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## **Designing Responsible Research and Innovation to encourage serendipity could enhance the broader societal impacts of research**

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This essay argues first, that Responsible Research and Innovation (RRI) should be conceived as a tool; second, that RRI can be used to enhance the broader societal impacts of research; and third, that designing RRI specifically to encourage serendipity is the best choice to achieve the goal of enhancing the broader societal impacts of research.

**Keywords:** Responsible Research and Innovation; serendipity; broader impacts; altmetrics; tool; evaluation

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### **1. Responsible Research and Innovation should be conceived as a tool**

As scholars and policy makers continue to explore the possibilities of implementing Responsible Research and Innovation (RRI), I suggest that it be conceived as a tool designed to afford creativity and freedom to researchers and others who are meant to be its users. Instead, RRI is often presented as a *process*. Consider the following proposed definitions:

*Responsible Research and Innovation is 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 (in order to allow a proper embedding of scientific and technological advances in our society).* (von Schomberg 2014, p. 39, author's italics)

Responsible Innovation is a process that seeks to promote creativity and opportunities for science and innovation that are socially desirable and undertaken in the public interest. (Engineering and Physical Sciences Research Council [[EPSRC](#)])

I shall return to the details of these quotes in a moment. For now, I want to suggest that many processes – specifically those that are human artefacts, or anthropogenic – can be considered tools. Yet, unlike the things we typically recognize as tools, like hammers, which are designed by people with certain explicit purposes in mind, and which we understand can be dangerous if poorly designed or used in unanticipated ways, processes *take place*, as it were, on their own.

Anthropogenic processes, however, can be tools in disguise. For although they can be employed by human beings, and thus function as instruments, they tend to simply take place on their own, without our having to exert any effort or thought. Anthropogenic processes are in such cases tools that we have forgotten are tools, with the result that we become subject to the process rather than being able to use it for our own purposes.

To help open the black box of an anthropogenic process, we can think of Robert Morris's (1961) "[Box with the Sound of Its Own Making](#)," which presents the box not only as already made, but also with an audio recording of the 'process' of measuring, sawing, and hammering the box together. Similarly, conceiving of RRI as a tool will help us avoid the idea that it is an institution or process that takes place on its own and according to its own internal logic. The point is to remember that *people* are vitally important to the continued functioning of institutions.

Returning to the two definitions of RRI, the first from René von Schomberg and the second from the UK's Engineering and Physical Sciences Research Council (EPSRC), I want to note some differences. Both define RRI as processes; yet these processes appear quite dissimilar. For von Schomberg (2013), a certain process must take place "in order to allow a proper embedding of scientific and technological advances in our society" (p. 39). The process *is* – not should be – both transparent and interactive. The process brings together innovators (including, presumably, researchers) and societal actors. The interaction prescribed by the process – rather than the process of interaction – brings about mutual responsiveness among those who follow it. They are told to consider the ethical acceptability, sustainability, and social desirability of the innovation in question. This, too, is part of the process.

Von Schomberg's version of RRI treats the process as a procedure to be followed (cf. Pellé 2016). The idea is reminiscent of the Habermasian ideal speech situation, tweaked so that it can be proceduralized instead of merely idealized and used to facilitate transdisciplinary communication conceived under what I have called the Habermas-Klein thesis (Holbrook 2013). The gist of the Habermas-Klein thesis is to gather the right people together and have them reach a consensus by following certain rules of discourse. For von Schomberg, then, RRI is a process *qua* procedure that, when followed, will lead to the 'proper embedding' of innovations in society (again, cf. Pellé 2016, which characterizes von Schomberg's position as both proceduralist and outcome-oriented).

Compared to such a procedural view of RRI, the definition proposed by the EPSRC allows much more room to maneuver. Theirs is a process "that seeks" rather than a procedure to be followed. What they seek is to promote creativity and open up opportunities for innovations that will have what in the US typically goes under the name 'broader societal impacts' – socially desirable outcomes that will benefit the public. The focus is on moving forward together, rather than moving in lockstep. If von Schomberg's approach is like that of the Habermas-Klein thesis, the EPSRC suggests moving in the direction of what I have termed the Bataille-Lyotard thesis (Holbrook 2013). Where the Habermas-Klein thesis tries to guarantee integrative consensus by prescribing a procedure, the Bataille-Lyotard thesis aims to generate reflective invention – the co-creation of a new language. The EPSRC approach to RRI thus *engages* researchers in engaging other societal actors, rather than requiring them to go through a procedure. The EPSRC approach empowers researchers, as well as other societal actors, since both are engaged in generating a new approach.

Note that I am not here claiming that the definition of RRI proposed by the EPSRC conceives RRI as a tool, as opposed to the definition of RRI proposed by von Schomberg, which treats RRI as a procedure. My claim is rather that we ought to conceive of RRI *itself* as a tool, which opens up the possibility that we will seek to design it in ways that will actually lead to the outcomes we seek. Treating RRI as a procedure both undermines its goal and encourages us to forget that RRI is something that we are in the process of designing. The key question is: *how should we design RRI so that it helps us achieve the outcomes we seek?*

## **2. RRI can enhance the broader impacts of research – but only if it is designed correctly**

Treating RRI as a procedure has the advantage of allowing us to answer this ‘how’ question rather easily – one simply follows the procedure. This is a real design strength of the procedural approach to RRI. Taken to the extreme, however, the only question one needs to answer under such a procedural view of RRI is whether the procedure has been followed. A real design flaw with such a procedural view is that the question of whether the procedure has been followed actually leaves unanswered (or really, replaces) the question of whether following the procedure guarantees that the research involved will have broader impacts. Instead, we simply assume that following the procedure is sufficient to achieve broader impacts (cf. Holbrook and Briggie 2014).

Another problem with such a procedural approach to RRI is that it tends to promote – not by design, but as a result of its design – a compliance attitude regarding the responsibility aspect of research and innovation. Much like certification for Responsible Conduct of Research (RCR), now mandated in the US for investigators funded by the NIH and NSF, one would simply jump through a hoop to demonstrate that one’s research is responsible. Although such a design satisfies shallow demands for accountability (one can check and see if the appropriate box has been ticked or not), it actually fails to promote the responsible conduct of research and instead promotes the idea that requirements for training in RCR are something one *must* undergo before one can get on with the research.

Similarly, telling researchers they *must* undergo an RRI procedure may satisfy some accountability demands; but it is hardly sufficient to guarantee that the researchers subject to the procedure have embraced the idea that their research should have broader impacts on society. In fact, a procedural approach to RRI is more liable to engender resentment toward governance than engagement with society, precisely because the latter is mandated by the procedural demands of the former. In order to enhance the broader impacts of research, we ought not design institutions to do the work of RRI *for* the researchers. Such an approach risks alienating researchers who may feel subject to accountability demands that are separate from and only serve to interfere with their research.

RRI should instead be designed as a tool that allows its users to exercise their own freedom and creativity (cf. Illich 1973). Exercising their freedom and creativity is, after all, something researchers tend to be good at. The problem for advocates of RRI, however, is that researchers tend to interpret freedom as freedom from interference (what Berlin [1959] called ‘negative liberty’). Requirements that research have broader impacts on society often face resistance from researchers who view such requirements as part of an ‘impact agenda’ designed

to control them (Holbrook and Hrotic 2013). Procedural RRI runs the risk of being lumped into the same category, especially if linked to the desire for broader impacts. Designed well, however, RRI could be a tool that helps researchers ensure that their research actually has broader impacts.

Although I am on record as having doubts about the value of principles in policy making, I want to propose here an overarching principle intended to orient – though *not* to determine completely – a good design of RRI:

**Empowerment.** – *Design RRI as a tool to empower researchers, rather than managers of research.*

This principle of empowerment is purposely vague, in that it leaves open precisely how it is that those designing RRI should empower researchers, as well as how they should design RRI to empower researchers. It is left vague primarily to prevent anyone from simply following it as a rule. Rather than a rule, the principle is presented here as a general guiding idea, albeit one that aims to proscribe a procedural approach to RRI. In the remainder of this essay, I begin to flesh out what the principle of empowerment might mean, as well as its connection to broader impacts.

### **3. Designing RRI for serendipity**

First, however, let me consider a serious objection to my proposal, which runs thus: the principle of empowerment depends on the overly romantic idea that researchers *want* their research to have broader societal impacts. A more realistic perspective would attend to the fact that researchers have routinely displayed resistance to the idea of broader impacts and to policy efforts intended to ensure them, which they have christened ‘the impact agenda’ (cf. Martin 2011). If we empower researchers, they will simply ignore anything that goes beyond scholarly impact. It follows that, if we want researchers to pay any attention to broader impacts, we should empower others to *manage* research via some sort of RRI procedure (cf. Sarewitz 2016).

This objection lays out the two poles of the pro-impact side of the conversation well. Those who agree that research should have broader impacts may nevertheless disagree on how to achieve that aim: on the one hand, ‘realists’ (or maybe cynics) think that impact must be mandated; on the other, ‘idealists’ (or maybe romantics) think that researchers simply need to be freed up to pursue broader impacts. This distinction leaves out those (call them ‘scholars’) who believe researchers ought to pursue only scholarly impacts. I suspect that the distinction between the realists and idealists is due in part to their different reactions to the scholars, who tend to resist impact requirements (cf. Smith-Doerr 2006). Since they believe that broader impact is important, realists react by leaning toward some way to force scholars to achieve it (RRI procedures, for instance). Idealists agree that broader impact is important, but they instead search for and try to overcome the causes of resistance. Examples abound of the realist strategy of mandating behaviors for researchers that go beyond research for its own sake, some of which (RCR, broader impacts criteria at funding agencies, and RRI procedures) have already been mentioned here.

In my view, none of these realist approaches actually overcomes resistance from the scholars; at worst, they breed resentment by forcing compliance. This approach is akin to treating the symptoms of the disease, rather than searching for a cure. As an idealist, I am advocating that

we aim for the cure. So, how should we attempt to overcome resistance to the idea that research should have broader impacts? And how might RRI be designed to help?

We should begin with an idea that researchers already embrace. ‘Responsible’ and ‘impactful’ are not, probably, the best choices. In defense of their freedom from interference, such as demands that their work have broader impacts on society, researchers typically appeal to the idea of *serendipity*. We researchers, the argument goes, cannot predict the exact broader impacts of our research, nor even whether any such impacts might occur at all (Bozeman and Boardman 2009). Impact is a matter of blind luck. Asking us to predict what is in fact a serendipitous event is simply a higher form of nonsense (Rip 2000). The Golden Goose Awards, given to defend the value of basic research, were given to serendipitous discoveries – blue skies research that happily, if by accident, resulted in benefits to society (Underwood 2012).

Researchers love serendipity; they do not, however, understand it. Serendipity is not blind luck. Serendipity is sagacity regarding opportunity.

Sagacity is a kind of practical wisdom, an ability to exercise good judgment. Sagacity also entails a certain openness to or confidence in the face of uncertainty – if we knew what was going to happen, we wouldn’t need to be sagacious. But that we don’t know for certain what’s going to happen doesn’t impair our decision-making ability; it allows us to use it.

In serendipity, our sagacity shows itself most when we recognize opportunities and take advantage of them creatively. Sure, we might not have known when we started out that our research would lead to any practical benefits. It might not have been part of our *motivation* for undertaking the research at all. We might have been out only to satisfy our curiosity. But if we are sagacious regarding opportunity, we can see and seize it!

Serendipity is neither blind luck nor a happy accident; it’s finding something useful even if we were looking for something else.

The EPSRC definition of RRI seeks to promote creativity and opportunities for research to have broader societal impacts and thus fits this notion of serendipity as sagacity regarding opportunity. The point is to empower researchers to recognize and pursue ways in which their research can have impact. Even if we think this is a good idea, though, how can researchers who are trained to ignore or disparage opportunities for impact (e.g. Fisher et al. 2006, Mitcham 1994, Smith-Doerr 2006) develop their sagacity? Or, in the case of the realists, how can researchers who would rather ignore broader impacts be forced to comply? The realist approach would empower managers by identifying opportunities *for* researchers – provide a list of national goals for broader impacts or stick researchers in a room with other stakeholders and have them follow the procedure for dialogue. The idealist approach would focus on designing tools that will help researchers begin to recognize and seize opportunities for themselves.

Altmetrics, non-traditional metrics meant to serve as an alternative to metrics such as citation counts, could be designed to empower researchers in just this way. Altmetrics capture a broad array of attention to a researcher’s products (including, but not limited to, publications), often using algorithms to track mentions on the Web, article views or downloads, bookmarks, mentions in science blogs, or references in Wikipedia. Altmetrics could arguably include other, non-webcentric indicators of impact, as well (Holbrook et al. 2013).

Currently, altmetrics are being considered, and sometimes touted, as a way to *measure* broader impacts. Standards are being developed about what altmetrics are and what they

measure. Soon enough, we'll have a tool designed for research managers to judge whether the researchers have had satisfactory broader impacts. Designed instead as a tool for serendipity, altmetrics could be a tool that empowers researchers to identify and reach out to people who are interested in (perhaps even concerned about) their research (cf. Ràfols et al. 2017).

The ultimate measure of RRI should not be whether we can set up a regulatory regime to make sure researchers have what the procedure determines are the 'right' impacts, but rather whether RRI actually empowers researchers to produce (the right) societal impacts. Of course, the realists might object that shifting from tools that empower managers (a performance-based approach) to tools that empower researchers (a performance-enhancement approach) will require us to rethink not only how altmetrics or RRI ought to be designed, but also how to retool the entire system for the governance of science. Well, so much the better!

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