Framing Responsible Innovation in Synthetic Biology: the need for a critical discourse analysis approach

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The terms 'responsible innovation', 'responsible research and innovation' and 'responsible development' are interpretively-flexible umbrella terms (Rip and Voss, 2014) that evoke notions of responsibility (Richardson, 1999; Pellizzoni, 2004), science and innovation (Grinbaum and Groves, 2013). Various framings of responsible innovation and responsible development have been proposed over the last few years, some specific to synthetic biology (e.g. PCSBI, 2010; UK Synthetic Biology Roadmap, 2012) and others more general to technovisionary science, emerging technologies, and innovation (e.g. von Schomberg, 2011; Owen et al, 2014; Stilgoe et al, 2013). Simultaneously, the last few years has seen the rise of 'responsible research and innovation (or RRI)' as a policy driver in Europe, where it has become a cross cutting theme for Horizon 2020, the European Commission's key research and innovation funding instrument (Owen et al, 2012; Owen, ERIAB report 2014) and where it is increasingly being adopted by funding institutions in member states (Owen, 2014). The RRI turn has shifted emphasis from risk to innovation governance, and from a pre-occupation with impacts to those of science and innovations' purposes (agendas) and processes, seeking to empower social agency in technological choices (Stirling, 2008), making these more participatory, inclusive and publicly accountable (Jasanoff, 2003), while enlarging the role responsibilities of researchers and research funders (Mitcham, 2003; Douglas, 2003). RI / RRI has emerged from historical foundations well known in science and technology studies, from technology assessment in its various forms (e.g. Schott and Rip, 1996; Guston and Sarewitz, 2002) to 'upstream public engagement', values sensitive design and socio-technical integration, placing a premium on future-oriented dimensions of responsibility that include care (sometimes translated as a desire to align innovation to societal values) and responsiveness (to different perspectives and emerging information). The desire for social alignment has been transcribed by von Schomberg (2011) into a quest for the 'right impacts' of science and innovation, which in turn question extant models of representative and deliberative democracy and the role of various modes of participation in agenda setting (e.g. Jones, 2008; Voices for Innovation). Most recently questions have also been raised concerning RRI's potential expansionism as a Northern political artefact into the so-called developing world, where assumptions concerning science – innovation and society relationships cannot be made, where cultural representations of genetic modification have been highly resonant and where other formulations of innovation and responsibility abound (Pansera and Owen, in press), for example around ideas of 'inclusive', 'grassroots' or 'empathetic' innovation (e.g. Gupta, 2012), set within broader contested discourses of post colonial development and post development thinking. In total RI / RRI presents as a set of emerging, pluralistic, sometimes hybridising narratives that, in a Foucauldian sense, have far from stabilized and which are the subject of debate and contestation. Our key research question is how are discourses of responsible (research and) innovation emerging and what dynamics (Fisher and Rip, 2013) are influencing these discourses?

A critical discourse analysis approach

We are beginning to take a critical discourse analysis (CDA) approach to understand, and critically reflect on, emerging discourses of RI. In doing so we adopt a CDA framework based on an integration of the 'ten steps for discourse analysis' proposed by Hajer (2006) and a combined tool of the 'building tasks of language' and 'context' by Gee (2011). This initial analysis represents two steps of Hajer's approach: desk research and document analysis (UK Synthetic Biology Roadmap, 2012 and PCSBI report, 2010).

Originating from linguistics, DA allows analysis of both written and oral forms of language-in-use and reveals power relations of different parties, uncovering the significance, practices (activities), identities, relationships, dynamics and politics (including the distribution of social goods) (Gee, 2011), which a certain piece of discourse is used. There has to date been limited reflection on the 'politics of RI' (Owen et al, 2012; van Oudheusden 2014) and we aim to critically evaluate this using a CDA approach.

Responsible Innovation in synthetic biology: emerging themes

We are yet to conduct a thorough DA of RI in synthetic biology, but an initial analysis reveals several themes that emerge as these are discourses related to RI.

Social Alignment: as mentioned above, this theme has been transcribed into a quest for the 'right' impacts of research and innovation based on the normative anchor points in the Treaty on the EU, which, to name but a few, include social justice, equality, and sustainable development (von Schomberg, 2011). In the context of synthetic biology, the PCSBI report points out two similar principles: (1) public beneficence and (2) justice and fairness (PCSBI, 2010).

Responsiveness: this theme is perceived as setting the direction, affecting the trajectory and pace of innovation through effective mechanisms of governance (Owen et al. 2013). In this regard, the UK Synthetic Biology Roadmap (2012) calls for an effective risk regulatory framework, whereas the PCSBI report (2010) requests for responsible stewardship.

Collective Responsibility: modern innovation is often a collective action, so there is a collective responsibility for the right impacts and negative consequences of innovation (von Schomberg, 2013). It also refers to the political considerations of a group's conduct regardless of the level of personal involvement of each individual (Grinbaum and Groves, 2013). In the UK Synthetic Biology Roadmap (2012), responsibility is taken as a culture that needs to be built. While the PCSBI report (2010) looks responsibility as an individual and institutional notion which, to some extent, bears a collective sense.

Anticipation: one perception of this theme is about describing and analysing intended and unintended impacts (Owen et al., 2013), by means of technology assessment and foresight (von Schomberg, 2013), which build up a prior capacity to time, position or order (Guston, 2013). Both documents have covered anticipation in different ways which are yet to be discussed.

The above themes form an initial list of potential research topics to be explored in greater depth and detail to understand how RI is framed in the context of synthetic biology. A CDA approach would serve such a purpose well as it provides insights of the meaning of language-in-use and its implications in the societal aspects.