Governance of EU research policy: Charting forms of scientific democracy in the European Research Area

Lorna Ryan

Centre for Comparative Social Surveys, Department of Sociology, City University London, Northampton Square, London EC1 0HB, UK; Email: lorna.ryan.1@city.ac.uk.

The nature of public participation in EU research governance is an under-explored area. Assumptions that governance arrangements enable direct participation of 'the public' are identified in the academic literature on science communication. This paper considers the extent to which such assumptions can be supported. It presents findings from a preliminary investigation into the discursive construction of the 'scientific citizen' in selected official texts of the EU in the context of the development of the European Research Area, focusing on new research infrastructures with the legal status of a European Research Infrastructure Consortium. Specific modes of participation are identified: as assessors of the accountability of decision-makers; as recipients and beneficiaries of scientists' knowledge-based decisions; and as participants in the scientific process via open access arrangements. The participation of the 'scientific citizen' is constructed as linked but external to the decision-making processes.

Keywords: governance; legitimacy; European Research Infrastructure Consortium (ERIC); European Research Area; science communication.

---

1. Introduction

The notion that citizen participation is a feature of 'good' governance of science is a durable one expressed in both academic (Michael 1998; Jasanoff 2003; Irwin 2006, 2008, 2009; Hornig Priest 2009; Felt and Fochler 2008, 2010; Meljgaard and Bloch 2012) and policy documents (European Commission 2000, 2004). Broadly, 'governance' is used here to refer to 'decision-making processes' (Irwin and Michael 2003: 10). Citizen participation is understood as a way of 'infusing legitimacy' (cf. Pieczka and Escobar 2013: 113) into the policy-making process, counteracting democratic deficits. The need for policymaking processes and outcomes to be recognised as legitimate is of fundamental concern to institutions of the State, both national and supranational. Public mistrust of science has implications for public support of science and for decisions about budgetary allocations to science. In addition, public participation in the policy-making process is presented as having beneficial effects in terms of the diversity of views brought to bear on a problem and wider legitimacy claims. This is particularly the case for the EU (Chari and Kritiziger 2006; Armstrong 2010). The concept of a 'scientific citizen' (Irwin and Michael 2003) is predicated on an idea of democracy and citizen involvement in decision-making: it is not fixed—different modes of the scientific citizen exist (Irwin and Michael 2003: 17–18) and it is discursively constructed. The question posed: 'how is the scientific citizen being constructed within current policy and decision processes?' is as Irwin (2001: 4) remarks:

> .. . especially important given the apparent academic and policy need to move beyond the mere advocacy of scientific democracy and towards a more a more considered treatment of the possible form of such democracy and their implications … We will be especially sensitive to the framing of issues for public debate, the constitution of the 'audience' for such discussion, the characterisations of science … and the implicit model of scientific citizenship being employed.

This paper seeks to engage with Irwin's question though an examination of selected official texts of the EU as they relate to the European Research Area (ERA) and new European Research Infrastructure Consortia (ERICs) within the ERA. The period covered ranges from 2000, when the 'European Research Area' was announced to 2012 when a follow on Communication provided the formal definition of the 'European Research Area'. Over the course of this period, a movement away from the goal of direct citizen participation to an engagement with citizens in which the citizen scrutinises decision-making but is not directly involved in this process, is traced. The form of the 'scientific citizen' changes.

The structure of the paper is as follows: a brief overview of some key debates in the science communication literature is followed by a discussion of the key features of the literature relating to the construct of 'governance'. The legitimacy concerns arising in respect of governance arrangements are discussed by reference to two types of legitimacy that are related to decision-making processes: input and output legitimacy.

This discussion of questions of legitimacy and governance, together with the question 'how is the scientific citizen constructed in the policy and decision-making processes', will form the basis of the analytical lens adopted with which to read the official texts (European Commission Communications, Commissioners' statements and Expert Group reports) relating to the ERA and, as a specific example, ERIC. The development of the ERA is reviewed and its definition presented. Five distinct elements identified in the texts are discussed:

- the citizen in the ERA
- the citizen, participation and consultation
- the citizen and accountability of scientific decisionmaking
- citizen involvement in the identification of grand societal challenges
- the citizen and open access: citizen participation in the scientific process

The example of the ERIC is discussed with a view to illustrating these elements in relation to a concrete case. The paper concludes by considering the implications, as identified in this initial review, for assessing science communication practices.

2. From government to governance and science communication practices

Irwin's question about the 'scientific citizen' was posed in the context of the burgeoning debate in the UK and beyond about the need for scientists to engage with the 'the public'. The aim was to engender public trust in science and thereby secure public support for scientific decisions and reflecting this aim, there were calls to

move from ‘public understanding of science’ to ‘public engagement with science’; from science and society, to science in society (Elam and Bertilsson 2003). The former seeks to provide information, the latter to engage the citizen in dialogue. The former privileges scientific knowledge and the scientist as the bearer of such knowledge, the latter recognises the contingent nature of scientific ‘facts’. Rigby (2007: 367) has referred to the history of this process as the:

> .. . heroic postmodern debate about the relationship between science and society.

It has been detailed by various authors Hennen 1999; Bauer et al. 2007; Irwin 2001, 2006, 2008; Pieczka and Escobar 2013) and is not reproduced here, other than to note three features: (i) the emergence of an explicit concern about governance within this corpus (European Commission 2000; Jasanoff 2003; Irwin 2006); (ii) the recognition of multiple ‘publics’ (Office of Science and Technology and the Wellcome Trust 2001); and (iii) the acknowledgement that the debate about governance and about the role of the public raises issues about public trust in public institutions, and linked concerns about a ‘democratic deficit’ and associated legitimacy crises.

In a later work, Irwin (2009: 10) has suggested that:

> .. . thinking about the relationship between science communication practices and the direction and governance of science and technology (and of scientific and technological institutions) … .

has made it:

> .. . clear that the governance of science ... and the communication of science are ‘not separate activities but instead [are] tightly bound up with one another’. (Irwin 2009: 14)

Considering how these two areas are linked constitutes the focus of this paper.

Irwin’s work stands as an example of the ‘governance turn’ in science communication studies (cf. Hagendijk and Irwin 2006). There has been a corresponding ‘governance turn’ in European studies, Kohler-Koch and Rittberger (2006: 27) refer to the ‘veritable growth industry’ in research on governance and the EU. These turns allied with an emerging research interest in the governance of EU science/research policy (McGuinness and O’Carroll 2010) offer opportunities for bringing the insights of these discrete fields to bear on each other in considering current arrangements for citizen participation in EU research policy decision-making.

‘From government to governance’ is a term used to refer to the changing nature of decision-making. Geddes (2005:
259) has asserted that:

> .. . the trend from government to governance seems now to be a fact of life.

That assessment is echoed in the comment by Elam and Bertillson (2003: 233, see also Irwin and Michael 2003: 41):

> As the distance between science and society is collapsed with the growth of contemporary knowledge societies, so a range of different approaches to the democratic governance of science superseding its Enlightenment government is emerging.

The movement from government to governance is accompanied by an idea of the replacement of hierarchical government by non-hierarchical governance arrangements. This is characterised as:

> … traditional power hierarchies .. . being replaced by a more complex, multi-relational balance of power, whereby citizens and companies are playing an active role in shaping socioeconomic change and addressing problems that were previously the sole responsibility of government. (Davies 2011: 37)

Often 'governance' itself is not defined, an omission that has implications for analytic clarity; while the everyday sense of governance is used in a way that means:

> ... to direct and control the actions, affairs, policy and function. (Collins English Dictionary)

However, in academic terms as Crinson (2009: 115) states:

> 'Governance' ... is a analytical construct ... [used] to describe the processes associated with the relationship of authority between the actors.

In the current case, the relationship between actors includes the EU, as a supranational polity and its institutions, scientists, and the public. As noted above, the field of scholarship relating to governance is vast and the concept of 'governance' is a contested one. Jachtenfuchs (2001: 259) comments that:

> ... the governance perspective offers a *problematique* but does not constitute a coherent theory.

Similarly, Marks defines multi-level governance as:

> ... a system of continuous negotiation amongst nested governments at several territorial tiers. (1993, cited in Bache and Flinders 2004: 3)

His definition is subject to the criticism that it is not novel:

> … being an amalgam of existing theoretical statements'; is largely descriptive; overstates the autonomy of subnational and supranational actors; implicitly adopts a top-down view of subnational actors and is focused on subnational authorities rather than other subnational actors such as pressure groups. (Fairbrass and Jordan 2004: 152)

However, alternative approaches, such as liberal intergovernmentalism (Moravcsik 1993) or state-centred theories are not immune to criticism (e.g. Fairbrass and Jordan 2004: 153).

Kohler-Koch and Rittberger (2006: 27–8) note that two key concerns relating to EU governance research to which analysts are oriented are:

- Does 'governance beyond the state provide solutions to pressing policy problems which cannot be solved by states unilaterally?
- Can governance beyond the state be democratically legitimate?

Such questions are relevant in the context of governance of research policy. However, for current purposes, the debate about the utility of the construct as it relates to understanding the processes of European integration is not of prime concern. Rather, the interest in the academic understanding of governance is the extent to which it is defined and how the definition of governance employed is vital for analytic clarity.

Governance is, generally understood as decision-making that extends beyond the state. It is:

> A flexible pattern of public decision-making based on loose networks of individuals .. . [Governance] refers to the capacity of governing systems to coordinate and solve public problems in a complex context .. . in the place of hierarchies of power based on traditional political institutions are self-organising, interorganisational networks characterised by interdepend ence .. . and significant autonomy from the state. (cf. Rhodes, cited in John 2001: 9)

Other definitions include that by Zurn (1998, cited in Jachtenfuchs 2001: 246):

> .. . governance can be understood as the intentional regulation of social relationships and the underlying conflicts by reliable and durable means and institutions, instead of the direct use of power and violence.

Such a definition foregrounds that governance seeks to reach decisions, to secure consent, by consensus. It is distinct from 'regulation'.

Gray (2004) in his review of the literature noted Rhode's assessment of the wide range of usages of governance; usages in the review carried out by Rhodes, include prescriptions of 'good governance', rather than offering definitions of the term.

Gray comments that to:

> .. . redefine governance as any one of these usages may allow the particular to take over the genus and thereby impoverish our analytical instruments and consequent understanding. (Gray 2004: 4)

His conceptualisation of governance is one in which:

> .. . the arrangements for the exercise of authority and function are allocated ... ensuring that rights and obligations are established and maintained. (Gray 2004)

Elaborating on this approach allows the identification of three different modes of governance (recognised as

ideal types): (i) the common mode of governance (based on law); (ii) the communion mode of governance, a relationship based on an appeal to common values; and (iii) the contract mode of governance (based on inducement– contribution exchange agreed by partners). Gray offers a definition of governance which refers to:

> ... *the arrangements of command, communion and contract relationships by which authority and function are allocated and rights and obligations established and regulated* and through which [specific] practices and policies are effected. (Gray 2004: 5, emphasis added)

The utility of this definition of governance is in its focus, requiring the analyst to specify what authority and functions are allocated to which actors; what rights may different actors lay claim to?

Governance is often taken to mean 'network'. Davies (2011: 32) refers to the existence of a 'universe of governance networks', noting that Rhodes (cited in Gray 2004: 4) defined:

> ... governance as networks; networks 'are the analytical heart of the notion of governance in the study of public administration'.

Davis' remark that governance 'was quickly captured as a synonym for 'networks' is apt; in addition, issues of hierarchy, of power and conflict were largely removed. While scholars do raise these issues (in particular, Davies (2011), but also, Irwin and Michael (2003)); the summation of the field (and somewhat simplified for current purposes) by Davies (2011: 13) is instructive:

> ... networking is ... a consensus oriented mode of coordination, encouraging the mutual adjustment of actors' behaviour.

The analytical focus using this understanding of governance directs attention to policy learning, to sharing of best practices and within the European studies arena, this is a focus which has been well developed (Borra´s and Radaelli 2011).

Sorenson (2002: 693) suggests that:

> ... we have moved from the age of bureaucratic government to the age of network governance.

He proposes that in the decision-making process there is room for citizens alongside elites and sub-elites:

> Hence, network governance makes way for the establishment of a ladder of participation that makes sure .. . that citizens can participate on different scales and levels. (Sorenson 2002: 709)

This comment is an example of what Davies refers to as:

> ... one of the optimistic claims for network governance ...

namely:

> … that it has the potential to enhance democratic inclusion and equality. (Davies 2011: 63)

Instances of the use of the concept of governance to refer to a 'network', with associated assumptions of the participation of a range of actors, including civil society actors, are evident in the science communication literature; for example, Felt and Fochler (2010: 220) define governance as:

> .. . a new way of arriving at collectively binding decisions, which does not imply top-down hierarchical relations between government and other societal actors, but rather involves stakeholders/citizens in more network-like constellations.

They add that:

> .. . [p]articularly in policy rhetoric in the European context, 'the public' or 'society' .. . are seen as key actors in these processes. (ibid.)

Those definitions, particularly that offered by Gray (2004), draw attention to the assumed role and functions of social actors within decision-making/governance processes. Focusing on roles and designated functions provides a lens through which citizen participation in the governance of EU research policy (particularly the ERA and its 'pillars', the ERICs) can be explored.

3. Underpinning EU governance: Legitimacy, democracy and science policy

The debate about governance (decision-making processes) and about public participation in science is underpinned by concepts of legitimacy and democracy. The EU as a polity has sought to demonstrate its legitimacy, countering claims of democratic deficit through the institution of measures designed to promote participation and transparency (Craig and DeBurca 2011: 149). Seven specific claims are levied: from a charge that EU decision making is 'unresponsive to democratic pressures' to 'distance' from the citizen (Craig and DeBurca 2011: 150). Craig and DeBurca offer an insightful analysis of the debate about democracy and the EU. Suffice it to note here that efforts to engage with such concerns have been made from initiatives such as the White Paper on European Governance in 2001 to the Articles 10 and 11 of the Lisbon Treaty (2009) which provide for both representative and participatory democracy. Indeed, Article 1 of the Treaty of the EU states:

> This Treaty marks as new stage in the process of creating an ever closer union among the peoples of Europe, in which decision are taken as openly as possible and as closely as possible to the citizen.

The debate about democracy includes a focus on process: it is important to note that governance seeks, via consensus decision-making, to legitimate both the decisions made and the decision-making process, to secure consent. Thus

both the legitimacy of decisions and the procedural legitimacy relating to decision-making processes should be considered. As Irwin and Michael (2003: 61) comment:

> ... it is not sufficient simply to call for 'scientific democracy'. Instead it is necessary to consider carefully the form of any initiative and its operating principles.

Thus, the form of 'democracy' needs to be considered, in the context of the different modes of democracy—representative and participatory.

De Elera foregrounds the issue of roles in the decisionmaking process comments in respect of the governance of European science policy:

> … the question of *who* is going to define such [research] necessities becomes then a crucial issue in terms of providing legitimacy to the research policy of the EU and to the EU itself. It would hardly be acceptable to identify European necessities without giving a say to the citizens. (De Elera 2006: 573, emphasis added)

How the citizen 'gets a say' will vary according to the different forms/modes of democracy in which the citizen will be allocated a specific role/function.

Abels (2007: 103), discussing citizen involvement in public policy-making with particular reference to participatory technology assessment comments that:

> The normative core of the participatory claim is the sovereignty of the people. According to its advocates, more citizen participation is often equated with more democracy, better accountability and more effective policy decisions.

She cautions against loose terminology and romanticising the nature and outcome(s) of citizen participation; specifically noting that participation *per se* does not necessarily result in greater accountability and legitimacy. Importantly, for current purposes and building on the work of European studies scholars such as Moravcsik and Follesdal and Hix (cf. Craig and DeBurca 2011: 152–3), she distinguishes between 'input legitimacy' and 'output legitimacy':

> Input legitimacy pertains to participation, i.e. the social dimension insofar as it considers who has actually access to the policy process and who can influence policy-making; it is based on normative criteria, such as, for example, self=determination (government of the people). Output legitimacy, in contrast, builds on a concept of policy-making as problem solving in the interests of the general public. The criterion here is functional. (Abels 2007: 105)

Therefore, exploring public participation can chart both input and output modes. It is suggested that these modes can be mapped to models of public participation in science policy. Input legitimacy is what the science in society mode of engagement is based upon; whereas output legitimacy relates to separation of science and society and has been described as a 'deficit model' of science communication. The 'deficit model' is defined as the belief that conveying

accurate scientific information will dispel opposition to the policy options embraced by scientists and other elites (Ziman 1991, cited in Hornig Priest 2009). These models are not disconnected. Reddel and Woolcock (2004: 75) similarly distinguish between citizen engagement and participatory governance, taking:

> .. . the former to involve efforts to expand citizen participation into decision making [and the] latter is based on active partnerships and collaboration between civil society, the private sector and governments.

Reviewing the field, Abels notes that the forms of participatory techniques 'have to be linked to specific functions' (Abels 2007: 105). This emphasis on function is of interest, and recalls Gray's definition of governance, cite in Section 2 (Gray 2004). Plotting the governance arrangements and mode of science communication on two axes is instructive:

- governance including participation arrangements (open/restricted; participatory/representative)
- mode of science communication (informing; engaging)

Schmidt (2013: 2) has argued that a third dimension, 'throughput' should be considered, suggesting throughput legitimacy:

> .. . is judged in terms of the efficacy, accountability and transparency of the EU's governances processes along with their inclusiveness and openness to consultation with the people.

For current purposes, however, the two dimensions of input and output legitimacy are taken to imply processes, obviating the need to directly address this third dimension, although it is recognised that it foregrounds consideration of process, particularly of output legitimacy, which may otherwise be overlooked. The instruments and their associated practices can be plotted along these two dimensions (see Fig. 1).

The heuristic, input and output legitimacy, will be used in attempting to answering the question 'how is the scientific citizen constructed within current policy and decision processes' in terms of the role or function of the public.

4. Methodology and selection of materials

The question, 'how is the scientific citizen constructed within current policy or decision processes' (*pace* Irwin 2001: 4),which seeks to focus attention on the role/ function of the 'scientific citizen' in governance arrangements, has guided the research methodology adopted here, which is informed by a qualitative epistemology and specifically by social constructionism. The purpose of the research has been to identify, in selected official texts of the EU, and using Irwin's question as an orientation device, the governance of EU research policy; to ask what are the functions or role of different social actors in the governance arrangements, paying particular attention

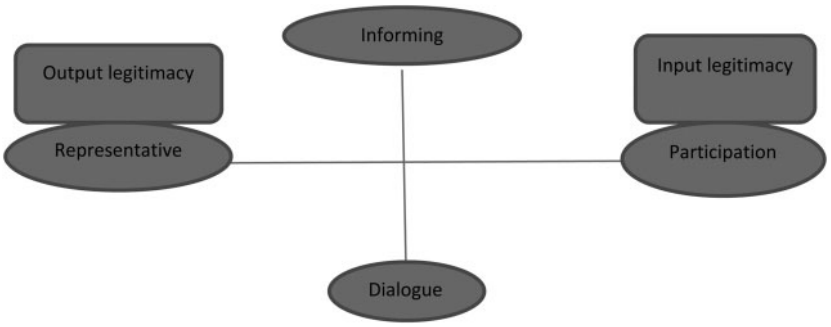

Figure 1. Science communication and participation.

to the 'scientific citizen'. In considering how the 'scientific citizen' is constructed, the focus is necessarily on how the citizen is spoken about, it concerns the discursive construction of a 'scientific citizen'—the nature, form and rationale for citizen participation do not exist independently of the constitutive discourses, enunciated in texts. The construct 'discourse' has many meanings in the social science literature. In this paper, it is used to refer to language in use, emphasising how discourses do not reflect a pre-existing reality but, rather, actively construct reality. Discourses have material effects affecting how citizen participation is organised. This interpretative approach to the texts also employed heuristic devices such as the distinction between types of legitimacy—between the nature of participation as part of the decision-making process or otherwise, as outlined above (Abels 2007; Schmidt 2013)—and the different understandings of democracy. Such questions guided the reading of the texts, presented here as an initial analysis.

The texts selected to explore the operation of different understandings of 'scientific democracy' are the policy statements in the official documents of the EU— European Commission communications; various Expert Working Group reports; statements by EU actors (Commissioners, Commission officials) and legal texts. Key texts from the period 2000–12 were selected, from the Communication in 2000 '*Towards a European Research Area*' to the Communication in 2012 '*A Reinforced European Research Area Partnership for Excellence and Growth*' (European Commission 2000; 2012b), the statements on Science and Society released from 2000 onwards and, for the example of ERIC, the relevant reports of European Commission Expert Working Groups and European Commission statements, in addition to the legal instrument, the Regulation issued by the European Council (Regulation 723/2009). The texts were read with specific attention paid to 'the citizen' and to the role of 'the citizen' in science decision-making processes. Drawing on the heuristic used by Abels (2007), the questions informing the exploration of the official statements about the ERA and about ERIC are: 'who' participates (or is constructed as a 'legitimate' actor in participatory activities); 'what' is the nature of this participation; and 'why' are they participating? The concerns raised by the definition of governance in respect of role, function and authority being used to consider what might be a contemporary response to Irwin's question, 'how is the scientific citizen being constructed within current policy and decision processes?' (Irwin 2001: 4). The analysis offered adheres to a key qualitative methodological requirement, namely the presentation of the material(s) so that the reader can judge the adequacy or otherwise of the assessment.

5 The citizen in the ERA

In 2000, the Council of the EU launched the Lisbon Strategy . The goal of the Strategy was to make the EU 'the most dynamic and competitive knowledge-based economy in the world' (European Commission 2000). The Strategy was re-launched in 2005 refocusing the strategic goals on economic

growth and job creation. Its successor, the Europe 2020 Strategy was launched in 2010 with the aim of making Europe a smart, sustainable and inclusive economy. The concept of the ERA as a means of securing the aims of each strategy has been steadily developed over the past decade, from its announcement in *Towards a European Research Area* (COM 2000) to the 2012 Communication (A Reinforced European Research Area Partnership for Excellence and Growth) (European Commission 2012b). The 'realisation' of the ERA is an objective of the Innovation Union Flagship of the Europe 2020 Strategy.

Lacking a formal definition over the course of its development, the ERA was defined in the 2012 Communication (European Commission 2012b) as:

> .. . a unified research area, open to the world, in which researchers, scientific knowledge and technology circulate freely and through which the Union and its Member States strengthen their scientific and technological bases, their competitiveness and their capacity to collectively address grand challenges.

The ERA aims to function as an internal market for research. The importance of citizens in the ERA was

signalled in the first ERA Communication COM (2000) which referred to the gap between the world of science and 'the people', or everyday life; it cast the issue in terms of the involvement of the citizen in a debate:

> Europe is not only investing less and less of its richness in progress in knowledge; the image that European's have of knowledge is also less positive than it was … the gap between the scientific world and the people at large is growing .. . Research has more and more of an impact on everyday life. The *debate* must therefore be extended to all of European society … (European Commission, 2000a; 2000b, emphasis added)

Over a decade later, the Communication '*Towards a Reinforced European Research Area Partnership for Excellence and Growth*' was issued in July 2012. Five priority areas for action are identified, including, the specific aims of securing:

> … optimal transnational co-operation and competition– defining and implementing common research agendas on grand challenges, raising quality through Europe-wide open competition, and constructing and running effectively key research infrastructures on a pan-European basis. (European Commission 2012b)

And also:

> … optimal circulation, access to and transfer of scientific knowledge including via digital ERA – to guarantee access to and uptake of knowledge *by all*. (European Commission 2012b, emphasis added)

Involvement of the 'citizen' is via an unelaborated mechanism: a 'stakeholder platform'; this is in line with the provisions of the Lisbon Treaty (2009) and in the 2012 Communication, the European Commission refers to its task of ensuring 'inclusive ERA policy development' through:

> ... supporting structured dialogue with research stakeholder organisations and relevant civil society bodies – e.g. in the form of a dedicated stakeholder platform. (European Commission 2012b: 13)

The 2012 Communication followed earlier commitments to:

> … more systematic, broader and structured consultation of relevant stakeholders in the ERA as well as the necessity to better communicate the aims, benefits and achievements of ERA and its Vision 2020 to the broader public and rele vant category of stakeholders. (Council of the EU 2009: Paragraph 6)

In line with the provisions of the Treaty of Lisbon (2010), 'the citizen' is consulted in the development of the ERA by the European Commission, for example, the recent Consultation on the Framework Directive for the European Research Area (European Commission 2012c), which was carried out prior to the publication of the

Communication (European Commission 2012b) invited citizens to respond to the proposal for a framework directive. 12% of the total number of respondents identified as 'citizens'. However while the resulting report does present citizens' responses (European Commission 2012a), it maintains a central focus on the concerns of and responses by 'researchers'.

The calls for stakeholder consultation is an attenuated version of earlier commitments to direct citizen participation in dialogue; the Commission Staff Working Paper, *Science, Society and the Citizen* which saw as the challenge responses to the questions:

> What needs to be done in order to underpin the *dialogue* between science and society, to improve the public's knowledge of science, to increase the interest of the young in scientific careers, and to expand the role and place of women in science and research? (European Commission 2000b, emphasis added)

6. From dialogue to consultation

Discussions about 'governance' have been ongoing in policy statements about EU research policy; for example, the Commission Staff Working Paper *Science, Society and the Citizen in Europe* (European Commission 2000b), defines it as:

> .. . meaning new forms of governing and administering public life based on interaction between traditional public authorities and 'civil society;' private operators, public bodies and citizens groups. (European Commission 2000b: p6)

'Dialogue' is central in the interaction envisaged:

> Dealing with technological risk and 'science/society' more generally calls for the development of new forms of dialogue between researchers, experts, political decision-makers, industrialists and members of the public .. . (European Commission 2000)

The *2002 Science and Society Action Plan* (European Commission 2002) which followed *Science, Society and the Citizen in Europe* (European Commission 2000b) sought to 'make science more accessible to European citizens', through implementation of 38 actions. It explicitly located the Science and Society activity as 'part of the process of 'creating a real European Research Area':

> If citizens and civil society are to become *partners* in *the debate* on science, technology and innovation in general and on the creation of the European Research Area in particular, it is not enough to simply keep them informed. They must also be given the opportunity to express their views in the appropriate bodies. (European Commission 2002: 17, emphasis added)

'Partnerships', 'dialogue', 'involvement in debate' and other expressive functions of participation are key discursive constructs in these policy constructions of citizen

participation. The idea that 'the public' is a key actor in the science governance network was central to the 'scientific citizenship' approachset out in the European Commission Staff Working Document (European Commission 2000b) and its associated *Science in Society Action Plan* (European Commission 2002). The context of a White Paper on European Governance (European Commission 2001) constitutes a backcloth to these texts. This presented a view of governance which meant:

> ... rules, processes and behaviour that affect the way in which powers are exercised at the European level, particularly as regards openness, participation, accountability and cohesion (European Commission 2001: 428)

Governance of the European Research Area: Giving Society a Key to the Lab (European Commission 2004) indicated that the science *in* society dimension was being advanced, explicitly referring to:

> The growing trend towards direct participation by civil society in the governance of European research is part of a process that is often referred to as 'democratising' science. (European Commission 2004: 2)

Commissioner Philippe Busquin, prefacing the report, spoke of how:

> More importantly, ensuring that science delivers what people need involves intimately weaving the social dimension into scientific research. This means that policy-makers should actively engage civil society. *Good governance of the ERA requires the participation of civil society.* (European Commission 2004, preface, emphasis added)

While this report was optimistic in its view of civil participation in the ERA, it concluded that:

> … a number of constraints influence the participation of civil society in policyand decision-making. These include the short-term outlook of politicians, the sheer size and diversity of an enlarging Europe, and the imbalance between intentions and the resources set aside for achieving them. A number of possible ways are recommended around these constraints, including structural changes in the political process to foster civil participation. Although the regional and national level should be the core foundation for civil participation, EU initiatives are becoming increasingly necessary in the context of the European Research Area and could prove a useful testing ground for good practices that could be applied elsewhere. (European Commission 2004: 12)

The limitations to citizen participation at EU level are noted but are not presented as insurmountable.

A review of the texts from 2000, when the ERA was first announced, to July 2012 when the follow up Communication was issued, suggests that a shift in emphasis from direct participation to some other form of involvement in the decision-making process has occurred. Citizen participation in *decision-making* can be seen to be substituted by 'citizen participation in *dialogue*'. In 2009

the ERA Board in its first report on the ERA referred to an indicator of reaching the milestone 'of shared responsibility' when:

> .. . a more educated citizenry is trained in science and technology issues to be able to participate in policy debate. (European Research Area Board 2009: 18)

By 2010, in the review of one programme (Science in Society, part of Framework Programme 7, the EU's multibillion euro research funding framework), the Director of the Science, Economy and Society Directorate, Jean Michel Behr, presented a concise statement of the European Commission's position on science governance as follows:

> To bring science closer to society, science must be made a public endeavour. The public has to be *kept aware – and be capable of scrutinising and debating* – new scientific and technological pathways .. . (European Commission 2010c, emphasis added)

The scrutiny function of 'the public' is emphasised here, highlighting a particular role for the public in ensuring that decision-makers account for their actions.

7. Citizen participation: Overseeing accountability

Accountability of the policy-makers and officials of the European Commission and other institutions of the EU is raised in context of discussions concerning the 'democratic deficit' (Chari and Kritzinger 2006: 222; Craig and DeBurca 2011). The theme of accountability and of attempts to account for the public funding of science has been explored by Elzinga (2012). De Elera's statement, cited in Section 3, about priority setting in the EU treats citizens' involvement in such exercises as a *sine qua non* of effective decision-making:

> .. . it would hardly be acceptable to identify European necessities without giving a say to the citizens. (De Elera 2006: 573)

In the official texts of the EU, the accountability of the EU and its institutions to the citizen is routinely enunciated. It is a 'discourse of accountability' in which the citizen is positioned as having the authority to assess the *legitimacy* of decisions made by politicians and non-elected experts; the following statement by Commissioner GeogheganQuinn encapsulates this point:

> Especially in the present economically challenging times, *taxpayers want to know* that public funding of research, and the results it produces, are put to the best use. (European Commission 2012d, emphasis added)

Piezcha and Escobar discern a managerial trend in policy discourses relating to commercialisation and government's

desire to obtain a return on [research] investments, suggesting that it is 'subsuming the PE agenda':

> PE seems to be turned into a technology to educate public, legitimise investments, improve public relations, manage risk and deal with the media. (Piezcha and Escobar 2013: 121)

This might be restated in a way which presented the aim of communicating science as required to ensure that the public can assess (educate the public) in order that investments are seen as legitimate, concerns are ameliorated and media pacified. The legitimacy claimed relates to output legitimacy.

Discussing the relationship between academic science and society, Hessels et al. (2009: 387) note that since the emergence of modern science the expected benefits has played a role in the allocation of research funding. The assessment of benefits is central to decision-making. A researcher, talking about research infrastructure investment, referred to how 'competition in science' has been something that:

> ... has been very beneficial in the past because it stimulates progress. *But as research infrastructures are financed by taxpayers' money, we have to be increasingly vigilant to spend funds in a very efficient way*. One way of doing that is to identify commonalities across the European research infrastructures .. . (Michael Krisch, cited in Janusz 2013, emphasis added)

The accountability rests with the scientists in this instance. Crucially, it does not rest with the citizen: the role of the citizen is inferred as one of an assessor of efficiency. Output legitimacy is sought, rather than input legitimacy.

8. Citizen participation: Citizens and societal challenges

The societal 'grand challenges' have been identified:

> … as including: climate change, energy security, food security, health, an ageing population. (EU Commissioner for Research and Innovation at European Research Advisory Board meeting, European Commission 2010a)

Horizon 2020, the funding framework programme for research in the EU, has recast these as 'societal challenges'. Securing solutions to these grand challenges, now societal challenges, constitutes a particular *raison d'etre* of the ERA. The ERA Expert Group (European Commission 2008) considering the rationale for an ERA that 'has a clear purpose which is meaningful to Europe's citizens and political leaders and relevant to its key actors' noted that:

> The central means to achieve this is to engage the research system in *Europe's response to a series of Grand Challenges* … The focus .. . is on the additional needs and measures required in order to make the compelling case for

> a real shift in resources in the forthcoming budgetary round, equipping the research community to make its central contribution to the future economic and social well-being. (European Commission 2008, no pagination)

Science is here presented as firmly in the service of society—scientists will, through *their* expert knowledge, apply the results of their endeavours to solve the key societal issues. However, how such grand challenges have been identified is not clear, although Kastrinos (2010: 308) refers to 'politically defined 'grand challenges', that is, the definitions of the 'grand challenges' did not involve the views of citizens.

Tracing the shifts in the policy rhetoric from the advancement of direct citizen involvement in science and in the science policy-making process, which characterised the statements in the opening years of the new millennium, to the contemporary rhetoric in which the role is to 'be kept aware – and be capable of scrutinising and debating', a role in which accountability is central, raises questions about how the changing mode of the governance of science affects how the purpose of science communication is understood. The discourses identified in the texts identify a core task for science communication as one which is to inform. Information provision is a key element of the deficit model of science communication: supporting public understanding of the importance of science so that public trust will be generated and will foreground the accountability of decisions taken by politicians, technocrats and experts. It further supports the thesis that the legitimacy sought is output legitimacy, policy-makers and scientists are best placed to made decisions in the interests of the public.

9. Citizen participation: Open access for amateurs?

Discussing democratic practice and public engagement, Hornig Priest (2009: 231–2) notes that:

> .. . another dimension of the relationship between science and society is suggested by consideration of the role of the nonexpert who participates in research.

Her discussion develops into considering the status of amateur versus 'scientist' generated output. This dimension, which is being foregrounded in the current debates about open access arrangements, is of relevance to the current study. Of particular note is that 'public participation' in science is framed as 'public participation in data analysis' in these scenarios.

The form of participation of citizens in science in cludes on the one hand participation in science pol icy decision processes and on the other, participation in the scientific process—open access arrangements are prioritised in current science policy. This is a

crucial distinction. The citizen, alongside scientists, is able to freely access data archives and other knowledge resources. The goal of 'open access' constitutes a key policy goal. 'Open access' is defined as unrestricted, online access to peer-reviewed, scholarly research papers for reading and productive re-use (Science Europe 2013: 2):

> … [open access] enables re-use and computational analysis of published material, sparks innovation and facilitates interdisciplinary research, as well as scholarly exchange on a global scale. Full access to research results strengthens the dissemination, testing and uptake of scientific breakthroughs, not only for the benefit of the research community but also for the economy and society as a whole.

This mode of participation foregrounds the role of the 'amateur'. A recent report from the EU High Level Expert Group on Scientific Data, *Riding the Wave: How Europe can Gain from the Rising Tide of Scientific Data*, heralded a 'bright future' for Europe:

> The benefits are broad. With a proper scientific infrastructure, researchers in different domains can collaborate on the same data set, finding new insights. They can more easily solve today's Grand Challenges, such as climate change and energy supply ... they can engage in whole new forms of scientific enquiry ... find correlations, draw inferences and trade ideas and information at a scale we are only beginning to see. For society as a whole, this is beneficial. It empowers amateurs to contribute more easily to the scientific process, politicians to govern more effectively with solid evidence and the European and global economy to expand. (European Commission 2010b: 4)

This comment positions the scientist as the expert and the politicians as representing the interests of the people. It reproduces the position of the scientists ('researchers') working together to solve the 'grand challenges' facing societies and the politicians as representing the interests of the 'citizen'. The way in which that the 'amateur' (the citizen scientist) can 'contribute more easily to the scientific process' is not specified but is presented as unproblematic. The issue of the various skills required for such 'amateurs' to participate in 'the scientific process' is not presented as problematic.

Importantly, for current purposes, the emphasis on open access by 'amateurs' shifts the mode of participation from participation in decision-making to participation in 'the scientific process'.

10. Citizen participation: ERA—the case of ERICs

While the general approach to citizen participation in the ERA is outlined above, details of a single case—that of a new group of research infrastructures (i.e. those with the legal status of ERIC) are presented here to illustrate the points made above in relation to public participation in

scientific decision-making/governance. In particular, it considers the way in which the role of the public is constructed as overseeing the accountability of policy-makers, focusing on the promotion of intra-scientist communication and the presentation of open access arrangements as 'participation'. Thus, a consideration of ERICs provides an opportunity to consider the issues raised in relation to citizen participation in science governance (and in science).

The completion or 'realisation' of the ERA is scheduled for 2014 in the Innovation Union Flagship of the Europe 2020 Strategy. Pan-European research infrastructures have been described as 'a pillar' of the Europe 2020 Strategy; as 'engines' to drive forward the Innovation Union (European Strategy Forum on Research Infrastructures 2012: 2, 6). In order to facilitate the operation, and funding, of some of the RIs, the European Council established the European Strategy Forum for Research Infrastructures (ESFRI) in 2002 and mandated it in 2004 to produce a Roadmap of European Research Infrastructures by 2006. It produced its first European Roadmap for Research Infrastructures in 2006, again in 2008 and in 2010. ESFRI occupies a central role in the governance of European research. It is an advisory intergovernmental group, with representatives from EU Member States and others (e.g. EFTA members). In March 2013, there were 48 projects on the ESFRI Roadmap (European Strategy Forum on Research Infrastructures 2012) and an explicit goal of the Innovation Union flagship of the Europe 2020 Strategy is the implementation of 60% of the ESFRI Roadmap projects by the end of 2015.

In 2009, a Council Regulation was issued which aims to facilitate Member States' joint ownership and oper ation of selected research infrastructures, this is the *Community Legal Framework for a European Research Infrastructure Consortium*, No 723/2009). ERICs are identified as:

> .. . necessary for the efficient execution of the Community's RTD programmes.

Elements of which relate to the need to effectively communicate the results of research to different communities. They are explicitly identified as 'contributors' to the development of the ERA (Recital, Regulation No 723/2009: 3) and more explicitly as 'central to the success' of the Europe 2020 Strategy (*op cit*). The topic of the governance of ERIC has been largely confined to considering the internal governance of an individual consortium (cf. *A Vision for Strengthening World-class Research Infrastructures in the ERA*, 2010: 11, 29ff; European Strategy Forum on Research Infrastructures 2012); the wider governance of ERIC within the ERA has not received specific attention. RIs with ERIC status range from social science and humanities RIs to biomedical databanks.

RIs are defined as:

> ... facilities, resources and related services that are used by the scientific community to conduct top-level research in their respective fields and covers major scientific equipment or sets of instruments; knowledge based resources such as collections, archives or structures for scientific information; enabling Information and Communications Technology-based infrastructures such as a Grid, computing software and communication, or any other entity of a unique nature essential to achieve excellence in research. Such infrastructures may be 'single-sited' or 'distributed' (an organised network of resources). (Regulation 723, Article 2)

RIs are therefore, in the first instance, 'for' the scientific community. In the Regulation, the core criteria for the award of 'ERIC' suggest that the prime audience of the ERIC is the scientific community (for example, a project seeking ERIC status should represent:

> ... an added value in the strengthening and structuring of the European Research Area (ERA) and a significant improvement in the relevant scientific and technological fields at international level.

And it should demonstrate that:

> ... effective access .. . granted to the European research community, composed of researchers from Member States and from Associated Countries. (excerpt from Article 4, Council Regulation No 723/2009 of 25 June 2009)

In addition, a research infrastructure seeking ERIC status is assessed according to how:

> ... it contributes to the dissemination and optimisation of the results of activities in Community research, technological development and demonstration. (excerpt from Article 4, Council Regulation No 723/2009 of 25 June 2009)

The nature of such 'dissemination and optimisation' is tied to the underpinning concern in the development of the ERA about the 'fragmentation of research', about the disconnection between researchers and their research efforts. The ERICs are to respond to this and are required to be 'open to the European research community at large' (Regulation No 723/2009, recital 9).

The 'general public' are not of central concern, it is largely absent from considerations of participation in these 'key pillars' of the ERA. The 'scientific citizen' largely disappears from view in terms of science communication—the prime audience of the ERICs is other scientists—intra-scientific communication is critical. Noting Cloitre and Shinn's four-stage model of science communication, moving progressively across groups (i)–(iv): from
(i) intraspecialist (between disciplines); (ii) interspecialist (across disciplines); (iii) pedagogic level (teaching/text book science); and (iv) popular level (articles in the press and amateur science of TV documentaries) (cited in Bucchi 2008: 61–2), the ERIC model of science communication has a predominant focus on the first two types of communication.

However, a role is accorded to the 'scientific citizen'; a discourse of accountability is also present in discussions about the relevance (or impact) of RIs; the Expert Group on Research Infrastructures, discussing the rationale for evaluating the impact of RIs, noted that:

> .. . the general public must give *tacit support* for the significant allocations of public funds that are made. (2010: 45, emphasis added)

The Chair of this same Expert Group, Gonzalo Leon, refers to those:

> .. . agencies that have an interest in promoting European Research infrastructures within the ERA.

> These include, amongst others, the Council of Ministers, the European Commission, the European Strategy Forum on Research Infrastructures (ESFRI), the ministries in Member States in charge of RIs, higher education institutions with research interests, existing research infrastructures and, of course, the scientific research communities themselves (2010, p.3).

It is notable that 'the scientific citizen' (the public) is not included as a 'stakeholder'.

Using the model developed from work by Abels (2007), ERIC illustrate that public participation in ERIC is largely related to securing output legitimacy. Scientists will identify and implement research programmes which have been determined by scientist. Provision for informing the public is made by some ERICs and public participation in terms of access to data is available for some RIs (notably the social sciences and humanities).

11. Conclusions

This paper has considered the ways in which public participation in the governance of EU research policy is constructed in official texts, the communications of the EU, official reports and other statements. It specifically focused on the official texts issued by the institutions of the EU on the development of the ERA and ERICs.

A model of participation was advanced, based on the distinction drawn by Abels (2007) between input and output legitimacy and the reading of the texts presented has been that the dominant construction of the function, role and authority of 'the public' is one in which the public is positioned in the top left-hand and bottom left-hand quadrants (see Fig. 2)—the model of science communication is, in traditional terms, public understanding of science (Elam and Bertilsson 2003): the focus on output legitimacy determines the nature of the activity. The dominance of 'representative' governance, designed to secure output legitimacy, positions 'the public' at particular points in the science decision-making process, specifically as an assessor of policy-makers' accountability and in so doing reproduces features of the deficit model of science

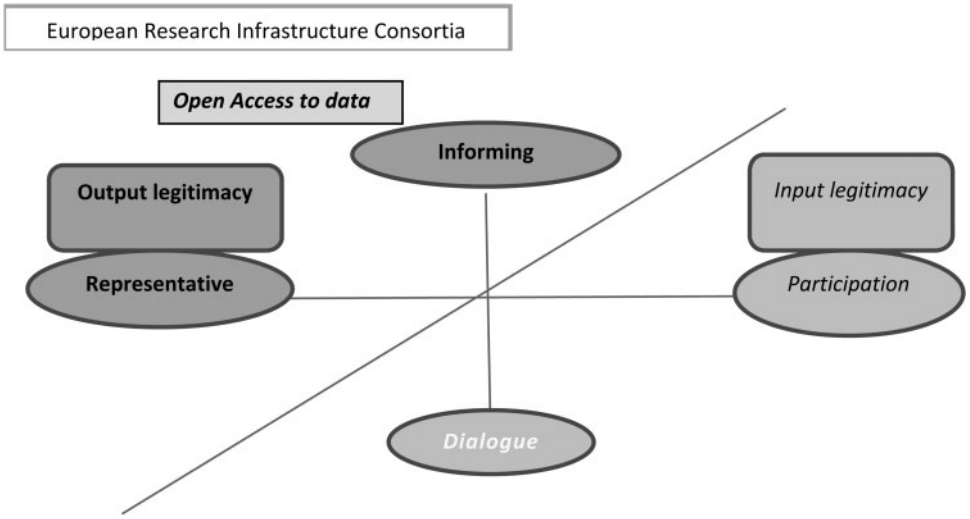

Figure 2. Science communication and public participation in ERICs.

communication—that if the public could be informed it would accept the 'correctness' of decisions about science—while simultaneously enunciating the rhetoric of public engagement. This is a position different to a technocratic perspective (Irwin and Michael 2003: 43), the public is involved but in a particular way. Alongside pronouncements of a move from hierarchy to network governance within the governance of science, a corresponding effort (or 'project') which seeks to identify vestiges of the 'deficit model', can be identified (cf Trench 2008, Irwin 2009: 8). The 'lens' of input or output legitimacy suggests that the deficit mode of science communication, of informing, can be drawn upon to demonstrate this mode of legitimacy.

Using a clear concept of governance, provided by Gray (2004) to guide analysis of how different discourses construct the 'scientific citizen' in particular ways further suggests that 'citizen' or 'public' participation has a dual meaning, denoting participation in policy decision-making processes (the scientific citizen) *and* participation in the scientific enterprise (open access) as the citizen scientist. The analysis suggests that 'open access' is presented as a mode of participation, rather than direct involvement in decision-making *per se*.

One response to Irwin's (2001) question: 'how is the scientific citizen being constructed within current pol icy and decision processes?' is that the 'scientific citizen' *is* 'present' in the governance of EU research policy, specifically, the ERA and in relation to ERICs but this participation is enacted in particular ways. Public participation is increasingly cast in terms of open access to knowledge resources, but the dominant approach to public participation in the decision-making process is that the public have oversight of, and can demand accountability on the part of, policy-makers and their decisions. This role is at the margins of governance. The nature of direct engagement is limited to stakeholder consultation

(the timing of such consultation in the decision-making process is not addressed).

One emerging focus, evidenced in the case of ERICs, is on intra-scientist communication. This is presented as a critical element countering fragmentation of research effort and is the focus of policy support with the goal of open access. The citizen is also constructed as a beneficiary of such open access arrangements, without critique as to their feasibility or meaningfulness.

The principles informing the governance arrangements within which science communication practices take place are predicated on specific understandings of the nature of citizen participation and assign a distinct place for the citizen. The examples presented suggest that governance arrangements are framed by either deliberative democratic ideas in which input legitimacy is central or by representative democratic ideas in which output legitimacy is central. Crucially, the discursive construction of the ERA suggests a move within legitimacy claims from input to output legitimacy: for example 'societal challenges' are identified and resolved by scientists and experts in the interests of 'the public'. Public involvement is on the basis of open access to data and to research infrastructures but this open access is not subject to critique in terms of the requirements needed to make sense of data, the basic scientific literacy required if citizens are to engage in amateur science in meaningful ways: the function of the public is limited. The key function of the citizen is to assess the accountability of decision-makers.

The construction of the scientific citizen shows how it is not only, or merely, a matter of arguing, as Pallet does, that that the shift towards public dialogue has been merely rhetorical while:

> .. . old visions of the autonomy of scientific progress remain strong and instrumental imperatives of science policy-making threaten emerging modes of decision-making. (Pallett 2012: 3)

Rather, principles of representative participation inform and structure governance arrangements, assigning particular roles, rights, authorities and responsibilities to the citizen. It is noteworthy in the context of the current discussion, that the following comment is included in the recently issued (December 2013) Work Programme *Science with and for Society* as part of Horizon 2020, Call 'for developing governance for the advancement of Responsible Research and Innovation':

> In order to increase the relevance of research and innovation policies for society, policy-makers and decision-makers in funding bodies are invited to constantly adapt the governance framework so as to induce society-friendly, research and innovation. (European Commission 2013: 29)

Irwin and Michael close their wide ranging analysis of science governance and social theory with the comment that:

> … issues of scientific governance and scientific citizenship have the potential both to challenge prevailing, rather passive models of democracy and to suggest new possibilities for democratic regeneration and revival. (Irwin and Michael 2003: 158)

This paper has suggested that the different understandings of representative and deliberative, and participative democracy inform governance practices and the discursive construction of 'good governance'. Directing attention to specific roles (with attendant functions and authority) accorded to actors in the science decision-making process is fruitful/productive and may be useful in assessing the space for and type of public participation possible within different governance systems. It also allows for a more nuanced consideration of the processes of participation. The comment by Elam and Bertilsson (2003: 246) comment is apposite in this regard:

> For citizens to identify themselves as scientific citizens they will need to be persuaded to both demand new rights and freedoms and to accept new duties and responsibilities.

The nature of 'scientific citizenship', involving rights and freedoms, duties and responsibilities, is bound by the form of 'scientific democracy'.

Acknowledgements

The author wishes to thank the anonymous referees who provided constructive criticisms on the submitted manuscript. Thanks are also due to Iain Crinson, University of London, for comments. The views expressed are those of the author alone.

References

Abels, G. (2007) 'Citizen involvement in public policy-making: Does it improve democratic legitimacy and accountability?

The case of pTA', *Interdisciplinary Information Sciences*, 13: 103–16.
Armstrong, K. (2010) *Governing Social Inclusion Europeanization through Policy Co-ordination*. Oxford, UK: OUP.
Bache, I. and Flinders, M. (2004) Multi-level Governance, Oxford: Oxford University Press.
Bauer, M., Allum, N. and Miller, S. (2007) 'What can we learn from 25 years of PUS survey research? Liberating and expanding the agenda', *Public Understanding of Science*, 16: 79–95.
Borra´s, S. and Radaelli, C. M. (2011) 'The politics of governance architectures: Creation, change and effects of the EU Lisbon Strategy', *Journal of European Public Policy*, 18: 463–84.
Bucchi, M. (2008) 'Of deficits, deviations and dialogues: Theories of public communication of science'. In: Bucchi, M. and Trench, B. (eds) *Handbook of Public Communication of Science and Technology*, pp. 57–76. London: Routledge.
Brussels; http://www.ec.europa.eu/research/era/docs/en/comp- council-eu-5.pdf accessed 13 Jul 2014.
Chari, R. and Kritzinger, S. (2006) *Understanding EU Policy Making*. London: Pluto Press.
Council of the European Union. (2009) *Enhanced Governance of the European Research Area*, 2009.
Craig, P. and DeBurca, G. (2011) *EU Law: Text, Cases and Materials*, 5th edn. Oxford, UK: OUP.
Crinson, I. (2009) *Health Policy: A Critical Perspective*. London: Sage.
Davies, J. (2011) *Challenging Governance Theory: From Networks to Hegemony*. Bristol, UK: Policy Press.
De Elera, A. (2006) 'The European Research Area: On the way towards a European scientific community?', *European Law Journal*, 12: 559–74.
Elam, M. and Bertilsson, M. (2003) 'Consuming, engaging and confronting science: The emerging dimensions of scientific citizenship', *European Journal of Social Theory*, 6: 233–51.
Elzinger, A. (2012) 'Features of the current science policy regime: Viewed in historical perspective', *Science and Public Policy*, 39: 416–28.
European Commission. (2000a) Towards a European Research Area, COM (2000) 6 final, 18 January.
—— (2000b) *Science, Society and the Citizen in Europe*, SEC (2000) 1973. Brussels: European Commission.
—— (2001) *European Governance: A White Paper*, COM (2001) 428. final, 25 July. Brussels: European Commission.
—— (2002) *Science and Society Action Plan*. Luxembourg: Office for Official Publications of the European Communities.
—— (2004) *Governance of the European Research Area – Giving Society a Key to the Lab*. Luxembourg: Office for Official Publications of the European Communities.
—— (2007) *Taking European Knowledge Society Seriously*, Report of the Expert Group on Science and Governance to the Science, Economic and Society Directorate. Brussels: European Commission.
—— (2008) *Challenging Europe's Research: Rationales for the European Research Area*, Report of the ERA Expert Group. Brussels: European Commission.
—— (2009) *Science in Society: Towards Reinforcing the Societal Dimension of the European Research Area MASIS Report*. Brussels: European Commission.
—— (2010a) *Preparing Europe for a New Renaissance: How Science Can Help Restore Sustainable Prosperity*, European Research Area Board Conference, held 6–7 May 2010, Seville, Spain.

—— (2010b) *Riding the Wave: How Europe can Gain from the Rising Tide of Scientific Data*, Final Report of the High Level Expert Group on Scientific Data, submitted to the European Commission. Brussels: European Commission.
—— (2010c) *Science in Society: Project Synopsis 2007–2008*, Directorate-General Research. Luxembourg: Publications Office of the EU.
—— (2010d) A Vision for Strengthening World-Class Research Infrastructures in the ERA, Report from the Expert Group on Research Infrastructures. <http:www.ec.europa.eu/research/infrastructures/pdf/era_100216.pdf>, accessed 13 Jul 2014.
—— (2012a) *Areas of Untapped Potential for the Development of the European Research Area (ERA): Analysis of the Response to the ERA Framework Public Consultation*. Brussels: Directorate-General Research, European Commission.
—— (2012b) *A Reinforced European Research Area Partnership for Excellence and Growth*, COM 394 COM (2012) 392 final, 17 July.
—— (2012c) *A Reinforced European Research Area Partnership for Excellence and Growth Impact Assessment*. <http:// www.ec.europa.eu/era-impact-assessment-pdf> accessed 13 Jul 2014.
—— (2012d) Press release, Ma´ire Geoghegan-Quinn, Commissioner for Research, Innovation and Science, Launch of the Communication on the Reinforced. <http://europa.eu/rapid/pressReleasesAction.do?reference=SPEECH/10/215&format=HTML&aged=1&language=EN&guiLanguage=en> accessed 15 Aug 2012.
—— (2013) *A Report on Responsible Research and Innovation*, by Hilary Sutcliffe, for Directorate-General Research, European Commission. Brussels: European Commission.
European Research Area Board. (2009) *Preparing Europe for a New Renaissance: A Strategic View of the European Research Area*. Brussels: European Research Area Board.
—— (2012) The New Renaissance? Will it Happen? Innovating Europe out of the Crisis, Third and Final Report of the European Research Area Board. Brussels: European Commission.
European Research Area Committee. (2011) '*ERAC Opinion on the Development of an ERA Framework*', 9 December, ERAC 1215/11.
European Strategy Forum for Research Infrastructures. (2012) *State of Play on the Implementation of the Projects on the ESFRI Roadmap 2010*. Brussels: European Commission.
Expert Group on Research Infrastructures. (2010) A Vision for Strengthening World-class Research Infrastructures in the ERA, Report to European Commission: Luxembourg: Publications Office of the European Union.
Fairbrass, J. and Jordan, A. (2004) 'Multi-level governance and environmental policy', in Bache and Flinders (eds) op. cit., pp. 147–164.
Felt, U. and Fochler, M. (2008) 'The bottom-up meanings of the concept of public participation in science and technology', *Science and Public Policy*, 35: 489–99.
—— and —— (2010) 'Machineries for making publics: Inscribing and de-scribing publics in public engagement', *Minerva*, 48: 219–38.
Geddes, M. (2005) 'Neoliberalism and local governance: crossnational perspectives and speculations', *Policy Studies*, 26:3/4: 359–377.
Gray, A. (2004) 'Governing medicine: An introduction'. In: Gray, A. and Harrison, S. (eds) *Governing Medicine: Theory and Practice*, pp. 1–7. Maidenhead, UK: Open University Press.

Hagendijk, R. and Irwin, A. (2006) 'Public deliberation and governance: Engaging with science and technology in contemporary Europe', *Minerva*, 44: 167–84.

Hennen, L. (1999) 'Participatory technology assessment: A response to technical modernity?', *Science and Public Policy*, 26: 303–12.

Hessels, L. K., van Lente, H. and Smit, R. (2009) 'In search of relevance: The changing contract between science and society', *Science and Public Policy*, 36: 387–401.

Hornig Priest, S. (2009) 'Reinterpreting audiences for media messages about science'. In: Holliman, R., Whitelegg, E., Scanlon, E., Smidt, S. and Thomas, J. (eds) *Investigating Science Communication in the Information Age: Implications for Public Engagement and Popular Media*. pp. 223–36. Oxford, UK: OUP.

Hooghe, L. and Marks, G. (2001) *Multilevel Governance and European Integration*. Lanham, MD: Rowman & Littlefield.

Irwin, A. (2001) 'Constructing the scientific citizen: Science and democracy in the Biosciences', *Public Understanding of Science*, 10: 1–18.

—— (2006) 'The politics of talk: Coming to terms with the 'new' scientific governance', *Social Studies of Science*, 36: 299–320.

—— (2008) 'Risk, science and public communication: Third order thinking about scientific culture'. In: Bucchi, M. and Trench, B. (eds) *Handbook of Public Communication of Science and Technology*, pp. 199–212. London: Routledge.

—— (2009) 'Moving forward or in circles? Science communication in an age of innovation'. In: Holliman, R., Whitelegg, E., Scanlon, E., Smidt, S. and Thomas, J. (eds) *Investigating Science Communication in the Information Age: Implications for Public Engagement and Popular Media*, pp. 3–17. Oxford, UK: OUP.

—— and Michael, M. (2003) *Science, Social Theory and Public Knowledge*. Maidenhead, UK: Open University Press.

Jachtenfuchs, M. (2001) 'The governance approach to European integration', *Journal of Common Market Studies*, 39: 245–264. Janusz, S. (2013) 'A coordinated approach for science in Europe', *ISGWT e-newsletter*, <http://www.isgtw.org/feature/coordinate-appraoch-science-europe> accessed 19 Jun 2013. Jasanoff, S. (2003) 'Technologies of humility: Citizen participation in governing science', *Minerva*, 41: 223–44.

John, P. (2001) Local Governance in Western Europe. London: Sage.

Kastrinos, N. (2010) 'Policies for co-ordination in the European Research Area: A view from the social sciences and humanities', *Science and Public Policy*, 37: 297–310.

Kaiser, R. and Prange, H. (2002) 'A new concept of deepening European integration? – The European Research Area and the emerging role of policy coordination in a multi-level governance system', *European Integration online Papers (EIoP)*, 6(18) <http://eiop.or.at/eiop/texte/2002-018a.htm> accessed 19 Jun 2013.

Kohler-Koch, B. and Rittberger, B. (2006) 'The 'governance turn' in EU studies', *Journal of Common Market Studies*, 44 (s1): 27–49.

McGuinness, N. and O'Carroll, C. (2010) 'Benchmarking Europe's lab benches: How successful has the MC been in research policy?', *Journal of Common Market Studies*, 48: 293–318.

Mejlgaard, N. and Bloch, C. (2012) 'Science in Society in Europe', *Minerva*, 39: 695–700.

Michael, M. (1998) 'Between citizen and consumer: Multiplying the meanings of the "public understanding of science"', *Public Understanding of Science*, 7: 313–27.

Morano-Foadi, S. (2008) 'The missing piece of the Lisbon jigsaw: Is the OMC effective in relation to the European Research Area?', *European Law Journal*, 14: 635–54.

Moravcsik, A. (1993) 'Preferences and power in the European Community: A liberal intergovernmentalist approach', *Journal of Common Market Studies*, 31/4: 1993.

Muldar, U., Corvers, F., Delanghe, H., Dratwa, J. *et al*. (2008) *A New Deal for an Effective European Research Policy: The Design and Impacts of the 7th Framework Programme*. Dordrecht, the Netherlands: Springer.

Office of Science and Technology and the Welcome Trust. (2001) 'Science and the public: A review of science communication and public attitudes toward science in Britain', *Public Understanding of Science* 10: 315–30.

Pallett, H. (2012) *The (Re)Publics of Science: Changing policy and participation*, <http://www.3s.uea.ac.uk/sites/default/ files/3S%20WP%202012-04%20Pallett%20Republics.pdf>accessed 28 Aug 2013.

Pieczcka, M. and Escobar, O. (2013) 'Dialogue and science: Innovation in policy-making and the discourse of public engagement in the UK', *Science and Public Policy,* 40: 113–26.

Reddel, T. and Woolcock, G. (2004) 'From consultation to participatory governance? A critical review of citizen

engagement strategies in Queensland', *Research and Evaluation*, 63: 75–87.

Rigby, J. (2007) 'From Aarhus to your house: The science and society interface', *Science and Public Policy*, 34: 364–7.

Schmidt, V. (2013) 'Democracy and legitimacy in the European Union revisited: Input, output *and* 'throughput', *Political Studies*, 61: 2–22.

Science Europe. (2013) Embedding Social Sciences and Humanities in the Horizon 2020 Societal Challenges, Science Europe Position Statement. <http://www.science europe.org/uploads/PublicDocumentsAndSpeeches/ SE_SSH_Pos_Statement_januari> accessed 13 Jul 2014.

Shaw, C. and Laffan, B. (2006) 'Policy memorandum on development of OMC in Research and Information Society', for NEWGOV: New Modes of Governance, FP7 Project Deliverable <www.eunewgov.org/datalists/deliverables_detail. asp?Project_ID=02> accessed 15 Nov 2013.

Sorensen, E. (2002) 'Democratic theory and network governance', *Administrative Theory and Praxis* 24/4: 693–720. Trench, B. (2008) 'Towards an analytical framework of science communication models'. In: Cheng, D., Claessens, M., Gascoigne, T., Metcalfe, J. *et al*. (eds) *Communicating Science in Social Contexts: New Models, New Practices*, pp. 119–38. Dordrecht, the Netherlands: Springer.