In these decisions, observers see how, due to their multiple emergent trans-boundary trans-disciplinary characteristics, nanotechnologies (as a case example of emergent and enabling technology) inevitably falls between the gaps of existing (bounded) regulatory frameworks and instruments, producing logical if perverse decisions, such as the 2007 decision by the US Environmental Protection Agency to classify the Samsung Silvercare washing machine as a pesticide, whilst noting that this does not represent a general principle when dealing with products incorporating silver nano-particles. On this basis, it could be asked how far and in what ways policy could go in response to the regulatory challenges of emergent technologies; to be addressed through changes to scope (extension); content (revision, reform); or philosophy (framings)? It also was set up to discuss the broader notion of RI-RG involving a wider range of existing and new instruments, actors, and governance processes including education, training, and professional codes of conduct; the role of ISO and other standards, procedures, and evaluation methods for which responsible governance might be seen as the institutionalisation of performance guarantees inscribed into the creation of measurable qualities of product and service; public deliberation mechanisms which frame responsible governance as the democratisation of science and innovation; voluntary pre-market technology assessment, societal foresight exercises, and labeling; and corporate activity aimed at developing and maintaining particular relations with communities, labour, and ecological environments, (corporate social responsibility; actions under the guise of 'sustainability').

Drawing upon this plethora of new and existing forms of instituting and changing policy and practice aimed at instilling 'new', 'different', 'greater' (or arguably 'less', or differently 'distributed') responsibilities, it could be asked: through what kinds of rationales/discourses and sources of legitimacy; and through appeals to what instrumental levers and case examples, do actors seek to change existing policy and practice to something quantitatively and qualitatively different, and what questions are raised by these processes? The session call thereby emphasised and encouraged reflection on real-time governance responses, taking nanotechnology/emergent technologies as the platform through which to discuss the notion of RI-RG.

Several panellists took their entry point to be that no-one is, or could be, 'against' Responsible Innovation, suggesting that we are not starting from a dichotomy which situates or contrasts a positive state of Responsible Innovation/Governance against some wild-state of Irresponsibility. Rather, in common, the panellists described (or implied) interpretations conceptualising a current state of affairs where there is an implicit or explicit wish for institutional, behavioural, moral, interpretative, academic or thought-process improvement (the notion of 'improvement' is implied if not explicit) and went on to offer reflections on their preferences for new or adjusted research agendas, governance frameworks and interventions (of various kinds, operating at different levels, aimed at influencing a variety of kinds of actors, through the implementation or adjustment of a range of initiatives and actions) to be realised through various proposed policy initiatives, methods and approaches. The observations raised in the roundtable can be summarized into three aspects. The first is a normative

'vision' or framing. Explicit or implicit in each position were a set of proposed values underpinning how a world of Responsible Innovation should look. The second is institutional anchors or reference points. A number of panellists referred to an existing source of authority to support their case: An Act, Treaty, or existing instrument such as an award scheme. Interestingly the institutional anchor points cited were, in each case 'local' to the institutional setting of the speaker (Europe, US, Norway); so providing not only one dimension of variety, but also one explanation of 'localised' diversity of views. The third is a proposed strategy, principles or practical actions for 'feeling-forwards'. Separate from the Normative Vision and Institutional Anchors; panellists differed on the principles and/or practical actions they proposed in order to for move their particular 'model' of RI-RG forwards.

1. Doing Good

Under this view, 'responsible' innovation/governance means more than simply avoiding harm or minimizing risk. It is about actively seeking to do good and cultivating the virtue of care [2]. This type of approach is arguably present in the Norwegian Gene Technology Act, which uniquely requires a demonstration of social benefit and contribution to sustainable development for biotechnologies to be approved for release. It can also be found in the recent EU code of conduct for responsible nano-science and technology, which requires that research is in accordance with the precautionary principle and contributes to the millennium development goals (among other things). While it is significant and praiseworthy that the discourse of responsible innovation/governance is growing around fields such as nanotechnology, this view is concerned that a perpetual focus on future technologies may distract us from the irresponsible realities of today, with innovation and environmental governance of biotechnology being a prime example. This view gave the example that in the EU, a new legislative amendment allowing member states to make their own decisions about the cultivation of genetically modified (GM) crops is currently under debate [3]. The European Commission (EC) has proposed that these decisions only be permitted on grounds not related to health or environmental risks, since the European Food Safety Authority (EFSA) apparently already adequately assesses these. EFSA risk assessments are, however, performed under a host of unethical conditions; e.g. there is a lack of independent research, a lack of transparency regarding key information, an inability for researchers to access test materials, and an application of double standards in evaluating the quality of evidence [4]. This view stated her position that, at a minimum, these conditions call for enhanced plurality in scientific advice for policy [5,6] and that the current EC attempt to close down scientific risk assessment to singular centralized forms works against responsible governance of biotechnology.

The example of Environmental Risk Assessment (ERA) can be taken to argue that a positivist view of ERA as an example of objective, independent and autonomous 'out-there' scientific practice, masks the point that it actually necessitates and engenders a range of social visions and value-based decisions. There is no static environment external to ourselves that can be objectively harmed or benefited by our actions. Rather, there is a co-evolving dialectical relationship between ourselves and our ecological communities that can be better or worse affected depending on what we (within our diverse cultures) value. Ecological responsibility is therefore not responsibility for the earth, but responsibility for our relationship with it. And just as

with all relationships, our aim should not only be to avoid bad ones, but to actively create good ones. How best to do this and the extent to which we have agency to cultivate the virtue of ecological responsibility, are questions that remain open for discussion.

2. Shifting Discourse

An earlier discourse related to responsible science has now shifted to responsible governance [7]. Responsibility came into the frame in the 1800s, related to ordering society. It is observed that while the word 'responsible' is used in the English language since the 16th/17th centuries (in various meanings), 'responsibility' comes up, tentatively, in the late 18th century, and comes into its own in the emerging professional-industrial society of the 19th century.

A striking thing about the recent discourse on responsible development & innovation (for nanotechnology and more broadly) is how it shifts away from the earlier discourse on social responsibility of scientists. An observation is the shift away from 'virtue' (of certain agents) to 'consequences'. One example is the definition of responsible development in the US National Nanotechnology Initiative (NNI). The NNI's definition is a very consequentialist way to look at nanotechnology. It is a discourse premised on the objective 'We have to try to find the best balance'. There might be a next step which is, "What sort of responsibilities are addressed here?" This discourse on responsible development of nanotechnology can be characterized as the balancing of efforts to maximize the technology's positive contributions and minimize its negative consequences. Thus, responsible development involves an examination both of applications and of potential implications. It implies a commitment to develop and use technology to help meet the most pressing human and societal needs, while making every reasonable effort to anticipate and mitigate adverse implications or unintended consequences [8]. The overall shift is important, because it puts responsibility again where it belongs: a language and practices about ordering our societies.

But, this is not just discourse at the policy level. A lot of things are happening at different levels: macro, meso, micro levels. There are lots of case studies. There is something out there which is happening and may lead to certain outcomes. It could be asked: under which should we locate responsible innovation and responsible governance? There is mostly vertical governance. The alternative to that, is not deliberative democracy but rather reflexive neo-corporatism. Nano reflexivity is a clear example – corporations and civil society organizations together try to figure out what should be done. As an entrance point, division of moral labor – implicit neo-corporatism becomes explicit. There is a lot of the discussion about responsible governance which is based on the tradition of the linear model. Governments think they are doing something because they are addressing the science side. By way of contrast Rip presents a schematic to depict Responsible Innovation and Responsible Governance as a discourse and as practices which work out differently at different levels, with their own dynamics.

If responsible development/innovation becomes part of how we organize ourselves in our societies, it will reinforce neo-corporatism because effective and legitimate decisions will be taken in (horizontal) interaction between institutionalized

actors with a "shadow of hierarchy" [9], a point that has made in Constructive Technology Assessment (CTA).

Would this constitute good governance? Phrasing the question this way implies that 'responsible governance' need not necessarily be 'good' governance. The reflexive-sociological position is that reflexive neo-corporatism is as good a governance practice we can get. This position on analysis of the limitations of various top-down governance practices and ideologies, and the reluctance to go for bottom-up approaches, even if they are called deliberative democracy. The importance of 'grey zones' (between official rules and legislations, and ongoing practices) is one of the arguments for this position. Other arguments derive from analysis of societal (quasi-) order in terms of intersecting sociotechnical worlds. All this is happening, and constitutes de facto governance. It can qualify as good governance if it becomes 'reflexive'. If fashionable terms like responsible innovation/governance help to create such reflexivity, then he is willing to go along with it.

3. Responsible Research and Innovation

What is Responsible Research and Innovation (RRI), why is it needed, and how can it be done? A perspective on definition:

> "Responsible Research and Innovation is ultimately defined by the actors engaged with it. The challenge is to organise collective co-responsibility in research and innovation processes thereby ensuring an inclusive process. Responsible Research and Innovation has, therefore, a strong process dimension. Yet, Responsible Research and Innovation can also be understood in terms of outcomes of a responsible process: research and innovation outcomes which contribute to societal challenges, to sustainable development and which are aimed at societal desirable outcomes while being ethically acceptable…Responsible Research and Innovation is a transparent, interactive process by which societal actors and innovators become mutually responsive to each other with a view on the (ethical) acceptability, sustainability and societal desirability of the innovation process and its marketable products " [10]

The reference point is policy-making and investments of the European Commission (EC). RRI is contrasted from the range of deliberative exercises implemented in the course of EC funded Science and Technology Studies (STS) type of activities and outlines the EU scope and recent initiatives under the domain of Responsible Research and Innovation.

A product dimension and a process dimension have been offered under a conceptualisation of RRI as being defined by and through the actors themselves, provides broad normative guidelines for translating the philosophy and principles of RRI into recommended portfolios of practical action, with rationales. Actors are encouraged to engage in three axes of action associated with the product dimension and four axes associated with the process dimension [11,12] The product dimension posits that products which are marketed throughout a transparent process (will) have been defined in terms of safety, sustainability (environmental and economically) and societal desirability, and brought about through:

1. Use of Technology Assessment and Technology Foresight
2. Application of Precautionary Principle
3. Use of demonstration projects: moving from risk to innovation governance

The process dimension posits that the challenge is to arrive at a more responsive, adaptive and integrated management of the innovation process. This requires a multidisciplinary approach with the involvement of stakeholders and other interested parties and should lead to an inclusive innovation process whereby technical innovators become responsive to societal needs and societal actors become co-responsible for the innovation process by a constructive input in terms of defining societal desirability of products. These outcomes are more likely to be realised through:

1. Deployment of Codes of Conduct for Research and Innovation.
2. Ethics as a "Design" factor of Technology
3. Deliberative mechanisms for allowing feedback with policymakers: devise models for responsible governance.
4. Public debate

4. Geography and Responsible Innovation

Responsible Innovation can also be thought of as innovation that is not harmful, is useful and relevant, and contributes to sustainability, noting that this raises issues about equity and distribution of benefits as well as environment. It can be a struggle to try to develop innovation in trajectories consistent with that.

The Nano 2 initiative in the US can be thought of as the tip of the iceberg [1]. This initiative comprised an extensive process of engaging scientists, industrialists, policy people, and community people to think about where the nano effort was in the last 10 years and where it will go. There was a scientific side to that but also a discussion about responsibility. It engaged people not just in the US but also in Europe and Asia.

The geographical dimensions of responsible innovation and explanations of geographical differences warrant attention. It can be posited that although there may be some divergences between countries, the huge differences are in the (institutional and regulatory) frameworks. The US does have a specific piece of legislation – the 21st Century R&D Act of 2003 – which encourages interdisciplinary working, provides for the commercial development of nanotechnologies, but simultaneously it provides for ethical, legal, and societal implication (ELSI) considerations. It is a fairly unique piece of legislation that provides a framework.

Looking back over 10 years of nanotechnology in the US, one thing to have occurred is investment and development of a significant infrastructure for nano in society, education, experimentation. There has been the development of a community facilitating engagement of a general 'public' with policy and vice versa. There has also been some engagement with industry – but that has been the weakest side.

To date, no major (public) issues around nanotechnology have emerged: a series of concerns around silver nano and titanium dioxide, but no major issues. The debate has made companies more attentive and careful (but not necessarily more responsible). But, not all is well. The NSF has led the societal assessment but other agencies have not followed. The system focuses on the science. It can be asked: are we ready for mass application? The answer is probably not. Because that deals with what business is doing. There are a number of challenges. There are a large number of

incremental applications. This is emerging in many products but it is almost all incremental. What is our reflection – is that socially responsible? The regulatory system cannot deal with it very well because the application span do not distinguish well whether we should regulate by size or function. Also the life cycle – what happens after these products are used – is an area of weakness.

Returning to the question of geography in reflections of what constitutes Responsible Innovation and Governance, we are reminded that the No 1 country producing nanoscience publication is China. The geography of consideration of the roundtable discussion is between the US and Europe, which runs the risk of criticizing from a well developed perspective. In a large chunk of the world there is not any community engaged in this and if they do they may get arrested.

Going forwards, some principles that might contribute to responsible innovation can be proposed. First, having an overall framework is important. But, the US framework needs to be updated as nanotechnology moves to an era of mass application. Focus needs to shift or re-balance from constituencies of scientist-researchers onto the innovators. The practical measures begin with responding to this perceived demand from businesses, that we should work with companies, get this more into business schools. The importance of creating forums for deliberation are important for doing it as the technologies are emerging (hindsight is too late). The priority now is to develop better technology assessment mechanisms where there is an element of sharing findings – this translates into a policy implication of how to best bring about a capability and ability for societal involvement in the commercialisation activities of firms: to get information from companies and to feed that into well thought through analytic processes.

5. Levers to Encourage Responsible Innovation

It is pretty hard not to favour responsible innovation. For that reason responsibility does command a greater immediate consensus, and enables and opens debate. Whether one is arguing for more resources, or to legislate into university curricula, this concensus-building dimension provides a useful lever.

Illustrative is an initiative involving a gathering of a group of a dozen people in DC in policy ranging from NGOs and other stakeholders. The gathering discussed the possibility of creating a prize for responsibility in innovation. The position was not to try to come up with a too analytically fine definition but pattern it on the Malcolm Baldridge Quality in manufacturing award. In that case the initial approach involved just getting applications, then in subsequent years the criteria was bootstrapped up by evaluating early winners. It did not require a long-range analytic approach. This has been pursued in a dialogue with a European foundation to try to create a prize for responsible innovation.

The second aspect is noting what happens in universities around their response to scientific integrity versus productivity modelled on the Bayh-Dole Act . This could be leveraged into a framing of responsible governance. For scientists, there would need to be a process to find ways to broaden and make more robust what that means. It is more than not killing human resource subjects or contributing to the local economy. What more do we have to do to be responsible? While universities established tech transfer offices and offices of responsible research, universities should also set up offices for responsible innovation. It is a vast array of tasks with debates between social scientists

and humanists the way that engineers maybe do not. Scientific responsibility is to responsible innovation the way that microethics and engineering is to macroethics. The political environment in the US focuses on the responsibility of scientists and engineers whereas macroethics gets at ethics of the individual and the society in which they work.

6. Practicing Responsible Innovation

It is easy to agree with all of the principles that have been put forward, but although the principles are here, the practice is the problem. When the Oxford principles for geoengineering have been presented [13] and when Mihail Roco articulates a similar set of values as part of the NNI [1], at that level, it is the practices that are missing. Centres are trying to do that multi-stakeholder work. It is not all in the language of responsibility, it can be in the language of cultural values. The Geo-engineering document puts out a careful, multi-stakeholder perspective which is carefully articulated. There is readiness to move from the principles, but the government is not ready and industry is not ready although many from industry would agree but they are not ready to take them on board as practices.

There is a need to concretize the excellent values the panellists are espousing. It is important to be clear about the goal of responsible innovation. One position advocates grass roots anticipatory approach while another is reluctant to rely on bottom-up approaches. The end user and community of use is important. For example the Bayh-Dole Act recognised the need to intervene to introduce new licensing rules to widen access rights to Intellectual Property (IP). However, nano is a continuation of bio's understanding of IP rather than a continuation of software's understanding of IP. In emergent solar technologies, small companies are being as secretive as they can, with a lock-down Apple economy approach toward absolute secrecy. There is an argument that this is retarding innovation progress. The public is used as a source of money, then asked to go away and (the companies) will work with this money. The IP is given to companies and they will get 100% of the profits. The public is not thrilled about being excluded in the IP system. If the agency is listed as a funder, which many are not, we need to do more to bring the public in and enable sharing, financially in that some of the money from corporate IP goes back to the public.

7. Conclusions

Views on RI-RG are marked by variety, lack of consensus and divergence of views. This finding begs the question that if this degree of heterogeneity exists within this primarily Trans-Atlantic constituency, then what further diversity of positions might we find by extending this exercise to academics and policy influencers in China, South East Asia, India, Canada, Russia, Latin America, for example. Nevertheless the positions did contain some generic components that give clues as to how one might devise a generic analytical framework through which to understand landscapes and contours of divergence and commonalities of positions. All positions were underpinned by the roundtable participants' own normative framing, whether explicit or implicit. Through the rubric of RI-RG all the participants articulated a 'problem' or 'deficit' with policy and practice preferences on how to address that 'problem'. But the participants' positions and argumentation differed on interpretations of the 'problem' to

be addressed, on the pre-existing institutional anchors and reference points appealed to, on how to understand and mobilise particular constituencies of actors, and what strategies (top-down; bottom-up, multi-actor arenas of engagement) and interventions were recommended to bring about the envisioned 'better world' of Responsible Innovation and Responsible Governance. Interestingly, there appeared to be a difference in entry-points with the European participants entering through an articulation of philosophy and principles, whilst the American participants were more oriented to empirical entry points: suggesting points of practical intervention, a notion of learning from 'what works' or what has worked in the past.

Institutionalised sources of inspiration or authority, be it an existing Law, Treaty or existing scheme or intervention, have been used as a jumping off point for articulating a way forward on Responsible Governance. Interestingly these reference points were situated at different levels of local/national institutional contexts consistent with the participants' country 'home base'. An interesting contrast to this was the reference by both UK and US participants to the recent UK HOC Select Committee Report on Geo-Engineering [14], which represents an innovation in Trans-Atlantic collaboration – an initiative in the policy framing of a new technological domain with trans-border risk, uncertainty, and ethical implications. This hints at one dimension on how institutionalisation 'up-scales'.

Still, questions of conceptualization remain. A number of categories and phenomena are becoming folded together in the responsible innovation debate. As a consequence there is a tendency to leave separate categories hanging, under-theorised and under-problematised. For example does Responsible Innovation differ conceptually and analytically from Responsible Governance? Likewise does the term Responsible Research and Innovation fold together ontologically distinct categories of Science, Technology, Research, Innovation and Commercialisation, each involving different constituencies of actors, orientating arenas of engagement, organising orders, norms, cultures, forms of legitimacy and histories of practice, with attendant separate challenges, issues and concerns? Alternatively is the folding together of these discrete categories a useful strategy, justified, in policy terms in the name of consensus building?

Moreover, the topic of Responsible Innovation and Responsible Governance appears benign but is in fact inherently and fundamentally political. Whether referred to in terms of 'balancing' different interests (euphemism for a politics of reconciling different and potentially contradictory interests and tensions); or through references to different 'models' of political science, such as Reflexive Neo-corporatism, questions of politics infuse and inform discussions of RI-RG. At the same time and ironically, rather 'hidden' were questions of power. In particular questions of asymmetrical powers are raised in negotiating the contours, priorities, and compromises in the production of new 'rules of the game' of RI-RG; of new patterns of inclusion/exclusion, and of winners/losers at the various negotiating tables.

What constitutes RI-RG is differently interpreted. This difference flows through debates in the social science research and policy communities. The use of roundtable sessions and prepared statements can be useful in articulating these differences in Trans-Atlantic conversations and research collaborations.

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