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DISCUSSION PAPER

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Introducing the dilemma of societal alignment for inclusive and responsible research and innovation

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ABSTRACT

In this discussion paper, we outline and reflect on some of the key challenges that influence the development and uptake of more inclusive and responsible forms of research and innovation. Taking these challenges together, we invoke Collingridge's famous dilemma of social control of technology to introduce a complementary dilemma that of 'societal alignment' in the governance of science, technology and innovation. Considerations of social alignment are scattered and overlooked among some communities in the field of science, technology and innovation policy. By starting to unpack this dilemma, we outline an agenda for further consideration of social alignment in the study of responsible research and innovation.

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Collingridge; inclusive innovation; responsible research and innovation; societal alignment; governance of science; technology and innovation

Introduction: the quest for addressing a legitimacy crisis in science, technology and innovation

Around four decades ago, David Collingridge put forward a dilemma that has been widely adopted amongst the technology assessment (TA), and later, responsible research and innovation (RRI) communities. The so-called Collingridge dilemma has permeated discussions on the governance of science, technology and innovation, enclosing an enormous challenge: that of anticipating and controlling the potential consequences of emerging technologies. The key point of this dilemma is that the consequences to the environment, society and economy will likely be apparent only when technologies have sufficiently

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evolved into more complex, quasi-irreversible, sociotechnical systems. This implies that our capacity to shape the trajectories of technological change (for the better) is radically diminished with time (Collingridge 1980).

When Collingridge developed his insights on social control and technological (ir)reversibility, public backlashes against governments, scientific institutions and industry in response to unanticipated effects of emerging technologies were on the increase. Around the same time, formal mechanisms for TA became institutionalised for the first time and a mass of critical academic thinking on the governance of emerging technologies started to emerge (van Eijndhoven 1997). Since then, the response to a continuing legitimacy crisis by institutions responsible for developing and governing science, technology and innovation (European Union 2000; House of Lords 2000; Jasanoff 1990) has itself continued to diversify and evolve (e.g. Guston 2014; Van Merkerk and Smits 2008; Zwart and Nelis 2009). However, despite growing visibility and discussion of such governance in public and academic arenas over the last four decades, it is fair to say that we continue to struggle with a limited capacity to shape technological and social change and are caught in lock-ins and path dependencies, as originally recognised by Collingridge.

A symptom of and reaction to the continuing crisis is the emergence of RRI as part of political, industrial and academic agendas, alongside an ever-increasing focus on societal 'grand challenges' and the urge to align the development of science, technology and innovation with societal needs. Broadly speaking, representations of RRI focus on the anticipation of positive and negative impacts of emerging technologies, reflection on the societal and ethical dimensions of technological development and the inclusion of diverse actors in agenda setting and research and innovation processes (Owen 2014; see Ribeiro, Smith, and Millar 2017, for a review). In the words of one of the champions for RRI at the European Commission, organisations should focus on promoting the 'right' impacts of science and technology – no matter how disputed the 'rightfulness' of such impacts may be (von Schomberg 2011, 2013). Other prominent RRI theorists have put forward frameworks that highlight the need to prioritise both public deliberation and scientific responsiveness in order to deal with 'questions of uncertainty (in its multiple forms), purposes, motivations, social and political constitutions, trajectories and directions of innovation' (Stilgoe, Owen, and Macnaghten 2013, 1570).

These arguments are well-known to a community familiar with longstanding critiques voiced by the field of science and technology studies (STS) regarding the governance of sociotechnical systems (Felt 2009; Macnaghten, Kearnes, and Wynne 2005). At the same time, they also draw upon contemporary notions of 'transformation' and a needed 'deep transition' in science, technology and innovation practices and policies from technocratic to more deliberative arrangements (Schot and Kanger 2016), which in turn are also popular amongst the innovation studies community. Furthermore, the RRI concept of inclusive innovation in particular calls upon the work of still other scholarly communities who deal explicitly with issues of social development, social justice and the distribution of burdens and benefits of science, technology and innovation (Smith, Fressoli, and Thomas 2014; Stirling 2016). Surprisingly, despite their relevance to the core aspirations of RRI, these distinct sets of issues are rarely addressed alongside one another and in an in-depth manner in ongoing discussions around RRI and emerging technologies (for an exception, see Schroeder et al. 2016).

In an effort to bring these somewhat fragmented discourses and communities closer together – and thereby to help guide further RRI developments – we suggest reorienting research and innovation governance discourses around key dilemmas of social alignment.[1]

Beyond Collingridge's dilemma: framing societal alignment

The issues discussed above are part of a 'social' or 'normative' turn in the governance and the social studies of science, technology and innovation. Calls for broader inclusion and public participation, experimentation and co-construction (Chilvers and Kearnes 2016), and attention to the public value and public purpose of science, technology and innovation (Bozeman and Youtie 2017) are examples of theorisation and operationalisation efforts that express this turn. Central to these debates is the complex issue of 'societal alignment', in that the main objective of many, if not all of these efforts, is to achieve a better alignment between the goals of science, technology and innovation and those of diverse publics.[2]

The dilemma of 'societal alignment' emerges therefore *not just* from technical or temporal challenges in divining pathways for emerging technological designs – as once highlighted by Collingridge and picked up by recent RRI literature, e.g. Genus and Stirling (2018) – but also from the difficulties in democratising science, technology and innovation, addressing divergent stakeholder perspectives, and ensuring a closer correspondence between their benefits and the needs of diverse publics. Neither Collingridge's dilemma, nor the dilemma of societal alignment are moral dilemmas *sensu stricto*. A popular dictionary definition of the term dilemma suggests 'a situation in which a difficult choice has to be made between two or more alternatives, especially ones that are equally undesirable' (Oxford dictionary, first definition).[3] While Collingridge's dilemma is often presented in terms of a choice between early and late interventions, where each suffers from a lack of knowledge or control, respectively, the problems of governance that it has helped bring into view are certainly not as simple as a question of choosing between two alternatives – especially equally undesirable ones. Furthermore, the notions of ignorance, uncertainty and complexity regarding the ongoing development and social embedding of technologies are central to Collingridge's dilemma. A second dictionary definition of the term dilemma is a generic one that suggests 'a difficult situation or problem' (Oxford dictionary). For Collingridge, the problem at hand is our insurmountable lack of capacity to predict the future and to avoid 'irreversibility' and technological lock-ins when these are intrinsic features of sociotechnical systems as they develop. This problem is entangled with yet another problem, that of our limited capacity to govern technological change and make decisions amidst ignorance and uncertainty on the future implications of the technologies we are implementing today. Likewise, as will be discussed later, the dilemma of societal alignment is one that also alludes to difficult situations and problems. However, differently to Collingridge's, it is less concerned with the challenges of foreseeing potential implications of technologies as it is with the challenges of shaping science, technology and innovation to ensure that their development processes are aligned with the values and needs of different publics.

In what follows, we start to unpack the dilemma of societal alignment by outlining a set of perspectives on the challenges and potential approaches for developing more responsible and inclusive forms of governance of science, technology and innovation that emerged from empirical and conceptual research situated within diverse geographical

and socio-political environments. These perspectives illustrate how issues of relevance to the dilemma of societal alignment unfold in four major spheres of knowledge production and innovation. They reflect diverse and self-contained cases in the complex – and somewhat messy – picture of a broader social turn in innovation studies. As a shared feature, they are relevant to or speak directly to RRI. Specifically, they embed challenges revolving around the creation of public value from research, the internalisation and operationalisation of responsibility principles in businesses, the possibilities of bottom-up innovations, engagement and co-construction, and the umbrella challenge of achieving sustainability and social justice. After presenting this limited but diverse set of challenges, and potential avenues for addressing them, we summarise the main ideas behind the dilemma of societal alignment. We introduce it by outlining the differences between this dilemma and that of social control in terms of key dimensions of relevance to the governance of science, technology and innovation. These are: the kinds of epistemic communities taking part in the production of knowledge, research and innovation; the governance focus and associated mechanisms; the nature of the governance problem; and the scope of action and analysis.

The creation of value and societal benefits by public institutions

The notion that the knowledge produced by public universities can drive economic and societal progress emerged in the nineteenth century in Germany, with attention to research-driven study and practical uses of knowledge and the founding of US land grant and UK civic universities (Youtie and Shapira 2008). In the mid-twentieth century, the US massively expanded its research universities and then (especially from the 1970s and 1980s) bolstered mechanisms for technology transfer (Berman 2011) – a model that other developed economies have sought to emulate under the model of the knowledge economy. Through to the present, there has been further expansion in efforts to exploit public research to generate societal benefits (Benneworth 2015). This has sparked a growing interest in understanding how to steer and guide universities and academics to realise the public value of their research (Edwards and Roy 2017).

One of the most well-known strategies for attempting to strengthen science-society relationships, and one that is central to articulations of RRI, is engagement, a broad term that includes public engagement (Wilsdon and Willis 2004), stakeholder engagement (Wender et al. 2014) and expert engagement (Fisher et al. 2015). Engagement practice takes place at different levels and is often organised between universities and different kinds of actors, including business, governments, the voluntary sector and civil society (D'Este and Patel 2007; Hughes and Kitson 2012; Landry et al. 2010). Importantly, these exchanges are influenced by the institutional and organisational characteristics of participating universities (Polt et al. 2001; Ponomariov 2008). Spaapen and van Drooge (2011) have argued for a need to consider the 'productive interactions' that mediate such a relationship. In this context, it is important to recognise the tensions engagement faces (Delgado, Lein Kjølberg, and Wickson 2011) and that both universities and their institutional norms and values, besides individual scientists and their motivations for engaging, are extremely diverse (Olmos-Peñuela, Benneworth, and Castro-Martínez 2015). Aspects such as a lack of recognition, resources (including time) and the rationale and interests of public and private research funders may therefore impede and shape ongoing relationships. In addition to the societal pressures and entanglements that scientists

experience (Olmos-Peñuela, Benneworth, and Castro-Martinez 2014), narrowly defined commercial interests can prevail over societal concerns in research agendas produced by collaborations between public research organisations and the private sector (Bozeman, Fay, and Slade 2013; Fiorina 1999).

Without a certain degree of internalisation of the normative ambitions and orientations of increasing the public value of research, a process also coined as 'responsibilisation' (Kuhlmann et al. 2016, 137), the programmatic goals of RRI cannot be realised among researchers. Although the concept of RRI as such might not be known to a large part of the academic community, researchers have clear ideas about fundamental aspects such as sustainability, transparency, public engagement, ethics and open access and quality criteria for good research.[4] They also recognise the potential benefits arising from more openness in research practice such as enhanced visibility in the research community, the emergence of new topics and higher levels of scientific output and quality and, surprisingly, there is a rather low degree of tension between these outward-looking aspirations and the more inward-looking rationales of the scientific community.[5] On the other hand, however, framework conditions can either facilitate or impede the responsibilisation of researchers. In this regard, structural factors such as the strategies of research performing institutions, but also the capacity to implement RRI, play a great role in researchers' behaviour. Meso-level transformations, such as adequate and tailored institutional strategies, as well as related incentive and support structures, are important for embedding RRI-related orientations and practices, such as public and stakeholder engagement, in the hope of supporting the translation of research into public value.

The enactment of 'responsibility' in the private sector

Alongside the public sector, businesses are essential actors in the production of knowledge and the development of science, technology and innovation. Yet, in the multiple projects on RRI that have been sponsored over the past decade, most are led by universities, other public entities, or consultancies rather than by industry. Tait (2017) observes that RRI researchers have focused primarily on basic science and upstream engagement, exemplified in numerous large projects that have pursued such themes. While industry should play a strong role in the development of RRI, some have called for more explicit attention to company-specific frameworks and procedures for responsible innovation (Lubberink et al. 2017). Some RRI projects have explicitly targeted business-oriented innovation (see, for example, Busquets-Fité et al. 2017). There has been attention to business-focused principles for responsible development, including in nanotechnology (NIA 2006), while other work has examined how greater attention to public values can be incorporated in support mechanisms for emerging technology start-ups (Youtie and Shapira 2017). Yet, many businesses and entrepreneurs are still largely unaware as to what specifically the concept of RRI entails (Auer and Jarmai 2017; Blok and Lemmens 2015).

Challenges exist not only in the form of unawareness about the concept, but also in terms of uncertainty regarding the benefits for businesses from implementing RRI and a lack of business-oriented tools and methods to aid implementation. However, despite these potential barriers, it is worth noting that businesses are not necessarily more oblivious to RRI in their research and innovation processes than actors in the public sector. Articulations of responsibility are ubiquitous but usually expressed in other terms, such

as 'sustainable innovation', 'open innovation' or '(corporate) sustainability'. Furthermore, resonating with earlier research on the topic (Flipse, van der Sanden, and Osseweijer 2014), some elements of RRI tend to receive more traction with businesses than others. These includes public engagement activities (e.g. stakeholder engagement and community action) and ethical conduct of research and innovation (e.g. codes of conduct, integrity, human rights engagement and efforts to increase transparency), which are also common elements of strategies of businesses who are considered to be ethical or sustainable (Nwafor et al. 2017).

Although the theory and practice of RRI is currently not highly tailored towards businesses, managers should be willing to consider embedding RRI in ways that make sense to them. One entry point in this context is building on what businesses are already doing – either individually or in terms of sectorial initiatives – to consider what approaches are feasible in order to go beyond and explore other aspects of RRI. In this regard, one characteristic that is important here is that of diversity, as implementation strategies will highly likely vary between sectors or even between individual businesses.

Civil society engagement and bottom-up innovation

Moving the focus away from the public and the private sectors (i.e. a producer-driven view of innovation), grassroots and co-production processes highlight the role of civil society in developing and implementing innovation. In the case of consumer innovation, for example, publics aim to solve particular real-life problems, bringing innovation closer to societal needs that are defined from the bottom-up (von Hippel 2017). In higher income countries, consumer innovation represents a significant portion of a nation's innovation activities (Bengtsson 2015; De Jong 2011; Kuusisto et al. 2013; Ogawa and Pongtanalert 2011; von Hippel, de Jong, and Flowers 2012). Examples are wide-ranging, including children's products developed by parents (Shah and Tripsas 2007), software and sport-related goods (Jeppesen and Frederiksen 2006; Lüthje 2004), and therapies for chronic diseases (Oliveira et al. 2015). But examples also exist from communities in poorer situations, where bottom-up innovations may contribute not only to the development of new technologies, but also to social empowerment, like the case of sanitary solutions in India (Kumar and Bhaduri 2014).

However, while there are a few exceptional examples of products and services that were first developed by consumer innovators and later diffused widely by producers, consumer innovations seldom get diffused at a larger-scale due to lack of incentives and capabilities (von Hippel 2017). The untapped potential of some forms of grassroots innovation, and resulting limited diffusion of valuable innovations, reflects a division of labour between consumer innovators, private companies and public organisations in innovation activities (Gambardella, Raasch, and von Hippel 2017). In this context, systems of innovation frameworks (Bengtsson and Edquist 2017; Edquist 2011) can be helpful for exploring policy alternatives. These include: (a) provision of knowledge inputs to the innovation process, (b) demand-side activities, such as articulation of new product quality requirements emanating from end-users and innovative publics, (c) providing incentives for and removing obstacles to grassroots innovation, and (d) implementing support services for innovative publics, such as collaboration platforms with access to solution and diffusion tools.

Indeed, a fundamental aspect of bottom-up approaches, but also of co-production mechanisms, is how publics are included and understood in these processes (Ott 2017). While public participation has been claimed to be beneficial in the democratisation of science, technology and innovation, it has also been argued that civil society involvements in very technical projects are mostly top-down exercises in disguise (Irwin 2001; Joly and Kaufmann 2008). The field of energy consumption and the future electricity system, often referred to as the smart grid, is a useful example of how citizens have been instrumentally involved in the experimental set-up of a technology that promises to act as a game changer in sustainability transitions (see Throop and Mayberry 2017). Here, empirical knowledge regarding the effect of the smart grid technologies and concepts, for instance, can be narrowly focused on the technical specifications. In such circumstances, householders and their behaviour are understood as 'barriers' in technological implementation rather than a crucial area of study (Hansen and Borup 2017). This is problematic given that the technologies and control mechanisms often suggested in relation to the smart grid, such as heat pumps, electric vehicles, and remote control of the consumption of these devices, are very close to the everyday routines of communities and challenge the ways people currently live (Hansen and Hauge 2017; Nyborg 2015).

Importantly, these changes affect publics unfairly. In terms of variable prices for electricity, for example, certain groups may not be able to change their practices to achieve optimal energy consumption (Nicholls and Strengers 2015). Additionally, in order to benefit from variable pricing schemes, there might be the need for purchasing new expensive technologies, which might prove to be difficult for some segments of the population. However, in Europe, the current debate on energy futures has so far overlooked the area of responsible and inclusive consumption in energy markets, while centring the attention to areas of privacy and security (Vesnic-Alujevic, Breitegger, and Pereira 2016). One important question in this context is whether the implementation of smart grid technologies – which are based on the assumption of citizens' empowerment through co-production – might in fact generate greater social inequality and discriminate against social groups who lack the capacities for changing their consumption behaviour or investing in new technologies.

The umbrella challenge of sustainable development and social justice

Acknowledging and addressing equity and normativity is just as fundamental to sustainability transitions as it is to efforts towards more inclusive and responsible forms of research and innovation. Yet, forces for sustainability, inclusive societies and responsible growth are caught in a cacophony of debates and hindered by the inconsistencies between institutional approaches (Waas et al. 2011). The global community has been searching for a common approach within the paradigm of sustainable development since the Rio Earth Summit in 1992 and on through the UN 2030 Agenda signed in the New York Sustainable Development Summit in 2015. These agendas are fundamental to the present and future of science, technology and innovation policy, but are often overlooked in debates around RRI (Stirling 2016; for exceptions see Macnaghten and Carro-Ripalda 2015) as well as in other domains.

Moreover, a crucial element missing from discussions is recognition of the inseparability between the concept of sustainability and that of equity. This implies the need for

involving science, policy and civil society equally in the pursue of transformation. Since the turn of the millennium, an emerging sustainability science community has been building the epistemological base of equitable science-society interaction (Spangenberg 2011). These sustainability scholars have been moving towards a strong theory of sustainability – an understanding of sustainability as an emancipatory concept (Dedeurwaerdere 2014; Ott 2017). With this, they aim to acknowledge and mainstream notions of normativity, values, justice, and human rights. They understand publics not only from the perspective of groups and individuals deserving equitable shares in a world of finite resources, but in terms of their role as agents of change in a joint future forming process (Gergen 2015). The production of knowledge and innovation is therefore necessarily an outcome of deliberative democratic processes and learning among diverse actors with different knowledge and value systems, besides diverse understandings of what development and innovation mean (Dryzek and Stevenson 2011; Spruijt et al. 2014). The challenge lies in crafting such transdisciplinary interactions between representatives from science, policy, business, and civil society, and in opening up processes to the point which allows actors to make meaningful contributions, i.e. to influence decision-making (Ott 2017; Ott and Kiteme 2016).

Mainstreaming the concepts of sustainability and equity are fundamental for the conceptualisation of inclusive innovation and RRI. The notion of inclusion or participation of actors in deliberative processes often remains vague. The relationship between science and society remains characterised to various extents by unequal power relations, a prioritisation of the needs and concerns of more powerful actors, and conflicting value systems. Instead, people's right to exercise decision-making power should be clearly articulated (Dryzek 2009). This extended understanding of influence goes far beyond the inclusion of vulnerable groups via indirect 'trickle down' processes, while elites still formulate innovations (and frame their potential benefits). In addition, articulations of responsibility become of utmost importance: rather than referring vaguely to intentions of making a positive contribution to poverty alleviation or societal progress, we need commitments and forms of joint decision-making processes that empower less powerful actors.

Organising productive and equitable transdisciplinary continues to be a challenge – in RRI (De Hoop, Pols, and Romijn 2016) as well as in the global governance approaches, in general. What is perhaps most challenging for many development actors and innovators is the idea of subordination to normative objectives, procedures, and assessments that are jointly determined together with others (Cornell et al. 2013; Sarewitz 2015).

From 'social control' to 'societal alignment'

A number of aspects shaping the development and implementation of inclusive and responsible research and innovation have been outlined in the previous sections. The points discussed sit at the intersection of formal and informal innovation processes, public and private organisations, and their multifaceted and complex relationships with societal actors. The examples used to illustrate these points are far from representing the whole of the challenges faced by the governance of science, technology and innovation and by frameworks such as inclusive innovation and RRI that have been designed to address them. However, they help us to start sketching out a complementary dilemma to that of Collingridge, one which has arguably more contemporary relevance in the

context of diversity and complexity of epistemic communities, the objectives of and mechanisms for the governance of science, technology and innovation and the changing configurations of sociotechnical systems.

Collingridge highlighted the serious limitations (or the impossibility) of 'predicting' future implications of technological designs emerging today and the challenges this temporal divide posed for the 'control', or social shaping, of science, technology and innovation. The problem of societal alignment is different. Here, the challenge is one of engaging multiple and often diverse publics, framing societal needs and aligning the objectives and configurations of science, technology and innovation for meeting those needs. Considering the limited set of examples discussed, central to the dilemma of societal alignment is the question of how to ensure that science, technology and innovation can be aligned with societal needs through (a) the translation of public research and the activities of businesses into public value, and (b) mechanisms of empowerment where publics can be agents in the development and/or decision-making around science, technology and innovation. Collingridge's dilemma and the dilemma of societal alignment should not be seen as opposite to each other, as they highlight different aspects of the governance of science, technology and innovation. Both deal with complexity and uncertainty and can be analytically useful. However, they do have contrasting features, as we compare them against a set of basic dimensions (Table 1).

As suggested in the table, the dilemma of social control emerges from a technical and organisational paradigm, where both the development of science, technology and innovation, as well as solutions to the problem of uncertainty around the consequences of large-scale technical systems (e.g. nuclear energy), are formulated based on epistemic knowledge produced within formal organisations and institutions. This explains the popularity of Collingridge's dilemma among the TA community as 'TA can be regarded as the science-based effort to meet the challenges and to counteract the dilemma by deepening and broadening the knowledge basis for assessment procedures and control strategies' (Liebert and Schmidt 2010, 56). More recently, the legacy of the Collingridge dilemma has also been extended to a number of academic articulations of RRI, where the concept is associated with a need for anticipation and immediate action to avoid technological irreversibility and lock-in (Ribeiro, Smith, and Millar 2017). However, the dilemma of social control falls short in addressing normative aspects of scientific production and technological change, dealing with issues of power distribution between decision-makers and diverse publics, and

Table 1. Dimensions of Collingridge's dilemma of social control and of the dilemma of societal alignment.

Dimensions	Collingridge's dilemma of social control	Dilemma of societal alignment
Main epistemic communities	Formal institutions and organisations who produce and regulate science, technology and innovation	Publics and diverse actors from the private and public sectors (e.g. specific groups of scientists, businesses)
Focus	Unanticipated effects of emerging technologies (backward looking/pipeline focus)	Societal needs and the generation of public value (forward looking/scenario options)
Governance mechanisms	Centralised / Formal / Regulatory	Decentralised / Formal or Informal / Deliberative
Nature of the problem	Technical, organisational	Political, cultural, ethical
Scope	Large technical systems, general analysis	Large and smaller-scale technical systems, situated analysis

acknowledging the complexity that characterises present-day knowledge production. While Collingridge himself acknowledged to a certain extent the limits of 'prediction' and expert knowledge (Liebert and Schmidt 2010), those theorising inclusive innovation and RRI are in a better position now to address the points highlighted in Table 1.

The dilemma of societal alignment does not aim to invalidate that of social control, but tries to extend it to more contemporary and alternative accounts regarding the development of science, technology and innovation. Semantically, the term 'control' suggests that science, technology and innovation can be steered via top-down mechanisms based on technical rationality, while 'alignment' moves the focus to more horizontal relationships and constant negotiation over the needs and concerns of diverse actors (Rip and Te Kulve 2008). Compared with Collingridge's dilemma, in which science and policy institutions are central players and are seen as more or less homogeneous entities, the dilemma of societal alignment aims to highlight diversity both in terms of formal institutions and organisations and the fact that different publics are also active producers of knowledge. This is a key change in focus from the potential (negative) consequences of science, technology and innovation to how they might – or might not – be able to address societal needs. The nature of the problem is therefore political, cultural and ethical, as the dilemma of societal alignment aims to take a step further in acknowledging normativity and thus the values of diverse actors. This offers a contrast to Collingridge's perspectives, which do not clarify *who* are the 'we' when asking, for example: 'can we get (technology) to do what we want' (Collingridge 1980, 11).

The dilemma of social control has been criticised for failing to acknowledge the politics of decision-making processes around science, technology and innovation and for insisting on a misleading separation between facts and values (see Johnston 1984). Whereas the core of Collingridge's dilemma is that of an increased lack of social control due to technological 'entrenchment' and embeddedness in society, the challenges outlined in this article suggest that the dilemmas of societal alignment emerge from a failure in acknowledging diversity of publics and institutions, situatedness of innovation processes and normative aspects in the governance of science, technology and innovation. These are important points that need to be considered as we continue developing frameworks for more inclusive and responsible forms of research and innovation.

Notes

1. This paper draws on authors' presentations and associated discussions at a panel on inclusive innovation and the challenges for science, technology and innovation policy at the 2017 Annual Conference of the Eu-SPRI Forum in Vienna, Austria.
2. To recognize the importance of understanding society in its plurality, we use the plural 'publics', see Marris (2015). The notion of 'public' suggests a single societal entity whose concerns, values and agendas are taken for granted by those in position of power and which is typically regarded as homogenous across different societal groups, geographies, cultures, and political-economic settings. In contrast, 'publics' acknowledges and allows for diversity and difference.
3. Oxford Dictionaries, https://en.oxforddictionaries.com (accessed June 22, 2018).
4. Preliminary results of survey conducted by MoRRI – Monitoring the Evolution and Benefits of Responsible Research and Innovation, http://www.technopolis-group.com/morri/ (accessed June 22, 2018).
5. Ibid.

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