# *Cardiff School of Social Sciences*

## *Paper 123:* 'Where do we start?' *Mesogenic* participation as an alternative to the 'top-down' and 'bottom-up' approaches to public engagement with science and technology decision-making

Simon Williams
PhD Science and Technology

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# ‘Where do we start?’ *Mesogenic* participation as an alternative to the ‘top-down’ and ‘bottom-up’ approaches to public engagement with science and technology decision-making


## Abstract

Processes of participatory and deliberative democracy can be thought of as alternatives (or supplements) to the ‘picket-fence democracy’ of representative politics and the ‘picket-line democracy’ of social movement politics. In many areas of social science, discussions concerning the extension of public participation into decision-making processes are taking place, with Science and Technology Studies (STS) being the exemplar. These discussions centre on theoretical concerns over the nature of public participation; questions such as ‘what form(s) should participation take?’ and ‘who should be responsible for its organisation?’ Generally, social scientists identify two broad and opposing models of organisation: ‘top-down’ (government-led) participation and ‘bottom-up’ (citizen-led) participation. Critiques of these models have led to the identification of significant limitations in both. STS scholars generally assume the role of analyst or evaluator, although examples do exist, albeit sporadically, of participation processes which have been organised by the independent social scientist. Such work can be seen to constitute a third, social science-led model of participation. This paper provides a *typology of public participation models*. The typology consists of the *exogenic*, *endogenic* and *mesogenic* models of participation. The exogenic and endogenic models are characterisations of the top-down and bottom-up approaches respectively, to which is added a suggested characterisation of the mesogenic model. It is argued that the mesogenic model, as a pragmatic alternative, can offer a compromised solution to the limitations of the exogenic and endogenic models, thus allowing for more robust and more useful public participation processes. It is hoped that the typology will serve as a useful heuristic device for future research into social science-led participation processes.



## Keywords

Public engagement; public participation; participatory decision-making; public understanding of science; citizenship; governance

**Public participation: Where do we start?**

> Mankind likes to think in terms of extreme opposites. It is given to formulating its beliefs in terms of *Either-Ors*, between which it recognises no intermediate possibilities (Dewey, 1963: 1).

The popularity of 'public participation' seems to be ever-increasing within many fields of social science research, with Science and Technology Studies (STS) being the exemplar.[1] Indeed, research on the role of 'the public' (or 'publics') in decision-making on science and technology (S&T) issues, is one of the defining agendas of the Public Understanding of Science (PUS), a sub-discipline of STS. This research is centred on the view that the growth of science and technology within society should be accompanied by a concomitant growth in public engagement with science and technology and their societal applications. Within this paradigmatic view however, there is ongoing debate concerning the nature of public participation. Pertinent questions being discussed include: 'what form(s) should participation take?' and 'who should be responsible for its organisation?' In formulating typologies of the various public participation processes and methods (e.g. Abelson *et al*, 2003; Fiorino, 1990; Wakefield, 2001), social scientists have generally directed their attention to the former question over the latter. Irwin and Hagendijk's (2006) survey of European citizen engagement cultures is a notable exception. Their critical analysis aims ambitiously at the construction of a typology of different 'modes of governance' in different European policy cultures, of which 'deliberative governance' is just one example. Irwin and Hagendijk's project is however different – indeed significantly more ambitious - than the one undertaken in this paper. Their work resonates with Rowe and Frewer's (2005) overarching 'typology of public engagement' – within which public participation is but one particular form of engagement (along with public communication and public consultation – see below). In comparison, this paper undertakes a more modest project; one which has perhaps been overlooked for this very reason, but one which can nevertheless serve as a useful heuristic device for future empirical research in this area. This paper attempts to construct a *typology of public participation models.*

The first section of the paper builds on the work of Irwin and Hagendijk (2006) and Rowe and Frewer (2005) to offer a general definition of 'public participation' and to locate it within the broader concepts of 'governance' and 'engagement'. Wider still, it seeks to locate participatory democracy on the overall democratic political spectrum – between the two (quite polarised) models of democracy to which it is a supplement. After public participation has been located within its wider political context, the paper then offers a more detailed definition, via the characterisation of the different participatory models. STS researchers usually work with (sometimes tacitly) two opposing models of public participation: the 'top-down' (government-led) participation and the 'bottom-up' (citizen-led) participation. Both models are also commonly seen to relate to general trends within the Public Understanding of Science - namely the 'deficit' (or 'technocratic') model of PUS and the 'constructivist' (or 'democratic') model of PUS. This paper offers a brief characterisation of the bottom-up and top-down approaches via the deficit and constructivist models of PUS. In using the term 'model', it refers to all those participation processes which have a similar point of origin: that is, *how* and *by whom* participation is initiated. The approaches are discussed as the *exogenic* and *endogenic* models. After discussing some problems with and limitations of both models,

[1] As such STS and specifically S&T-related decision making will be referred to throughout this paper, although many of the typology's aspects could also be relevant and applicable outside of this field.

it introduces a third, pragmatic model for public participation in S&T decision-making - the *mesogenic* model – for which it offers a suggested characterisation.

**Placing public participation in democratic politics: Between the picket fence and the picket line**

A definition of public participation might be best achieved through reference to what it is not (cf. Gutmann and Thompson, 2004: 13). As suggested above, Rowe and Frewer (2005) have defined public participation within the broader context of 'public engagement'. They distinguish those mechanisms associated with participation from those associated with communication or consultation according to the direction of information flow. The defining feature of participation is the presence of a *dialogue* between members of the public and the sponsors. Information flow is therefore two-way, unlike in communication, where information is disseminated from the sponsors to members of the public, or in consultation, where information is elicited from members of the public by the sponsors (consultation) (Rowe and Frewer, 2005). Using this typology, Rowe and Frewer (2005) categorise methods such as the Citizens' Jury, Consensus Conference and Deliberative Opinion Poll as public participation processes. Irwin and Hagendijk (2006) share a similar aim. Through their analysis of European trends in 'scientific governance' they suggest that deliberation (between citizens and political agencies) is only one of six 'mode of governance' which both coexist and conflict with one another. Parallels between Irwin and Hagendijk's (2006) and Rowe and Frewer's (2005) typology are evident. 'Market governance' for example uses public consultation processes as devices through which the public valuation of, and demand for, science can be ascertained. 'Educational governance' on the other hand, resonates with the emphasis in public communication processes on 'bringing science to the public'. 'Deliberative governance' of course, resonates most closely with Rowe and Frewer's (2005) public participation processes and their emphasis on two-way dialogue between sponsors and the public. However, as will be discussed in following sections, within 'deliberative governance' or 'public participation', how democratic this 'two-way' information flow is (i.e. how 'two-way' it actually is) depends on who is organising the process. Consequently, as well as categorising types of public engagement processes, or cultures of governance, it is also useful to typologise the various *models of public participation*, according to their point (or source) of origin.

In addition to those identified above, Irwin and Hagendijk (2006) also propose 'discretionary', 'corporatist' and 'agonistic' modes of governance. In the two former modes, public engagement is limited, with policies being seen to emerge largely from negotiations within government or between stakeholders. In the latter, governance is characterised by 'conflict and opposition' between policymakers and the public. It is important to remember that forms of democratic practice are not related only to 'participation' or even 'engagement' as these terms have come to be understood and defined. As such, before progressing onto an in-depth discussion of specific models of participation, it might prove useful to locate participatory democracy *per se*, on the broader spectrum of democratic politics. The 'participatory paradigm' is a democratic philosophy which presents itself as an alternative - or rather as a supplement to – other democratic philosophies such as representative politics and social movement politics. It can be located somewhere between what might be referred to as 'picket fence' democracy and what might be referred to as 'picket line democracy'. Representative democracy is the established, dominant model of Western political systems. The constitution of such systems is rooted in the idea that political representatives are to be elected and are to make decisions on behalf of the (best interests) of the electorate. This

model has been seen to possess a number of limitations, with participatory and deliberative democracy theorists contributing significantly to the critique of representative democracy. Elster (1998: 2), for example, suggests that although the electorate do have a share of political control – insofar as they can choose whether or not to re-elect – this control is indirect and therefore 'diluted'. The representative model is also referred to as the aggregative model, since it 'adds together' the preferences of the electorate (either through voting or through public opinion surveys) without requiring any discussion of the reasoning behind those preferences (Gutmann and Thompson, 2004). That preference which is most fair and most rational (in an instrumental sense) is simply that which has the most votes behind it. The representative model is therefore pejoratively seen as a 'majoritarian' form of decision-making akin to the cost-benefit style of decision-making characteristic of 'the market' (Gutmann and Thompson, 2004: 14). Citizens, in choosing between competing 'products' (i.e. political candidates and parties), act much like consumers (Gutmann and Thompson, 2004).[2] Such a model is seen to foster a competitive approach to democracy, where individuals behave (through voting choices) strategically in order to protect private interests and maximise personal gains (Mansbridge, 1983; Cohen, 1997; Elster, 1997; Young, 2000). Only those views which represent the majority are acted upon, with minority views being precluded as a result. Criticisms of this 'capitalist' system of decision-making often align themselves with classical (left-wing) critiques of liberal democracy, which associate practices such as representation with the *bourgeois* middle-classes. From this point of view, the representative system of political decision-making might be considered a 'picket fence democracy'. 'Social movements' on the other hand, are forms of 'non-institutional' collective political action which stand in opposition to the traditional interests-based politics [of the representative model] and which often ground themselves in left-wing political philosophy and manifest themselves in protest actions (della Porta and Diani, 1999). Traditionally, those involved in social movements are 'mobilised' by an issue which affects them (personally and/or ethically), and become engaged in political conflicts which aim to directly facilitate (or oppose) social or political changes. As such, although considerable discussion no doubt takes place within social movements, and also between social movement actors and institutional actors, it is generally felt that direct political pressure is a more successful means of advancing the movement's aims. As Della Porta and Diani (2006: 16) suggest, for social movements - which place a heavy emphasis on ideology (cf. Della Porta, 1995) - 'the central focus of "political process" is the interaction between institutional political actors and protest' (see also, Rucht, 1996).[3] In this respect, political activity associated with social movements might be considered a form of 'picket-line democracy'. The task here however, is to discuss how a model of participatory and deliberative democracy relates to the representative and direct action models of democracy. How does public participation fit in 'between the picket fence and the picket line'?

The underlying premise of the participatory paradigm is that citizens make a direct contribution in political decisions, and deliberative democrats add that this contribution should be made via the dialogic exchange of *reasoned* views on a given political problem. Emphasis is placed not on reaching a decision which satisfies the majority, through the instrumentally-rational aggregation of individual views, but on reaching a decision which can

[2] It could be argued that the term 'citizen' is used somewhat inappropriately here by Gutmann and Thompson, given that, as will be discussed in this paper, it resonates with participatory and deliberative democratic theory, and contrasts with the 'passive voter' characteristic of the representative model.

[3] It should be noted that in this discussion I am explicitly referring to traditional over 'new' social movements. Social movements have quite different characteristics, for example their 'non-ideological' nature (Della Porta and Diani, 1999).

be *reasonably* accepted by all, through communicatively-rational (cf. Habermas, 1996) participation. As Porter (1995: 3) suggests, too much 'trust in numbers ... discredits genuine democratic political participation. A deliberative system of democracy allows for the inclusion, rather than the 'demeaning' (Porter, 1995) of minority views – in turn allowing for what de Tocqueville (1835) warned of as the 'tyranny of the majority' (also, Mill, 1892) to be avoided. Importantly, the deliberative system allows for the reasoning behind (minority and majority) views to be exchanged and given due consideration. The fairest and most rational decision is therefore not necessarily that which - in the absence of deliberation - would receive the most votes, but rather that which - following deliberation - comes to be seen as having the most acceptable reasons behind it. Social movements of course are also a means through which people can directly involve themselves in politics. They have in common with the participatory paradigm the conviction that members of the public are themselves political actors with political consciousnesses whom do not need elected representatives to mediate or 'dilute' their share of political control. Where these two models diverge is in their interpretation of the best means by which people should become directly involved. Whereas social movements traditionally advocate (usually antagonistic) instrumental action (usually in the form of resistance and protest), participatory processes advocate (usually consensus-seeking) communicative action through deliberative engagement between citizens and between citizens and political institutions. The other central difference relates to the motivation behind political involvement. In social movements, as suggested above, people become involved (or 'mobilised') because they are in some way directly affected by the issue at stake. As such they *enter* into political activity as a partisan with strong, preconceived views. Public participation however, is premised on the idea that, participants do not have any strong, preconceived views. As STS has pointed out, the ideal participant is the non-partisan, 'disinterested' citizen or 'idiote' (Kotchetkova and Evans, 2007; Lezuan and Soneryd, 2007).

Like most schemas, the one presented here simplifies the definition of public participation *vis-a-vis* representative democracy and social movement activism. As some social scientists have suggested (e.g. Leach, Scoones and Wynne, 2005), some types of social movement, particularly *new social movements*, could also be considered forms of civic engagement, because of their disassociation with (left-wing) political ideology and because of their new emphasis on reaching consensus – rather than maintaining conflict – with political institutions (cf. della Porta and Diani, 2006). As alluded to earlier, another consideration is 'how democratic' actually are public participation processes, in terms of how well they represent and include all strata of the designated population. Of course, this opens up both methodological and philosophical 'cans of worms' which cannot be sufficiently discussed within the remit of this paper. Some brief considerations are, for example: 'Who should take part in a participation process? How is 'the public' to be defined? What does it mean to be representative? How are the public to be sampled? Such substantial issues have had, and will continue to have, much scholastic ink dedicated to them. In short, it is important to consider, not just how forms of participation include people, but more importantly how they exclude people. Those attempting to organise a participation process must consider whether and why certain members of 'the public' (however defined) are more likely to take part than others. Without such a consideration, and without exploring means and methods for including a diverse range of views, it is possible that public participation is just as 'picket fence' as the representative model. After discussing the wider political context within which 'public participation' can be located, it is now possible to return to the central project of this paper: the construction of a typology of public participation models.

**The typology: An overview**

The twin aims of this paper are the critical (re-)characterisation of established models of public participation and the suggested characterisation of a 'new' third model. In many respects, the success of the paper's second task depends on the success of its first task. That is, before a third model of public participation in S&T decision-making can be discussed as a viable alternative to the two established models, it is first necessary to establish why there is a need for a third model at all. This will be achieved in the following sections of this paper. First however, an overview of the typology, including its nomenclature, will hopefully be of use to the reader.

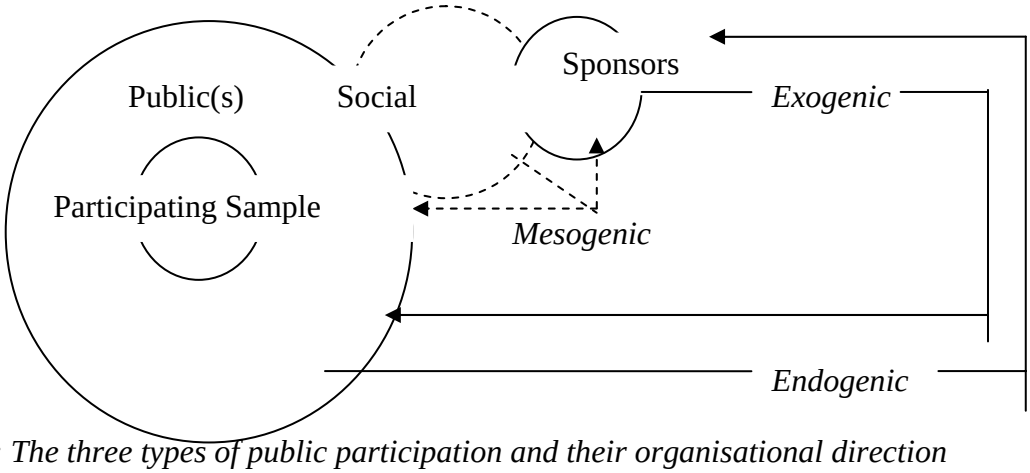


*Figure 1: The three types of public participation and their organisational direction*

As illustrated in *figure 1,* the three types of public participation in S&T decision-making can be termed *exogenic, endogenic* and *mesogenic.* Whilst the terms exogenic and endogenic are neologisms (or proposed neologisms at least) within this area of STS research, the models of participation to which they refer are neither new in terms of their theoretical underpinnings nor in terms of their practical applications. The exogenic model refers to all those participation processes which are organised externally ('from outside') by a sponsoring agency or institution – who are usually stakeholders in that issue. This model has hitherto been referred to as the 'top-down' approach. Chronologically, the exogenic model of participation can be considered the first model of participation, and arguably, the exogenic model is necessarily conceptually antecedent to the endogenic model. This chronology is explored diagrammatically and (perhaps too?) simply in *figure 2*. The chronology of the typology will also be referred to throughout the following sections of this paper. The endogenic model consists of those participation processes which are organised internally ('from inside') by the participating citizens themselves, as opposed to an outside sponsoring agency or institution. The endogenic model positions itself in opposition to the exogenic model and defines itself in terms of its perceived limitations of the exogenic model. This

model is therefore commonly referred to as the 'bottom-up' approach to participation. This might be considered the second model of public participation in S&T decision-making. It sees itself as critical of, and therefore superior to, the exogenic model. The exogenic model has been explored to the greatest degree practically, whilst the endogenic model has received the most theoretical attention, largely via its critique of the former.

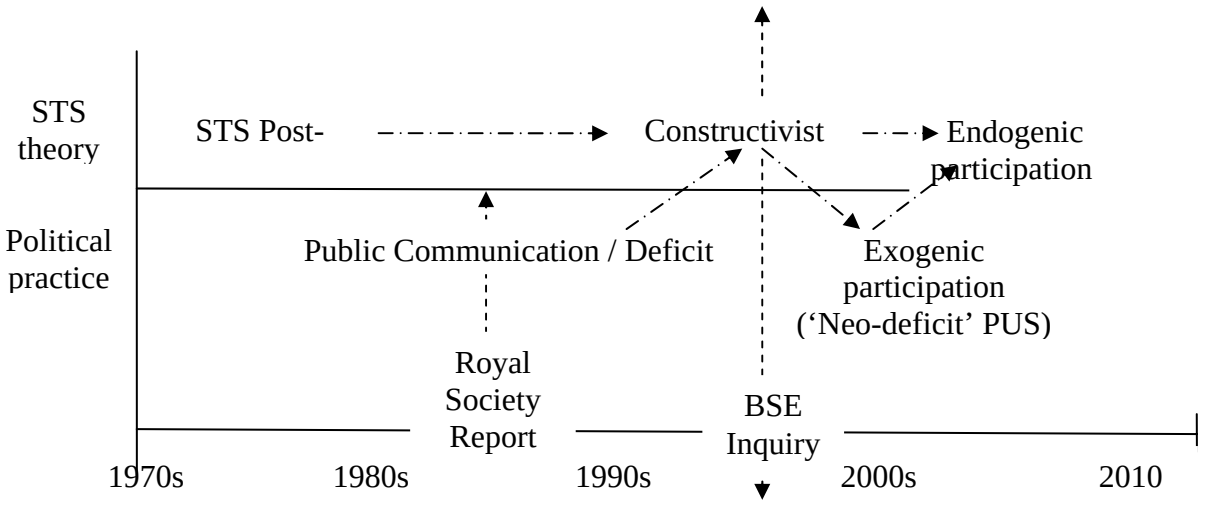


*Figure 2: the chronological development of the exogenic and endogenic models of participation*

In this paper, the labels 'top-down' and 'bottom-up' are generally avoided. This is not because the author necessarily sees them as inaccurate, or in terms different to those scholars who have used them hitherto to conceptually describe the different approaches to participation. The new nomenclature is introduced for two main reasons. Firstly, it does so in order to distance itself from the somewhat Marxist connotations of the terms top-down and bottom-up. As discussed above, the political philosophy espoused by deliberative democrats is far nearer the centre that those political philosophies 'from below'. Participation, according to theories of deliberative democracy is better captured by terms synonymous with inclusion/exclusion (e.g. 'from within/from without') rather than those synonymous with oppression/subversion (e.g. 'from above/from below'). Secondly, and the main reason as to why these new terms are deemed more appropriate, is because they allow greater room for the introduction of a third model. As the quote from the pragmatist philosopher John Dewey at the beginning of this article suggests, inquiry all-too-often proceeds based on blind faith in the existence of, and need for, straightforward dichotomies. In turn, this often precludes the consideration of intermediate forms. Given that, as we will see, the 'ideal types' constituting a binary are often by their very nature prone to limitation (where limitations are identified according to the relative strengths of their opposition), intermediate forms can be a more pragmatic (i.e. useful) alternative. In this instance, an intermediate form of public participation in S&T decision-making is seen to be desirable. This alternative form – the

*mesogenic* model - conceives of participation as being organised 'from the middle out'. It is these considerations which have led to the renaming of the top-down and bottom-up approaches as the exogenic and endogenic models. All three models will now be explicated and critically discussed in more depth.

**Exogenic participation**

Those forms of public engagement with S&T which have been referred to as top-down can be discussed according to two broad trends: the 'deficit model' of the public understanding of science and what might be termed the 'neo-deficit model' of public participation (see *figure 2*). The original deficit' model of PUS (Wynne, 1995) is frequently associated with the public communication ethos of the Royal Society (1985), and is increasingly an axiom of pejorative parlance within STS. The deficit model sees the 'administrative PUS researcher' (Bauer, Allum and Miller, 2007) conducting research on behalf of scientific and political agencies, and information flows 'one-way', (downward) from these agencies to the public (Rowe and Frewer, 2005). This unidirectionality is implicit in the unproblematic characterisations of the relationship between a monolithic 'Public' (P) – who do or do not Understand (U) a monolithic 'Science'. The Public are seen to approach scientific and technological issues from a position of ignorance (Irwin, 1995), and it is the responsibility of scientific and political institutions to 'educate' them through providing information on these issues. The general assumption is that this ignorance leads to public 'misunderstanding' (Irwin and Wynne, 1996), which in turn leads to a lack of support for science and technology. Conversely, better science communication could lead to improved scientific literacy amongst the public, which in turn could lead to greater public support for science and technology. The deficit maxim is seen to be 'the more you know, the more you love it' (Bauer, Allum and Miller, 2006).

In relation to decision-making processes, because the Public are seen as *de facto* ignorant, they are therefore disqualified from partaking in S&T-related policy decisions (Bauer, Allum and Miller, 2006). They are neither active nor involved in such decisions (Rowe and Frewer, 2005). The role of Science and scientific advice in the deficit model is based on three further assumptions: it is objective, it lends authority to policy, and it separates the technical from the political (Irwin, Jones and Stilgoe, 2006). This model is informed by an epistemologically positivist view of Science; a Mertonian normativist Science which (often successfully) appeals to standards such as disinterestedness and universalism (etc). In this model, Science cannot be challenged by that which it defines as 'non-science' (including Public knowledge) (Gieryn, 1983). In asserting the importance of esoteric knowledge to the formation of policy, Science becomes a 'political resource' (Nowotny, 1981) - the possession of which yields considerable political power (Nelkin, 1976, cf. Jasanoff, 2002). Since the Royal Society (1985) report, there have been notable incidents in the UK related to S&T policymaking, which have – necessarily - prompted reflection on the triadic relationship between Science, the Public and political decision-making. In particular, the inquiry into the BSE crisis of the 1990s (BSE Inquiry, 1998), which almost single-handedly shook the foundations upon which the aforementioned authority had been so carefully built, ushered in an era of governmental instability and reflexivity in regard to S&T policymaking. This 'civic dislocation' (Jasanoff, 1997) proved to be fertile ground for the uptake of STS theory. From this body of research has materialised what can be summarily referred to as the 'constructivist model of PUS'. The assumptions underlying this model will be more fully explicated in the following section. However, it is necessary to have a basic understanding of how the

constructivist critique of the deficit model of PUS spawned the neo-deficit model of PUS in the guise of exogenic public participation. Essentially, in the wake of the BSE Inquiry, government institutions (particularly – but not only – in the UK) sought for ways of re-establishing public faith in Science and public trust in scientific advice-based policymaking. They drew on the hitherto overlooked arguments of STS. Given the ill-fated consequences of the BSE crisis – which had revealed the perils of scientific hubris - it was acknowledged that Science could no longer unconditionally 'speak to power' (Collingridge and Reeve, 1986). Terms common within the STS idioms – terms such as 'accountability', 'openness' and 'transparency' - quickly became political 'buzzwords'. Authority it was said would be built on 'dialogue' with the Public about Science, rather than deference of the Public to Science. The democratic theories upon which much STS critique was based were crystallized into a new definition - 'engagement'; one which claimed that the Public were to actively 'participate' in decision-making on S&T issues.

| | **Endogenic Participation** | **Mesogenic Participation** | **Exogenic Participation** |
|---|---|---|---|
| *Organised by* | Citizens | Independent social scientist | Sponsor(s) |
| *Funded by* | Citizens (citizens/voluntary groups) | Independent source e.g. Research Council, academic funding body | Sponsor(s) |
| *Type of Knowledge* | Polymorphic knowledge<br><br>Constructivist | Polymeric knowledge<br><br>Pragmatist | Dyadic knowledge<br><br>Positivist |
| *Form of inquiry* | Dialogic inductivism | Holistic dialogic inquiry | Dialogic deductivism |
| *Degree of structuring* | Relatively unstructured | 'Guided' by social science | Relatively structured |
| *Direction of engagement* | Plural 'publics' (or *active* citizens) engage with experts | *Interactive* citizens *co-operate* with one another and with experts | Experts engage with 'the Public' (or *passive* citizens') |
| *Evaluation criteria* | Evaluated according to context and democratic legitimacy of process | Evaluated according to outcomes (consequences) | Evaluated according to instrumental effectiveness of decisions |
| *Possibility for policy action* | Low in comparison to the other models | Lower than the exogenic model but higher than the endogenic model | High in comparison to the other models |

*Table 1: Summary features of the exogenic, endogenic and mesogenic models of models of public participation in S&T decision-making*

Post-BSE Inquiry, exogenic public participation has been espoused by numerous political institutions. They have replaced what we might see as an 'exclusive repertoire' of downward information communication (Royal Society, 1985) with what we might see as a more 'inclusive repertoire' of two-way information exchange (see, House of Lords, 2000). This aside, it can be suggested that many of these features reproduce many of the features of the deficit model of PUS, in participatory form. A well known example of an exogenic participation process is the *GM Nation?* Public Debate, which was sponsored by the UK Government (Horlick-Jones *et al*, 2007). *Table 1* summarises the features of exogenic participation. For example, most public participation processes, like public communication processes, are still sponsor-led. The sponsors provide the funding and maintain a high level of control throughout the process, which is often rigidly *structured* from start to finish. Exogenic participation processes, like public communication PUS processes, are epistemologically positivist. Although the processes do sometimes include what have been referred to as 'alternative' (Collins and Evans, 2007), 'lay' (e.g. Arksey, 1994), 'indigenous' (Leech, Scoones and Wynne, 2005) or 'popular' (Brown, 1987) 'expertises', they usually fail to consider them as forms of expertise in the same way that 'Scientific knowledge' is considered expertise. As such, the former are accorded less status than the latter, and much of the evidence in exogenic participation processes is weighted in favour of the latter over the former. Knowledge in the exogenic model of participation is therefore *dyadic* in that it still presupposes a clear and relatively unproblematic demarcation between scientific and non-scientific forms of knowledge (cf. Gieryn, 1983) or 'expertise'.

Sponsors or their 'steering groups' will usually have set in advance, a range of definite questions to which participants' deliberations should be oriented. In addition to this, there are often a set of (policy) options which are outlined by the sponsoring agency, from which the participants can choose (post-deliberation). That is, exogenic participation entails finding 'answers' to predetermined, sponsor-set questions - something which has been referred to as the 'use or choose' approach to participation (Cornwall and Gaventa, 2001). In this sense, the participants' dialogic inquiry proceeds very much *deductively*. This stems from its positivist epistemology, which is something it shares with the deficit (public communication) model of PUS. The main difference however, between the deficit model of public communication and the neo-deficit model of public participation, is the directionality of information flow. That is, in public participation information flows *between* sponsors and citizens (Rowe and Frewer, 2005). As will be highlighted in the following section however, problems arise when discussion looks at how this information flow is organised, who it is organised by, and whether it is actually even, equal and democratic. Members of 'the Public' produce 'Public knowledge' through the participation process, but the question is to paraphrase Weber and Marx , do they participate within 'webs of significance' which the citizens themselves have spun, or do inherit the terms of participation under circumstances not of their own choosing? This question will be elaborated upon in the following section, but in short, organisation in the neo-deficit model of public participation, as in its deficit public communication antecedent, remains organised very much from the top-down, albeit in a more implicit and subtle manner. Another feature of exogenic participation refers to the criterion by which it is evaluated. As one would expect, given the high level of sponsor involvement, participation is evaluated according to the *instrumental effectiveness* of the decisions. That is, the purpose of participation is to produce a 'better' process for decision-making which leads to 'better', more politically 'usable' and more instrumentally rational decisions and policies. The distinction between decisions which are good or bad again reflects the epistemic positivism characteristic of exogenic models of participation. Finally, there is a high possibility, in theory at least, that exogenic processes, will be followed up with

policy action(s), precisely because they are being organised by the agencies or institutions that possess the (respons)abilities for such action(s).[4] However, as will be discussed in the following section, the nature of exogenic participation raises questions as to whether these actions have genuinely and legitimately followed from the participation process itself.

**Endogenic Participation**

The endogenic model of public participation in S&T decision-making, as a critique of the neo-deficit model of public participation, has emerged from the constructivist critique of the deficit model of PUS. As alluded to in the previous section, the fallibility of Science has been increasingly acknowledged in public and political domains, largely since the scientific controversies (e.g. BSE) of the 1990s. This fallibility of course is something which STS had been discussing for (at least) the past two and a half decades, post-Kuhn (and Feyerabend etc) (see *figure 2*). To borrow a Newtonian metaphor, it is on the shoulders of this giant corpus of scholarship which the constructivist critique of deficit PUS now stands. This scholarship has argued how even 'core' scientific research is contingent on the socio-cultural context within which it is produced (e.g. Woolgar and Latour, 1978; Gilbert and Mulkay; Collins, 1985; Bijker, Hughes and Pinch, 1987; Latour, 1987; Woolgar, 1988; Knorr-Cetina, 1999). The constructivist critique of deficit PUS contends that laypersons, rather than being passive recipients of scientific knowledge (via public communication), contribute to its very production and definition – both through their active (re)interpretation of the scientific information received (Michael, 2002) and through bringing their own forms of expertise and experience to bear on the issues at stake (e.g. Wynne, 1985; Williams and Popay, 1994; Epstein, 1996). As such, there is a re-definition of the term 'understanding' (u), wherein multiple, local interpretations of what constitutes science (s) are performed by plural 'publics' (p) (e.g. Irwin, 1995).

The constructivist critique of deficit PUS has also been used to inform a critical understanding of those forms of policy-relevant science which operate more explicitly in political domains. The Kuhnian legacy of this model is apparent in its commonly-used moniker 'post-normal science' (Funtowitz and Ravetz, 1993; cf. Weinberg, 1972; see also, Jasanoff, 1994; Hilgartner, 2000). The post-normal thesis argues that in domains where science and policy are closely interfaced, either decision-stakes and/or systems uncertainties are high. In such instances, there is a need for an 'extended peer-review' - effectively greater (non-scientific) public participation in decision-making processes (Funtowitz and Ravetz, 1993; de Marchi and Ravetz, 1999; Ravetz, 2004). Despite the fact that, in part, STS theory has influenced the development of political institutions' inclusive repertoire, STS scholars have not responded to the exogenic model of participation positively. They take issue with the 'new tyranny' of participation (Cooke and Kothari, 2001) which paradoxically sees participation processes as simply reproducing existing forms of control or oppression, and as having a 'disciplining and thus participation-closing role' (Leach, Scoones and Wynne, 2005: 11). Citizens themselves are seen to have very little say on the terms of their participation, which are set according to the sponsoring institution's narrow, pre-existing frames (Irwin, 2001; Hagendijk and Irwin, 2006) and presumptive normative models of the Public (Leach, Scoones and Wynne, 2005: 11). Because members of the Public have little or no say in the formulation of the problem, in choosing the forms of scientific or technological expertise to be consulted, or setting in the agenda guiding deliberation, participation is seen to be empty

[4] However, as the *GM Nation?* example shows, this is not necessarily the case in practice (e.g. Lezuan and Soneryd, 2007).

and meaningless. Such attempts at participation, such 'technologies of hubris' are felt to be tokenistic means of legitimating decisions which are often pre-determined and are still based on a the traditional positivist model of expertise (Jasanoff, 2003). What could be referred to as *epistemological recidivism*, or what has been referred to as 'a very top-down commitment to the bottom-up' (Horst, 2003, as cited in Irwin, 2006: 303), sees the positivist and reductionist characterisation of 'the Public' re-appearing in 'neo-deficit' guise.

In keeping with its constructivist epistemology, the endogenic model (see *table 1*) holds that participation should be organised without the direct influence of a sponsoring agency, and should be flexible. Because all forms of knowledge, including scientific knowledge are seen to be contingent, transient and context-specific, participation processes must be sufficiently flexible so as to allow for this epistemic mutability. Knowledge, rather than being static and dyadic - conceived of in terms of science/non-science - is instead conceived of as having multiple and changing forms, and could therefore be termed *polymorphic* (i.e. relativist) in nature. To account for this, endogenic participation needs to be fairly unstructured *vis-a-vis* exogenic participation. Those citizens involved are not only able to set the terms of participation from the start, but are more importantly able to adapt and amend them as participation proceeds. In this model, the notion of a monolithic 'Public' is replaced by the notion of plural 'publics', and, in specifically in relation to participation in S&T decision-making, by the notion of the active 'citizen'. It is the active citizen who assumes or accepts a direct role in the organisation of that decision-making process within which s/he is participating. This role allows the citizen to frame the terms of their own participation and to largely control both the practical procedural choices related to the specific process and the wider normative choices related to the purpose of participation *per se*. In regard to the former, it is felt that citizens should be able to create their *own* answers to problems which they (and not the sponsors) *themselves* have determined – something which has been referred to as the 'make and shape' approach to participation (Cornwall and Gaventa, 2001). Dialogic inquiry proceeds very much *inductively*. Citizens are able to (re)construct their own agenda, and decide which specific experts are relevant to the issue. In regard to the latter, citizens phrase and confront normative questions such as: what are the problems and how should they be answered, as well as: what does it mean to be an expert and what does it mean to be a citizen? Whereas the exogenic model is seen to enable men and women to participate, but under terms inherited and not of their own choosing, the endogenic model sees participation as taking place within 'webs of significance' which the citizens themselves have spun directly. In this model, public knowledges engage with expert knowledges and organisation is therefore seen as 'bottom-up'. An example of the difference between the endogenic and exogenic models would be that whilst in the latter, participants would discuss whether and what (predetermined) action(s) should be taken to mitigate against any possible risks of, say a new technology, in the former, participants would be able to discuss whether this technology should be considered useful to society in the first place. To *table 1* might be added a further distinction between the endogenic and exogenic models, the latter being typically 'downstream', whilst the former being ideally 'upstream'. This implies then that not only should citizens assume a direct role *early on* in the organisation of a participation process, but that the participation process should itself take place *early on* in the development of that S&T issue (e.g. in the development and 'rolling-out' of a new technology). Endogenic participation is largely evaluated according to the criterion of *democratic legitimacy*. Itself a highly contested and interpretable term, democratic legitimacy as a criterion stands more for the quality of the means by which decisions are produced, than the quality of the decisions as ends *per se*. Although precisely what constitutes 'democratic legitimacy' varies widely between constructivist scholars, those

features which generally speaking seen to be undemocratic and illegitimate, are those which are associated with the exogenic model of participation.

Theoretically, the likelihood that endogenic processes would be followed by policy action is low in comparison to those (exogenic) processes which have been directly organised and funded by a sponsoring agency or institution with the relevant responsibilities. In any case, examples of participation processes which are truly bottom-up are thin on the ground, so to speak. The reasons for why this might be the case will be discussed in more detail in the following section, although it is important to note here that this is clearly a limitation of this model, which at present exists more comfortably in theory than in practice. It should also be noted that of those few processes which do explicitly claim to be bottom-up, such as the 'do-it-yourself' citizens' jury (PEALS, 2004) – in spite of them allowing for citizens to determine their own terms of reference – are still initiated and facilitated by the social scientist, and cannot therefore be classed as 'bottom-up' in the fullest sense.
The reasons as to why there is a lack of practical examples of endogenic participation will be discussed in more detail below.

**Mesogenic participation**

*Does public participation need social science or does social science need public participation?*

The mesogenic model is defined primarily by the fact that those participation processes which constitute it are social science-led. There are still relatively few practical examples of mesogenic participation processes, although a few are beginning to emerge. The vast majority of participation processes are exogenic. In STS for example, the role of the social scientist in public participation has largely been at the analytic level, and there is a substantial amount of empirical work evaluating existing government-led public participation processes (e.g. Irwin, 2001; 2006; Rowe et al, 2005. See also, Rowe and Frewer, 2004). This, as we have seen, has led to theoretical support for the development of endogenic participation processes (of which there are also very few practical examples). The exogenic and endogenic models do have in common the fact that the independent social scientist is primarily involved in an analytic capacity only – retrospectively in the case of the former, and prospectively in the case of the latter. It is worth pointing out that social scientists are invariably involved in the organisation of exogenic processes – however, these generally work for, or within, the sponsoring agency, and significantly cannot therefore be classed as 'independent' social scientists (as discussed below). Also, a citizen-led model, as defined by social scientists themselves, should have as little external (non-citizen) involvement as possible. .

The presentation of public participation in terms of the top-down vs. bottom-up binary has led some social scientists to perceptively question (the relevance of) their own role in this area. For example, Kotchetkova and Evans (2007: 5) ask 'what is the role of the social scientist in a deliberative exercise?' In an attempt to answer their own question, they offer two provisional suggestions. They suggest that the social scientist could either [continue to] play the role of analyst or they could play the role of facilitator. Whilst the latter role is less involved, and therefore 'more in keeping with the spirit of deliberation' the former 'retains the idea of the social scientist as an expert in their own right' (Kotchetkova and Evans, 2007: 5). This idea of the social scientist as expert stems from Evans' work (with Collins) on the normative categorisation of different types of expertises (Collins and Evans, 2002, 2007), which will be returned to later in this paper. In constructivist STS research, which contributes to the endogenic model of participation, the analytic role has been given priority.

Conversely, those social scientists who are employed by sponsoring agencies to carry out exogenic participation processes are given a more facilitatory role. It is of course likely that social scientists are employed by the sponsors for methodological design and implementation. However, because they do so within (and are constrained by) the wider frames and demands of the sponsoring agency, any claim to the process being 'independently organised' lacks credibility. Where the terms of participation have been pre-framed by a sponsoring agency, any involvement thereafter is arguably more facilitatory than organisational.

As is hopefully clear by now, the aim of this paper is to question the utility of the top-down/bottom-up binary. It is not possible to see the social scientist as capable of fulfilling both of the above roles and others as well? Again, echoing Dewey (1963), rather than seeing their role 'in terms of Either-Ors', could we not see the social scientist as being responsible for facilitating *and* analysing a participation process which they themselves – and not the sponsors or the citizens - have designed and organised? In order to do so, it is necessary to expand the top-down/bottom-up binary and allow for a third social science-led model which can offset some of the limitations in both these models. The mesogenic model, discussed in more detail below, represents the claim that public participation processes can benefit from the independent social scientist playing a more direct and comprehensive role in their organisation. However, this relationship can be seen to be a mutually beneficial one. Evans (2008a) has argued that the popularity within STS of the 'democratization of expertise' should not blind us to the fact that doing so risks erasing the idea of expertise itself, including by implication the notion of the 'social scientist as expert'. Firstly, the characterisation of new forms alternative/lay/indigenous/popular expertises threatens the authority of traditional expertises, such as those associated with all forms of science (including the social as well as the natural sciences). Secondly, the very existence of public participation processes, in which the citizens themselves are analysing expert knowledge, threatens the very relevance of the social scientist within this field of research (Evans, 2008b). As others have noted, the role of citizens within processes of deliberative democracy are in many respects akin to the type of inquiry practiced by social scientists (Bohman, 1999). Taking this to its logical extreme, we might ask whether allegiance to the endogenic model is therefore a form of 'sociological martyrdom'. If the popularity of citizen-led participation processes were to grow and spread from the academic sphere to the public sphere itself, then it might lead those within the latter to ask whether the social scientist is actually needed in this area of research. At present however, this is somewhat of a moot point, given that, as suggested above, very few examples of endogenic participation exist. Nevertheless, this consideration does tie the mesogenic model to wider debates concerning the practical role(s) of STS within society. Coopmans, Neyland and Woolgar (2004) discuss public engagement as one of a number of criteria for future progress within STS. They caution that 'if STS is not engaged in contexts of application beyond its traditional scholarly concerns ... will it be in a good position to continue?' If 'public participation' as an area of research is to progress, then arguably the idea of the social-scientist-as-organiser is useful, not only to those taking part in, and affected by, the processes, but also to the continued relevance of the social scientist in this area of research. Before this claim can be given any credit however, it is necessary first to provide a fuller description of what the mesogenic model of participation (including the role of the social scientist within it) actually entails.

*The role of the independent social scientist*

Mesogenic participation, as the name suggests, is any form of public participation which is generated from the middle-out. That it, is it organised neither by the sponsoring agency, nor

*directly* by the citizens taking part in the participation process. As suggested above, the need for some form of mesogenic participation stems from the limitations of both the top-down and the bottom-up approaches - particularly the theoretical (legitimation) deficiencies of the former, and the practical (application) deficiencies of the latter. To suggest however, that participation is more advantageously organised by a third party, is not necessarily to suggest that the independent social scientist is the only possible third party organiser. The case must be made therefore, as to why the social scientist is best placed for this role. This case centres around two main criteria: organisational objectivity and organisational capability.

Firstly, there is a need for any public participation process to be organised *as objectively as possible*. Whilst it is acknowledged that the term 'objective' is, in the social sciences at least, a contentious one, and whilst in the eyes of many, 'pure' objectivity is somewhat of a chimera, it is still possible to use objectivity as an organisational criterion. That is, one can think in terms of *degrees* of objectivity. To this end, it might be more useful to use the term 'detachment' as a synonym for objectivity. Because outputs and processes are, to an extent, necessarily inextricable – that is, the decisions made through participation must be in part a product of the actual process itself – careful attention must be paid to how the process is constructed. In particular, attention needs to be paid to the information being fed into participation exercises, so that citizens' deliberations are an analysis, and not simply a reflection, of that information. In many ways, the choice of what information is fed into the participation process (and from what sources this information is taken) is (one of) the most important organisational choice(s). Such a choice is necessary because citizens naturally cannot digest everything there is to know about a given S&T issue. Furthermore, such a choice is important, because if information was unnecessarily skewed in favour of one particular (expert/stakeholder) point of view or another, then it would follow that the citizens' deliberations would also be unnecessarily skewed in favour of that (expert/stakeholder) point of view. As such, the content and direction of the citizens' deliberations would not so much be an analysis of the debate or problem as a whole, but would rather be a one-sided reproduction of a subjective (expert/stakeholder) interpretation of that debate or problem. This is a simplification of the constructivist argument (above), which criticises the tendency of the sponsor in exogenic participation to impose narrow framings on the process' agenda for example. It follows that the task of organisation needs to be entrusted to someone whose subjectivities are not directly and heavily invested in the substantive issue itself; to someone who has an indirect intellectual interest in the substantive S&T issue, but whose direct material interests are not invested in that issue. It is argued that the independent social scientist satisfies these requirements. S/he is both intellectually interested in the substantive S&T area (otherwise they would not be studying public participation in that area) and presumably does not have any invested material (conflict of) interests in that area. Whilst social scientists are, to varying degrees, engaged professionally with their substantive areas, generally speaking they are more detached than those who are the subject of their study.[5] In public participation research, the ability of the independent social scientist to be materially and personally detached than would-be sponsors (who are directly involved in the substantive issue) allows them to feed in information which is more representative of the debate as a whole, and which is more inclusive of all the different expert/stakeholder points of view. Subsequently, deliberations can be thought of as a sort of meta-analysis of different expert/stakeholder accounts of the issue, rather than a straightforward analysis of that

[5] Some methods are an exception to this. In participant observation for example, the aim of the social scientist is to become an 'insider'.

expert/stakeholder account which is most closely aligned to the interests of the sponsoring body.

Secondly, there is a need to acknowledge that not everyone is capable of organising a public participation process, which is conceptually, methodologically and practically quite complex. Whilst official sponsoring bodies and their employed researchers lack the necessary detachment, they do however possess the capability, in terms of skills and resource. Whilst citizens themselves possess the necessary detachment, questions must be asked as to whether they have at their disposal the necessary capabilities, in terms of skills and resources. Davies *et al* (2007) have argued that despite the theoretical merits of citizen-led participation processes, as identified in the STS literature (e.g. (Webler 1995; Pickard 1998; Hagendijk and Irwin, 2006), in practice this might not be so feasible. As suggested above, there is little empirical (in contrast to theoretical) work exploring how this could be achieved practically (Mort, Harrison and Dowswell 1999: 103), and examples of 'citizen-led' participation processes (e.g. PEALS, 2004), still tend to be, to an extent, engendered and facilitated by the social scientist (thus arguably making them more mesogenic than endogenic). One does not have to think hard as to why examples of endogenic participation are thin on the ground. Generally speaking, participation processes are expensive, both in terms of money and time. Citizens Juries for example, can cost upwards of ten thousand dollars (or its equivalent) per exercise (e.g. Jefferson Center, 2004). Also, the organisation of a participation process can demand the attention of a team of full time employees. It is unrealistic to expect citizens to be able and willing to afford the monetary costs of organisation. So too is it unrealistic to expect many 'full-time citizens' to exist, due to the existence of people' myriad commitments related to, for example, family and employment (etc). Of course, a citizen's other commitments do contribute toward their total stock of 'civic knowledge' as well as to their sense of civic duty. The downside is that these commitments also serve to limit the amount of time that he or she could potentially dedicate to the organisation of a participation process. A more fundamental problem lies in getting people interested in participating in the first instance. As the example of the *GM Nation?* public debate shows, where processes allow participants to self-select, they leave themselves at risk of becoming interest-driven (Pidgeon *et al*, 2005).[6] It seems as though those forms of public involvement which are truly endogenic and citizen-led, are likely associated with the kind of (new) social movements discussed previously. As was argued above, these are not considered forms of 'public participation' as such, precisely because the participants already possess strong views about the issue at stake. In public participation processes, the arguments and experiences of social movement actors are considered relevant, but they are more appropriately fed *into* the deliberative process as a form of (alternative/lay/indigenous/popular) expertise.

The most practical solution to the problems of objectivity and capability which have blighted the exogenic and endogenic models is to specifically employ someone who has the necessary skills to carry out the participation process. Importantly, because of the criticisms associated with sponsor-employed organisers, as discussed above, there is good cause for this employee to be independently-employed. It is not sufficient to state however that the independent social scientist is best suited to the organisation of a participation exercise simply because he or she is already in a line of employment which allows it. We might just as easily conceive of a participation process organised by an 'independent consultant', such as a public relations (PR) professional, who could be employed specifically for this purpose. Although a process organised by such a third party could justifiably claim to be more

[6] In the *GM Nation?* initial public consultation meetings were heavily (over-) attended by anti-GM protestors (see, Pidgeon et al, 2005).

objective than the sponsor-led process, there is still a case to be made in favour of the independent social scientist, since they *already* possess the skills required for the organisation of a public participation process. Whilst they are not directly involved in the production of scientific knowledge, they are sufficiently informed about the issue so as to understand the production and the implications of the scientific knowledge (Collins and Evans (2002) would distinguish this as 'interactional' rather than 'contributory' expertise). The 'detached comprehension' (or interactional expertise) of the social scientist enables them to make informed decisions as to which (contributory) experts and stakeholders are important to the debate and what themes and sub-issues are important to the debate. Furthermore, as suggested above, the mesogenic model, as well as encouraging the social scientist to organise and facilitate the participation process, can also allow them to retain their role as analyst. To this end they are well suited as experts in civic and social interaction (cf. Jasanoff, 2003) of which public participation is a form (Webler, 1995).

*The features of mesogenic participation*

In addition to the role of the independent social scientist as organiser, it is possible to identify a number of additional features which constitute a suggested characterisation of the mesogenic model of public participation (see *table 1*). There are a growing number of public participation processes which have been organised from within the social sciences. Examples of mesogenic participation processes could include the 'Deliberative Opinion Poll' (Fishkin *et al*, 2000), the 'Deliberative Mapping (DM)' approach (Burgess *et al*, 2007), and the work of Policy, Ethics and Life Sciences Research Centre (PEALS) at Newcastle University. Each is based on specific assumptions of what a 'good' participation process should entail. However, there is less general reflection on the role of the social scientist, and of the relation of the specific process to a wider programme of social science-led participation research. The creators of DM do account for the philosophical origins of their method, which is seen to derive from the work of Webler (1995) via Stern and Fineberg's (1996) characterisation of risk assessment as an 'analytic-deliberative process'. This process in turn is a conscious attempt to reconcile 'technocratic' and 'citizen-centric' approaches (Stern and Fineberg, 1996, in Burgess *et al*, 2007). Their approach, despite being admirably symmetrical and integrative sees deliberative elements (i.e. participants' views) being subjected to a degree of quantification (via the use of multi-criteria mapping) – something which is at odds with most purist conceptions of deliberative democracy (which can also be said of the deliberative opinion poll approach). The point of relevance here however, is that the social scientist aims to construct an integrative process in which technocratic (i.e. top-down) and citizen-centric (i.e. bottom-up) elements run alongside one another. The organisers of the Nanojury (PEALS) similarly see their project as being representative of a 'two-way street' model of participation. However, their interpretation of 'mutualistic' engagement leads to a bipartite division of the participatory process, where the citizens set one agenda, and the stakeholders and organisers set another. This can result, as was the case in the Nanojury, in the existence of two very separate agendas, and a discussion which not unlike the exogenic model above entails a dyadic separation of 'scientific' from 'political' issues.[7] Before discussing in more detail the specific features of a mesogenic model of participation, it is important to emphasise

[7] The Nanojury entailed 'bottom-up' and 'top-down' processes running consecutively. Citizen jurors were allowed to chose the first issue (young people and exclusion) whilst stakeholders and organisers chose the second (nanotechnology). In the former, organisers acted as 'critical friends', whilst in the latter they assumed a more dominant role meaning the citizens took 'little more than a passive role' (Singh, no date).

that this is one *possible* and suggested characterisation of social science-led participation. The 'two-way street' and 'analytic-deliberative' models also represent social-science led participation processes. In addition to the essentiality of the social scientist-as-organiser, they do not necessarily display all the features of mesogenic participation, as outlined in *table 1*. The salient point is that this characterisation, as part of the wider typology, can serve as a heuristic device for future empirical research (in the form of participation processes) conducted from within the social sciences. In turn, this future empirical research can feed back into this heuristic characterisation and modify it where appropriate.

Mesogenic participation it is argued can be defined according to a set of unique and particular characteristics. It can, for example, can be considered semi-structured, insofar as processes are *guided* rather than controlled by the social scientist. The mesogenic process is less rigidly structured than the exogenic participation process, but not as unstructured as the endogenic model. The social scientist is charged with the impartial definition of the (policy) problem(s) and in setting the agenda, selecting relevant experts and stakeholder points of view, collecting the initial evidence and initiating the citizens' deliberations. It should not be overlooked however that some have warned that the direct involvement of social science in participation processes is not without problems of its own. Rayner (2003) for example, questions whether this is merely the substitution of one form of technocracy for another. The question is a fair one – does the mesogenic model simply replace traditional scientism (associated with the deficit and neo-deficit models above) with social scientism? In some respects, the mesogenic model can be seen to fall short of the democratic ideal set by the endogenic model, because the processes are not entirely 'ruled by the people'. However, if we are to see the preservation of deliberative liberty as a central criterion for legitimacy, and if we are to agree with Dewey (1963) that 'guidance can be an aid to freedom, not a restriction upon it', then the mesogenic model can be seen to be more democratic than technocratic. Of course, the important point remains that structuring in the mesogenic model is not only more detached than structuring associated with exogenic participation processes, but also it allows for greater flexibility. As suggested above, organising a participation process not only requires skills and experience in social and civic interaction, but also a satisfactory comprehension of the substantive S&T issue.

The endogenic model as we have seen allows citizens to actively (re)define participation in their own terms. In the mesogenic model however, 'citizens' are not defined as such (*a priori*) before participation. Rather, what it means to be a 'citizen' is defined by the participants themselves during the participation process. In this respect, participation processes construct citizens as much as citizens construct participation processes. The notion of an 'interactive citizen' who *cooperate* with one another, with 'experts' and with the social scientist in order to define not only the nature of the substantive S&T problem(s) – including the usefulness of a new technology's societal applications for example - but also the nature of underlying assumptions concerning participation and citizenship in general. The mesogenic model differs to the exogenic and endogenic models because it assumes neither that citizens are incapable of organising participation processes at all nor are they fully capable of organising them 'from scratch'. Rather, it assumes that as citizens become increasingly informed – through the act of participation – they are increasingly qualified to adapt and amend the terms of their participation as they see fit. This allows for the redefinition of the (policy) problem(s), the restructuring of the agenda, and the selection of new and different 'experts' and 'evidence' – terms which are themselves subject to redefinition during the course of deliberation. Although participation commences according to terms not of the citizens' own making, these terms can be readily redefined by the citizens themselves (who 're-spin the webs of significance' we might say). Participatory inquiry in

the mesogenic model is *holistic*, insofar as it not only contains elements of deductive *and* inductive reasoning, but also *retroductive (or abductive)* reasoning.[8] The emphasis here is on providing explanations (in the form of arguments and suggested courses of action etc.) which are always provisional and tentative, but which are seen to be the best explanations for that (S&T problem) under discussion. Knowledge in the mesogenic model is neither dyadic nor polymorphic, but might be thought of more accurately as *polymeric* – insofar as it is produced as a result of the continued 'linking together' of 'separate parts'. These 'separate parts' are pieces of sensory, empirical information – *experience* – which are 'linking together', and made sense of through the process of inquiry *per se* (in this case through mesogenic participatory inquiry).[9] For the pragmatist, the only type of knowledge which can be considered valid – or *useful* rather – is that which is rooted in experience. It is through experiencing the consequences of *past* chosen courses of action, that we can (incrementally) acquire knowledge which can be used to inform *future* decisions concerning related courses of action. It is this piecemeal, this 'trial and error' approach to epistemic inquiry, which allows us to suggest that pragmatism is well-suited to the problem-solving demands of S&T decision-making. As such, mesogenic participation is evaluated retrospectively (retroductively) according to consequences of the chosen course of action. Participation in the mesogenic model should not, as is often the case in the exogenic model, consist of one off tokenistic exercises, but rather should consist of repeated processes as part of a long-term commitment to the development of democratic and effective decisions on a given S&T issue. As discussed above, the exogenic model has low procedural (democratic) legitimacy but high procedural effectiveness (i.e. a high chance of policy action), whilst the endogenic model has high procedural (democratic) legitimacy but low procedural effectiveness (i.e. a low chance of policy action). The mesogenic model finds a compromise between these two criteria. Whilst its processes might neither be fully democratically legitimate (compared to endogenic processes) nor fully effective (compared to exogenic processes), as a pragmatic model for citizen participation, it aims towards a "trade-off" – a realistic compromise - between legitimacy and effectiveness. As discussed above, the role of the social scientist is key to the facilitation of this compromise. It is only through the actual 'experiencing' of participation process that allows us to decide not only whether criteria such as procedural 'effectiveness' and 'legitimacy' can be applied, but also whether such criteria should themselves be considered applicable in the first place.

**Conclusion: Where do we start next?**

This paper has constructed a typology of public participation models. It has (re-) characterised the top-down and bottom-up approaches to public participation as the exogenic and endogenic models. The chronological development and conceptual antecedents of these models were discussed, before a set of characteristic features was suggested. Critical

[8] The pragmatist model of holistic inquiry was outlined by Pragmatism's 'founding father' C.S. Peirce (see for example, Peirce, 1878). Although complex in its intricacies, the significance of retroduction or abduction as applied here simply asks us to tie together what we physically know (i.e. sensory phenomena) with hypothetical know (i.e. what we think might best account for those phenomena). It therefore is a links together inductive and deductive inquiry.

[9] The term 'polymeric' is introduced as a (hopefully useful) metaphor for knowledge as conceived by the pragmatists. It is less concerned with the epistemological demarcation of objectivism from subjectivism, and is more concerned with how knowledge is accumulated (not necessarily linearly) through the gradual accumulation of *experience* – which is itself a synthetic product of the interaction between an sensory world and the interpretive (hypothesizing) work of social actors.

discussion of these features was used to suggest the usefulness of a third model, one which is beginning to take root within social science research - the mesogenic model. The mesogenic model is defined primarily by the fact that those participation processes which constitute it are social science-led. That is, most if not all of the elements of the process are organised by the independent social scientist. It is they who are responsible (provisionally at least) for setting the agenda, choosing a balanced selection of various 'experts', and constructing the forum within which citizens can deliberate. The need for an independent organiser was emphasised and the criteria of organisational objectivity (or detachment) and organisational capability were used to argue that the social scientist is well suited to this task. It was also provocatively suggested that, for 'public participation' research to progress, then the idea of the social-scientist-as-organiser is useful, not only to those taking part in and affected by public participation processes, but also to the social scientist and their continued relevance in this field of research.

The typology outlined above is in the true sense of the term a 'work-in-progress'. It is fitting therefore that it be published first in working paper format. It is hoped that the typology can act as a heuristic tool for future practical research within the field of public participation, both in terms of scientific and technological decision-making and also in terms of decision-making more generally. In part, the typology also suggests that the mesogenic model holds much promise for future public participation processes which, to a degree, manage to avoid the main problems encountered by the exogenic and endogenic models. Such a model could however, not justifiably claim to be pragmatic, if it simultaneously claimed to be the finished article. It is hoped then that this working paper will receive comment and constructive criticism, based on the work of others, which will contribute to its ongoing (re-)formulation.

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