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Engaging with Strangers and Brief Encounters: Social scientists and emergent public engagement with science and technology.

Abstract

Social scientists operate in a range of roles within the public engagement with science and technology (PEST) agenda. Social scientists strengths in respect to ‘translation’ and ‘intermediary’ skills have captured attention at a time of disciplinary pressure to demonstrate impact. This article explores how social scientists engaged in PEST consider their role(s), drawing on 21 semi-structured interviews and Horst and Michael’s (2011) proposals of an *emergence* model, in addition to ongoing discussions related to expertise. The findings suggest there are many benefits when social scientists engage with ‘strangers’, both scientific and public, but that focusing only on pragmatic elements misses the true opportunity such working relationships can offer amongst critical friends.

Keywords

Social Scientists, Public Engagement, Impact, Science, Technology

Introduction

Public engagement has become a central and politically accepted aspect of science and technology policymaking in the UK, shifting the focus amongst scientific policymakers from understanding to engagement (Powell & Colin, 2009; Trench, 2008; Felt & Fochler, 2008) at a time when most policy debates in relation to science ‘are not simply technical issues’ (Nisbet & Scheufele, 2009; 1776). Public engagement has been encouraged for a multitude of reasons; it can capture public insights, aligns to democratic principles, creates more socially robust knowledge and is seen to be appropriate, particularly when research is

publically funded. However, there can also be a lurking sense that some identify public engagement as a way to offset or relieve potential controversy around emerging fields of interest (Wilsdon & Willis, 2004). Regardless of these motivations, engagement has found favour amongst science bodies, policymakers and government and may or may not include social scientist involvement (Parry, 2009). Multiple definitions of public engagement exist (Davies, 2013; Davies, 2009; Trench, 2008); a commonality is often the perception that there should be a two-way element to the relationship, with natural scientists and publics engaged in the process (Powell & Colin, 2009). Such engagement approaches have been influenced, prepared and analysed by social scientists for many years (TwoCan Associates, 2009; McKenzie Stevens, 2008; Lezaun & Soneryd, 2007; Webster, 2007; Wynne, 1996; Epstein, 1996) but in the UK context, as well as others, there are increasing reasons why the role of social scientists in such engagement processes are worthy of attention.

This article is framed by Horst and Michael's (2011) discussions of the *model of emergence* vis-à-vis the communicative relationship between science and society. As they describe, public understanding of science activities, at least in rhetoric, moved away from a traditional *diffusion* model, in which information and knowledge is diffused via a medium to an audience, to a more critical stance recognising a need for *public deliberation*, once again via a medium. Horst and Michael (2011), highlight that the key difference between these two models is not the perception of an intermediary but the direction of flow of information, knowledge and values, from scientist to public, and vice versa. In turn they point to a third model, that of *emergence* with no privileged direction of information, the focus instead becomes communication as a 'constitutive force in shaping entities such as science, publics and society' (Horst and Michael, 2011:286). The *model of emergence* comprises a mediatory role, but as their work suggests this and the role of other actors within a science communication 'event'¹ is an unstable process; physical, social and individual mediators

within this process are unfixed, 'actants who change and are changed through, the event of coming together' (Horst and Michael, 2011: 286). It is such instabilities and specifically how this influences the role of social scientists in such arrangements that this article seeks to explore.

Social scientists operate in a range of capacities around the public engagement with science and technology (PEST) agenda, from policymaking organisations, to advisers and co-investigators, facilitators and evaluators (Jung, 2009). As Calvert and Martin (2009:201) state:

Social scientists can adopt many different roles and responsibilities...they can be advocates, intermediaries, translators, connoisseurs, critics, activists or reformers. They can reflect on the implications of a finished piece of research, or become involved at a much earlier stage. In newly emerging areas of scientific endeavour, we are seeing novel arrangements forming between natural and social scientists, whereby social scientists are becoming a required component of research programmes and are even involved in the creation of new fields.

Increasingly work has arisen where natural scientists have shifted from being the subject of study for social scientists, to being collaborators or partners and social scientists may also be involved in the types of mediatory roles described by Horst and Michael (2011), as well as others (Valve & McNally, 2012; McKenzie Stevens, 2008; Cassidy, 2008). However our present understanding of how social scientists operate in such capacities is narrow, particularly when contrasted with the developing literature around natural scientists' involvement in public engagement processes (Authors reference removed, 2010; Martín-Sempere, Garzón-García, & Rey-Rocha, 2008; Poliakoff & Webb, 2007; Burningham, Barnett, Carr, Clift, & Wehrmeyer, 2007). Chilvers (2013) has recently highlighted this gap in the literature and called for greater understandings of the actors that form, shape and mediate such activities.

Burchell carried out a small survey (n=8) of academic, practitioner and organisational perspectives on the role of social science in PEST and found contrasting definitions around

the role of the social scientist, as well as issues over the accessibility, presentation, and timeliness of their contributions (Burchell & Holden, 2009). Other work has highlighted that a perception could exist amongst some scientists that the role of social scientists is to manage and improve the communicative role (d'Andrea & Declich, 2005), conduct 'invited participation' (Bogner, 2012), or to represent the public view (Michael, 2012; Metcalfe, Riedlinger, & Pisarski, 2008; Lezaun & Soneryd, 2007), but this practical role can be challenged in practice when; 'that [social science] contribution might well work against any tidying up exercise' (Webster, 2007:462; Collins & Evans, 2007; Irwin, 2006). Conscious of this aspect some natural scientists may see a more critical involvement on the part of social scientists as a threat to the character of scientific research (Bijker & d'Andrea, 2009) and accounts of public engagement activities frequently suggest natural scientific expertise tends to be privileged (Davies, 2013).

In such a climate, Collins and Evans (2002:236) suggest the problem of legitimacy has been dealt with by broadening notions of expertise, but not the problem of extension, 'if it is no longer clear that scientists and technologists have special access to the truth, why should their advice be specially valued?' Thus in certain contexts this extension of expertise, without privileged direction is identified to be highly problematic. 'The attack on expertise has made 'expertise' itself a field within which one now needs to become an expert' (Durodie 2002:23). When science is popularised, the apex of certainty can be extended to the public (and arguably to other experts like social scientists) prior, it is argued, to sufficient resolution amongst the *core-set* of scientists involved in experimentation and theorising. Thus the arguments and debates of the *core-set* become visible and open to the public and their criticality seen to be problematic.

Collins and Evans (2002) suggest in their framing of 'Studies of Expertise and Experience' (SEE), that new definitions of expertise are necessary. These include

‘interactional expertise’ to network, ‘contributory expertise’ to the science or technology itself, and ‘referred expertise’ with a recognition of contributions to an area, ‘the boundary is no longer between the class of professional accredited experts and the rest; it is between groups of specialists and the rest’ (Collins & Evans 2002:270).

Although Collins and Evans work has been critiqued (Wynne 2003, Jasanoff 2003) their explorations of tacit knowledge, developed via sustained social contact with a group as one way to institute expertise (Collins & Evans, 2007) is of relevance to the types of role we see social scientists taking in PEST. From the perspective of the social sciences, expertise is ‘relational’ and therefore social scientists are arguably able to develop considerable ‘interactional expertise’, a mastery of the language of a specialism without practical ability (Collins & Evans, 2007). In addition expertise can be ‘transmuted’ with the use of social expertise or ‘sociological discrimination’ to inform judgement, which may add to, but not outweigh, expertise influencing decision making in areas of scientific controversy (Collins & Weinel, 2011; Collins & Evans, 2007).

Turning back to more pragmatic framings, a recent European project, the Social Sciences and European Research Capacities (SS-ERC) Project, examined the activities of 217 social research institutions specialising in the study of science and technology suggesting there were four main functions for the use of social science in such settings (Bijker & d’Andrea, 2009). The first was *interpretive*; widespread and established (55% of the sampled institutions), it involves the social science exploration and interpretation of scientific and technological practices. Secondly, there is a *functional* role whereby the social sciences produce knowledge and ‘problem solve’ issues raised in science and technology (30%). The third involves *substantive* use where by social science participates in an interdisciplinary endeavour. Finally, a *practical* role is identified where the social scientist operates as facilitators and mediators (8%) (Bijker & d’Andrea, 2009). This research suggested problems

can arise, where by natural scientists perceive social scientists to operate in an answerable relationship to their agendas, with social scientists experiencing issues around access and acceptance which may ultimately lead to a marginalised position (Bijker & d'Andrea, 2009). Here, this particular example makes some proposals, including that greater numbers of social scientists should take an interest in science and technology and that there are specific roles they could fulfil, including cooperating in research projects, advising and contributing to debates (Bijker & d'Andrea, 2009). However such suggestions could also imply a potentially deferential role for the social scientist, which the same research had highlighted as problematic, rather than the cooperative spirit that was perhaps intended.

Returning to the work of Horst and Micheal (2011) there are two specific reasons why a contemporary focus on the role of social scientists in PEST is worthy of exploration in the current context.

Firstly, Horst and Michael (2011) highlight that science communication and engagement events are characters of temporality, they are influenced by their space and times, reflecting different rhetorical and political contexts. In the UK, as in many other countries, the research climate has enhanced the requirement to demonstrate the impact of social science (as well as other areas of research), particularly economic impact (Bastow, Dunleavy & Tinkler, 2014; Levitt et al., 2010; BSA, ESRC & HaPS, 2010; Brewer, 2009). It can be argued that such moves are indicators of 'Mode 2' research, whereby research is increasingly seen to serve political and economic purposes (Gibbons et al., 1994; Hammersley, 2000). In response campaigns have been launched by a number of organisations including the Academy of Social Science 'to promote and defend UK social science' (Academy of Social Sciences, 2010) in particular in the face of global economic pressures where the natural and medical sciences have generally fared better than the social, arts and humanities (Bastow et al., 2014). In a recent review UK social sciences strength in science

and technology studies was highlighted, and specifically in respect to its ‘translation’ and ‘intermediary’ skills. This has captured the attention of policymakers and research councils and offers a demonstrable impact of social science endeavour in the UK (BSA at al., 2010). In this regard *functional*, *substantive* and *practical* roles can easily become a solution at a time when all research is under pressure to demonstrate its worth. Social science defined as part of ‘science’ in the UK, for example amongst research council funding, also offers an ‘outsider role’ in terms of contributing relevant expertise (Bastow et al., 2014; Burchell & Holden, 2009) thus the boundaries around it are not fixed.

Secondly, Horst and Michael (2011) stress the social aspects of science communication and engagement events, social scientists’ roles in these activities co-exist, change and are shaped by and with other participants in such processes. This coincides with ever increasing ‘new’ scientific issues worthy of consideration, be it synthetic biology (Calvert & Martin, 2009), the implications of climate change (Pidgeon & Fischhoff, 2011) or new biomedical practices (Rose, 2013), there will always be new, emerging scientific issues around which to engage and new high profile research communities with whom to collaborate. John Brewer (2009), former president of the British Sociological Association encouraged ‘engaging with strangers’, stating that in the case of sociology it needs ‘for example, to link with environmental sciences to discuss climate change, with medical sciences to debate future welfare demands and with economics when thinking about sustainability.’ The following article offers one opportunity to reflect on the experiences of those already ‘engaging with strangers’, exploring how social scientists engaged in public engagement with science and technology settings in the UK regard their role(s) and how this could be influenced by demands on those social scientists to deliver impact in that context.

Methods

The research carried out for this project involved a small-scale exploratory study, using qualitative interview techniques. The focus was confined to the UK, and to interviews with a small sample of individuals with a view to developing more extensive research at a later date. Key findings were drawn from the existing literature to inform the research design and devise a series of interview questions (Meyer, 2010; Benyon & David, 2008; Lomas, 2007). These can be found in Appendix 1. The interviews intended to explore a number of areas including definitions of PEST, discussion of the roles, barriers and contributions of social scientists and experience of working within PEST settings and across disciplines. The interview questions received feedback from an external advisor for the project and were piloted during the first few interviews which resulted in some minor changes.

An initial pool of social scientists was generated via the following means. Firstly, it included social scientists working at relevant institutions (for example ESRC Genomics Network) or in relevant fields of science, technology and public engagement identified via searching of UK university websites. Secondly, attendees with social science backgrounds at relevant events (for example The British Science Association Science Communication Conference and The Roles of Social Science in Public Dialogue on Science and Technology: Report of a One-Day Stakeholder Workshop) were noted. Thirdly, recommendations from key contacts in the field and advisory group members were requested. Additionally, a small number of social scientists that had published relevant work on PEST and social science engagement were listed. This generated a sample of 55 individuals, from which a stratified sample of 29 social scientists was identified, based on different stages of career, working across diverse areas of science and technology and in differing roles (e.g. researcher, facilitator etc.). These participants were initially invited for interview. Eight declined to be interviewed or did not respond over the duration of the data collection period, this did not

have a noticeable impact on the stratification approach taken. There are limitations within this sampling approach, for example it identified those with high academic and institutional profiles and recommendation may have lead to the inclusion of those with similar academic perspectives; however it was appropriate to the project which sought to identify individuals with particular roles and expertises.

Interviews were carried out with a sample (n=21) of UK-based social scientists, working in and around the PEST field. Interviews predominantly occurred via the telephone, with a small number occurring face-to-face, based on interviewee preference. Additionally one social scientist chose to respond to the interview questions via email. Interviews occurred between June and September 2010. All interview data were digitally recorded and transcribed. The transcripts were analysed via a coding frame based on Ritchie and Spencer's (1994) five-step framework analysis, using the qualitative software programme NVivo, with the coding frame developed on the basis of the data. Four key themes originated from this coding framework, including 'definitions', 'role of social scientists', 'working with scientists', and 'social science public engagement'. A further 20 codes carried content under these broader themes. These codes are illustrated in Table 1, which also details the number of interviews from which references to the code were drawn, as well as the total number of references in each code. In this article the focus is mainly on the most dominant codes, and these are illustrated by relevant quotes which were selected as representative.

<Insert Table 1 about here>

Ethical approval was granted by the [Removed for anonymous review]. Representing the professional nature of the project, interviewees were given the option to use their real names where that was their preference, however the majority of those included here preferred to remain anonymous with job title given only. Interviewees were also asked to complete a

short questionnaire on their academic role, qualifications and interests primarily to provide context to their comments.

Interview participants came from a variety of academic roles including: one PhD student, two Senior/Research Assistants, six Senior/Research Fellows, four Senior/Lecturers, two Academic Fellows and six Professors (two of whom were also Directors of Institutes, Units or Departments). Despite the sampling approach it should be acknowledged that the interviewees ended up being slight more weighted towards senior stages of their careers. Nine interviewees were male, with the remaining 12 being female. Interviewees had a range of informal to formal academic experience within the social sciences and were asked to note their informal and formal educational experience in the social sciences as set out by Economic and Social Research Council (ESRC) definitions. These are presented in Table 2.

<Insert Table 2 about here>

Were this research carried out in an international context, then widening these definitions would no doubt be beneficial to capture for example, communication backgrounds, which in a UK context frequently but not exclusively fall under the remit of a different research council (Arts and Humanities Research Council). Definition of the social scientist role can be contentious. Due to the small scale of this project it was necessary to work with practical measures and formats for identification, in more extensive research it would be beneficial to explore the nuances of these definitions in more detail. It should also be noted that this information did not include formal education beyond the social sciences, and the expectation would be that additional undergraduate and postgraduate qualifications would also have been present amongst interviewees had they been asked to provide this detail. Perhaps predictably the most common areas of interviewees experience included sociology; 18 interviewees expressed some level of experience in this field, followed by Science, Technology and Innovation Studies at 16 interviewees. However there was a wide

range of experience across all of the fields included, each of which had at least one interviewee with a level of experience.

Interviewees were also asked about the types of roles they had taken in previous work with scientists. The most frequently ascribed roles, which interviewees stated they had ‘often’ done, included as a Researcher (scientist as subject) (n=11), Principal Investigator (n=10), Co-Investigator (n=10), Joint-Investigator (n=6), and Teacher (of science students) (n=6) as illustrated in Table 3. It was also relatively common to ‘often’ act as a Named/Sub-contracted Researcher (n=5) and Facilitator (n=5). This diversity of roles perhaps reflects the different career points of those interviewees included.

<Insert Table 3 about here>

Interviewees were also involved in a variety of scientific areas and it was very common for participants to note that they had worked on a variety of scientific fields. Most common were subject areas such as Genetics (n=13), Genomics (n=10), Biotechnology (n=10), Stem Cells (n=9), Biomedicine (n=9) and Cultural Studies of Science (n=8) and the Environment (n=8). It should be highlighted that there was a bias amongst interviewees towards biomedical and genetic issues. This is not unexpected within the UK context as these subjects have high prominence. A variety of other subject areas were noted, as is illustrated in Figure 1.

<Insert Figure 1 about here>

It should be acknowledged that the study was designed by a social scientist, though a natural scientist contributed to a proportion of the data collection and coding. As such there is the possibility that some assumptions and values within the study could be influenced by the socially situated context of the researchers own disciplinary background and research context (Hammersley, 2000).

Results

Engaging with strangers: Working with scientists

It goes without saying that for the majority of those interviewed working with natural scientists was an essential aspect of their research interests but when probing aspects that they found beneficial there were many comments suggesting that natural scientists were ‘enjoyable’, ‘interesting’ and ‘intelligent’ participants in research practices. Exploring the data associated to the theme ‘working with scientists’ and selected codes from ‘social science and public engagement’, collaboration with natural scientists was identified as both a rewarding and essential aspect of PEST activities:

We worked with the chemical industry and we only got access to the industry because we had a chemical engineer on board. And he knew the right people and he knew the right language to get them interested...that was really critical...it was very much a social research project, but it couldn't have happened without working with scientists who thought that what we were doing was valid. (Interviewee 15, Senior/Lecturer)

The interviewee's comments suggested that collaborative and considerate working relationships were key features to productivity, but natural scientists also provided access, tools, dialect, consent and recognition that was essential for some work to occur. It was often expressed that the relationships built when working with natural scientists are comparable to that which can occur in any social science setting that requires trust, cooperation and respect:

I think working with people from other disciplines always creates challenges, so I'm not sure if it's particularly unique with science...because of the turn in science towards an emphasis in science communication for example...there's a kind of openness to joint working, which I think, although there are still barriers around what that means, what public engagement might mean, generally the starting point is very, very positive. (Interviewee 20, Professor)

However, as the Professor above commented the increased emphasis on engagement and communication within the sciences had opened up amplified opportunities for these forms of collaboration, despite some definitional differences, a point returned to later. Working with scientific areas could bring success; in having their research supported at an

interdisciplinary level, for example with higher levels of financial support available via scientific funding bodies than those traditionally supporting social science research. A number of interviewees commented that learning more about different areas of science, finding out ‘the basics’, was rewarding in itself, though interviewees did not always reveal subject knowledge when interacting with natural scientists, as one interviewee suggested: ‘they just assumed I knew nothing, which was quite useful’. Instead they were able to draw on prior experience (a number of interviewees had some preceding education in natural science), informally develop their knowledge, or pursue a line of questioning which could draw out information from scientists they worked with. In general there was a sense that the natural scientists were quite open in dialogue; enthusiastic and happy to talk about their research with only occasional ‘hostile’ incidents referred to. Social scientists were able to capitalise on the general openness by showing interest when conversing, though a couple of interviewees mentioned that gleaning information from scientific publications, or if a discussion advanced too far into technicalities, could be challenging.

Some difficulties when working with natural scientists were also highlighted, for instance in funding bodies recognising work which may bridge or branch across differing fields or the concern that one would become isolated from an original disciplinary areas by cultivating a career with other disciplines. Funding across disciplines could raise issues of ‘power dynamics’, or see social scientific work ‘tacked on’ but also required negotiation and time at the outset of the project to learn about and consult with other fields of work and this applied to both natural and social scientists:

If you’re working with someone that is not from your core discipline, then some investment needs to be made in understanding the basic framing of that discipline and where people are coming from and why they think it’s important to look at certain things and not others... [if] they are not willing to try to see the world from another perspective, which is provided by another discipline, that can be a barrier...if people can’t do that then you can’t really work with them. (Interviewee 12, Senior/Lecturer)

These comments suggested the most fruitful relationships took time to establish, pithy encounters focusing only on a short-term pragmatic partnership could be seen as a lesser engagement between the disciplines, a point which has been raised in prior work related to cross, inter and multi-disciplinary approaches. Learning about the other discipline/s, on both the part of the natural scientist and social scientist however is a further ‘cost’ in time or space which could be easily neglected or ignored within a more traditional framing of research that takes specialist subject knowledge as a given. Conceptions and understanding of social science can be problematic (Schummer, 2009), from the perspective of methods a variety of issues were raised including awareness of qualitative approaches, working from different empirical perspectives and differing timeframes as possible points of difficulty:

Scientists organising an event or data collection at an event, they probably have a very short period of time for the analysis of that, because they just want quite a basic content analysis, just kind of “50 people said yes”. Whereas a social scientist will want to spend a bit more time really getting to grips with it and it’s really quite hard to argue that case...without it being a crash course to social science analysis...it’s really difficult to show what social scientists can really do. (Interviewee 4, Senior/Research Fellow)

This raises practical and methodological questions for social scientists in such settings, will aims be achievable or maximise the potential outcomes of a piece of work? And how can such ‘border’ discussions between disciplines be negotiated efficiently? These are perhaps straightforward to handle on a one-to-one basis but can be more challenging amongst a wider discourse of results, efficiencies and impacts where social scientist involvement may not always be embedded from the outset:

Scientists think that social research is going to be a lot quicker and cheaper than it is...An experience recently, just somebody writing a sort of draft proposal in which they had got about five types of social science involved, including ethnography, all happening in a few weeks, you know for a few thousand pounds and you sort of think ah, have they really understood what that will actually consist of? (Interviewee 15, Senior/Lecturer)

Interviewees expressed considerable satisfaction in coming to understand new scientific developments and areas, enjoyed the work that they were engaged in and identified the

contributions that social science perspective could provide but comments suggested that such positive working relationships took time and confidence to develop, and it was important not to neglect the benefits social science and natural science perspectives could offer.

Brief Encounters: Influence of space and time

In the UK context the influence that social scientists had played in shaping, influencing and heartening the ‘language’ and ‘rhetoric’ of public engagement was a prominent area of discussion under the theme ‘role of the social scientist’, drawing out a sense of contribution but also responsibility amongst those interviewed, particularly if they had worked in the field for a number of years. Access to this event space had been hard won and created a sense of responsibility for a critical eye on engagement processes that had emerged. Thus whilst in interviews many discussed the multiple roles that social scientists operate within a PEST agenda, for example that social scientists might be involved in the development of strategies, methods, protocols or techniques used in the PEST setting, or offering the inspiration for them, for instance via the evaluation methods that have emerged in the field which often map to common social research techniques as has been noted elsewhere (Metcalf et al., 2008), they also stressed a role beyond the ‘methodologist’ (Wright Mills, 1959):

I think social scientists have been quite good at giving examples of different methods and what they mean...I think methods are crucial but I think they often don't translate very well, because it's a skill isn't it? It's a whole craft to understanding the social, you can't just pass it around. (Interviewee 12, Senior/Lecturer)

Interviewee 12 made the point that the passing on of methods may miss the skills, experience and ‘craft’ that a social scientist has developed, arguably to PEST’s cost if methods are not truly understood. The adoption and adaptation of social research methods within public engagement framings could mean at times social scientists were seen to take quite practical roles providing functional, translation and mediatory approaches or for the social scientist to

be removed from the situation altogether with their techniques and methods utilised by others. Whilst it was recognised that this could be a situation social scientists were accepting of, interviewees also stressed that this could miss some of the benefits of social science expertise and could be controversial, as illustrated when asked about roles like facilitation:

I think there is a role for social sciences to say that there is actually a danger of these processes when they become commodified, when they become seen as the domain of the consultant, that that tends to seclude the critical edge that actually negates the very function that they set up in the first place. (Interviewee 7, Phil Macnaghten, Professor)

Interviewees questioned the assumption that a social scientist might in some way be conditioned to be neutral or clearer communicators suited to translation, interpretation or mediation, but returned to the idea that they could operate as a critical eye or trouble maker.

This also created challenges in working relationships with those natural scientists involved in PEST projects:

To some extent we can also be trouble makers, we can feed in, we can play the devil's advocate as part of these events if that's what we think is appropriate in adding in our own analysis, alternative positions, bringing in our findings from all the kinds of research projects, feeding back our own analysis of the issues and so on. (Interviewee 16, Senior/Lecturer)

It puts you in this strange paradoxical position. On the one hand, you certainly don't want to undermine the authority of science to an extent, because of course the reason why we are interested in science is because it has such a strong authority within our society. At the same time, we are also aligning ourselves with all the kind of anti science critique, which is also emerging very strongly now at a popular level...and it's a fine line to walk. (Interviewee 8, Sabina Leonelli, Senior/Research Fellow)

Interviewee 13 drew on an interesting example where one finding from the research project presented potentially negative ramifications for those involved in the research process, were it focussed on in detail:

It left me with questions about what my role as a social scientist was, in terms of reporting that to the wider community and we were quite exercised in how to report our research without necessarily jeopardising or being kind of unnecessarily provocative or undermining the work of scientists, but at the same time, to give us the space to have a kind of critical position analysis of what that work was about. (Interviewee 13, Professor)

There is the problem of maintaining a critical distance when you also want to close that distance in order to work collaboratively and often just to have a friendly relationship. It's hard to be critical when you're going for a pint with the scientist in question...I'm surprised that sociologists are still seen by people as quite threatening, that you can say something moderately critical and that is seen as really bad...I love it when I'm speaking with scientists and I get challenged. (Interviewee 4, Senior/Research Fellow)

The social scientists were thus balancing a multitude of roles and dilemmas at the boundary of the disciplines; the servant, the critic, the friendly face with whom you would want to collaborate or socialise. Though many had and were operating in *interpretative* and *substantive* roles, opportunities for the *functional* and *practical* were also apparent.

Emergent spaces: Collaboration in science communication and public engagement

Returning to the concept of engagement as an emergent space, it was clear in the interviews that both definitions of engagement and the types of roles for social scientists within those spaces remain many and varied. They form processes of negotiation, compromise, mutuality, achievement and concession. These issues emerged under the theme 'definitions' and selected aspects of 'social scientists and public engagement'.

Despite or perhaps due to the interviewee's acute awareness of the history and development of concepts such as scientific literacy and public understanding, definition of the term 'public engagement' remained contentious, as one interviewee suggested, it was 'the million dollar question'. Over ten years after the signalling of a dialogue and engagement agenda in the UK, PEST and its meanings remains a process of arbitration for many of the social scientists interviewed:

One of the problems with it is that people make it mean what they want it to mean, a lot of the time. Sometimes that's a problem and sometimes that's a good thing. (Interviewee 1, Senior/Research Fellow)

Interviewees raised issues that these multiple interpretations could mean engagement was used at times to describe something more akin to a traditional deficit model approach.

Whereas the majority of interviewees conceptualised public engagement as having a more ‘democratic’, ‘two-way’, ‘deliberative’ or ‘dialogic’ connotation. That such concepts are difficult to define is already well discussed within the literature (Nisbet & Scheufele, 2009) but it is significant that for these social scientists, it remains a concept for adjudication at a practical level, even within one national setting where discussions of such approaches are well advanced.

For social scientists operating in these spaces this raises one final point of interest whereby some of those interviewed often found public engagement around their own research was perhaps complicated by their involvement in PEST, to engage around their work on public engagement with science and technology represented a challenge and question around their own engagement strategy:

Actually I found it quite difficult to communicate my own work, so I’m aware there is a real irony there. Part of that has to do with, I’ve studied controversies and I don’t want to be part of the controversy while I’m studying it. There’s a real methodological reason not to let yourself get drawn in, but at the same time it’s quite easy to hide behind that. (Interviewee 1, Senior/Research Fellow)

The challenges of engaging around science and technology studies, making them socially accessible and publically useful and whether that is even appropriate has only been addressed to a limited extent (McKenzie Stevens, 2008). Perceiving engagement as an emergent, transient and non-linear space may therefore assist social scientists to frame the complexities of this engagement. As with many other areas of social science research, participation in methods, with communities or other stakeholders in shared and collaborative ways may indicate impact but not in a traditional, linear or transmission based-model:

I have been working with the [names a specific project]. That community engagement is meant to be over a long period of time, during the trial process. I mean, the wider communities that they [within this project] do try to engage, yes, it is to get their interest, but I somehow feel that with public engagement in science that it’s more like those Café Scientifique kind of things, where people just trot along and think ‘Oh, I’m going to listen to this lecture or you know join a group somewhere’. (Interviewee 5, Mary Upton, PhD Student)

However, these are issues to be contended with, as with any calls to arms to provide more *functional* and *practical* roles would suggest equally functional and mechanistic impacts. In fact the interviewees grappling with how their work related to and fitted within a wider engagement agenda suggested and added to the notion of public engagement as a reflective, contingent and heterogenic space worthy of continued exploration and analysis (Horst & Michael, 2011).

Discussion

The results from this small number of interviews with social scientists engaged in PEST within a UK context suggest there are multiple rewards and opportunities in collaborating with the scientific community but it does take time (both in regards to individual experience and within an individual project or research area) to establish true collaboration, share social behaviours and reap the potential that engagement can arguably hold for all engaged in these shared boundary spaces.

Many of the negotiations around the social scientist role in public engagement settings share commonalities with the involvement of social scientists in policymaking more widely and relate to ‘interactive ability’ (Collins & Evans, 2007:38; Bastow et al., 2014). Policymakers can find it demanding to reach and assess research expertise (Holmes & Clarke, 2008; British Academy, 2008), to decipher its language (Davies, 2004) and work to different timings and decision-making models (Johnson, 2004; Jones, Fischhoff & Lach, 1999; Sharpe, 1975). The relationships between research and practice is full of ‘misapprehension’ and a perception can exist that research is a ‘product’ to be purchased ‘but too often it is the wrong size, needs some assembly, is on back order, and comes from last year’s fashion line’ (Lomas, 2007:130). In this regard social scientists operating in PEST are facing similar difficulties as any other researcher seeking to establish research aims, generate new insights,

or framings in research with potential relevance to other disciplines, policy, practice or applied settings.

However many of the interviewees who took the time to share their perspectives have cultivated rewarding, critical, collaborative stances, which could be distorted with regards to recent emphasises around the role of social science expertise and its confusing relationship to disciplinary impact. UK and European discussions have seen some very positive reactions to the incorporation of a social scientist in PEST settings (Burchell & Holden, 2009; Bijker & d'Andrea, 2009) in roles which can accentuate translation and mediation, and these can be attractive as one route to maintain funding and disciplinary visibility. Yet it was clear that many of the interviewees felt a responsibility to maintain their 'interactional expertise' (Collins & Evans, 2007), whilst adopting a critical role rather than a reverence to science and technology agendas. In its own way a critical role is also 'partisan' (Hammersley, 2000), and therefore provides 'impacts', yet these maybe less visible or apparent than a functional remit or role.

Social science contributions have formed a substantial foundation for the current PEST schema and have been shaped by many past areas of scientific controversy. A number of comments evidence that interviewees felt a sense of 'loyalty' to the public engagement agenda (Valve & McNally, 2012), whilst at the same time seek to focus a critical social science eye back to the spaces they 'themselves have been involved in prompting or creating' (Chilvers, 2013:284). As Webster (2007:459) highlights work within science and technology studies seeks to 'open up and reframe conventional hierarchies of knowledge, expertise and practice' which does not match well within a policymaking framework 'founded upon such hierarchies that order and legitimate the actions of government and state agencies' and the predicament between collaboration and criticality was noted by a number of those interviewed. Over time social scientists critical, reflective and removed scholarship has

contributed to public engagement framings, both improving, but also sometimes challenging that which occurs within PEST, as criticality can imply independence from the dominant ideology (Hammersley, 2000). Thus whilst some interviewees recognised that functional roles could be taken within such contexts (including aspects such as facilitation and evaluation) they also highlighted as important these more critical spaces.

In addition it was also noticeable that some recollections suggested PEST contexts can utilise the approaches, methods and techniques of the social sciences without a social scientist present. Perhaps some natural scientists may not appreciate their own ‘interactional expertise’ with regards to the skills of a social scientist, that they may *understand* and *discuss* social science approaches, though not necessarily be able to *do* them (Collins & Evans, 2007; 35). This raises the need to consider how natural scientists and those working in PEST perceive their own ‘interactional expertise’ where the social sciences are concerned and that *understanding* and *discussing* social science approaches, may not translate to the skills or ‘craft’ required to *do* them (Collins & Evans, 2007; 35). It is a weakness of this study that the natural scientists perspective is not represented, as this could unduly authorise the social scientists account of events alone. However, as there has been a dearth of research on social scientists perspectives on their role in PEST, in comparison to natural scientists experiences, it may also be argued that this partiality increases objectivity around the PEST setting without moving to an entirely partisan perspective in terms of its potential influence (Hammersley, 2000). Nevertheless further research on natural scientists perspective of the role of social scientists specifically, and any ‘interactional expertise’ they develop, as opposed to their general experience of PEST, would be insightful.

As discussions around appropriate expertise and its definition continue to occur (Collins & Weinel, 2011) such spaces are exclusive, easily open to closure (Bogner, 2012) and under explored (Collins & Evans, 2007). In the interviewees comments it was clear that

established relationships with natural scientists often provided access to PEST spaces and yet there was a strong sense that social science contributions could be ‘tagged on’ or poorly anticipated even within such longstanding contexts.

As new, emerging research areas continually emerge, natural scientists working at the cutting edge may often be engaging the first time, in this regard PEST is a perfect example of ‘Mode 2’, in that its contexts are so transient, dynamic and heterogeneous (Gibbons et al, 1994). These novice engagers need clear guidance, recommendations and accessible instruction on how to engage (Burchell, 2009) and such queries were often presented to interviewees. Continual reflection on the social scientists role is then important as new scientific research issues come to the fore of the PEST agenda and find foundation in new working relationships. Just as we see ‘ideal’ publics stereotyped as neutral, non-opinionated, unorganised, representative characters in some engagement framings (Powell & Colin, 2009) there is also the potential for social scientists to be framed as without expertise beyond method or mediation, or to be characterised as ‘natural’ communicators. However if we consider science communication as Horst and Michael (2011) describe as ‘emergent events’; where social scientists are working in shared spaces full of contradictions, definitional issues and ‘noise’, it was also clear that interviewees may have resonance against such practical expectations.

Focussing on the practical skills and resources social scientists may offer or provide to PEST settings, particularly in periods of disciplinary insecurity, may ignore the fruitful collaborations that can occur and that many of the interviewees had cultivated and sought to protect. Operating in an answerable relationship to scientific agendas can lead to a marginalised position (Bijker & d’Andrea, 2009). Too often the focus of academic attention around engagement processes has been on the documentation and processes of public engagement activities (Bickerstaff, Lorenzoni, Jones & Pidgeon, 2010; Bogner, 2012),

influenced by the frequently small timescales and/or budgets associated to such events which neglects not only how time intensive they are (Powell & Colin, 2009) but also the potential to address broader issues of agendas, framing, intentions, discourses and outcomes (Michael, 2012).

This raises the final aspect for discussion, that of the difficulty of filtering out the impacts of such activities. The entities, results and outcomes of such events are rarely clear cut as the many evaluations of such activities attest, but this is particularly the case in regard to our understanding of the perspectives of the social scientists involved. These are not necessarily projects with an 'end point' but are complex and spherical making the demonstration of impact more intricate (Metcalf et al, 2008; McKenzie Stevens, 2008; Osborne & Rose, 1999). Therefore whilst social scientists in a UK context are undoubtedly playing a role in discussions around science and technology issues establishing how they mediate that process, the role that they play and the impact that they have is variable and complex.

Conclusion

Engaging with strangers can create fine lines and unstable boundaries for those social scientists working in such settings and it also has its dangers as Gouldner (1973:15) expressed in a wider context;

In return for a measure of autonomy and social support, many social scientists have surrendered their critical impulses. This was not usually a callous 'sell-out' but a slow process of mutual accommodation; both parties suddenly found themselves betrothed without a formal ceremony.

Influences on social scientists to provide either more effective communication, 'invited participation' (Bogner, 2012), impact, or a 'tick box' that public issues have been dealt with, may particularly come to the fore at a time when the financial justifications and impacts for a particular disciplinary field are coming to attention but the liaison between

social and natural scientists where PEST is concerned is ‘complicated’. This is particularly so as many social scientists may have moved into the field from a natural science background, established expertise in the areas of science they are working in and with, or are located in university environments where they are working closely with natural scientists in their day-to-day routines. Thus the boundary is in a constant state of traverse. This may not then reflect as cleanly intentions to suggest social scientific research demonstrate a linear impact on the scientific community within a public engagement with science and technology setting, the outcomes and impacts will be there but establishing their origin can be multifarious to decipher.

Nor does it suggest that it is simply a case of social scientists paying more attention to scientific and technological issues (Bijker & d’Andrea, 2009). Identified as the ‘social scientist’ in a PEST setting does not necessarily mean one transition from social scientist to science but is often more intricate, with shared academic histories, educational perspectives and the need for future learning across disciplines often present and therefore is more akin to the unstable and unfixed *emergence* model proposed by Horst and Michael (2011). Public engagement with science and technology does then offer one example of ‘engaging with strangers’ generating fruitful interactions and impact over time, but social scientists engaged in this process are varied and reflective, shotgun ceremonies and ‘brief encounters’ may miss the potential of such opportunities and further research on these interactions and the negotiations that occur at this boundary will be beneficial as these relationships expand and go on within science, public and society settings, and spaces and time continue to evolve.

Appendix 1

- 1) What does the term public engagement mean to you? [Prompt - and your work?]
- 2) Do you think social science knowledge and expertise contributes to public engagement with science and technology? [Prompt how?]
- 3) What roles would you describe social scientists as having in a public engagement setting?
- 4) Others have described social scientists as [prompts - facilitator, translator, theorists, and problem solvers, providing methods] are there any you would strongly agree with or disagree with from this list? And why?
- 5) A number of barriers have been noted when working across science and technology disciplines (language, timeframes, objectives, identity as a social scientist) could you discuss any of these or others that you have identified in your own work with other disciplines?
- 6) Reflecting on your work what would you describe as being the main benefit of working with scientists?
- 7) Have there been any challenges when working with scientists?
- 8) Has there been anything unexpected when working with scientists?
- 9) Do you think social scientists are prepared to engage with publics about their work?
- 10) Do you think social scientists are accessible and useful to publics? If so, how?
- 11) Do you think social scientists should be contributing more to areas effecting publics [Prompts - for example responding to government consultations, acting as advisors, interacting with policymakers]?
- 12) Are there any challenges or differences you would anticipate when engaging about social science based on your experiences within a science context?
- 13) Is there any learning which you feel the natural sciences could share with regards to engagement and the social science communities?
- 14) Finally, is there anything further you would like to add?

Questions drawn from Benyon and David (2008), Burchell and Holden (2009), Elliot and Williams (2008), Lomas (2007) and Meyer (2010).

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¹ Horst and Michael (2011: 286) define the concept of an event in terms of a ‘coming together of different elements through which novel relations and identities can emerge.’ It is not then restricted to a face-to-face activity but represents the varied assemblages via which communication and engagement may occur in science and technology settings.

Tables

Table 1. Coding Frame

Key Themes	Underlying Codes	Number of Interview Transcripts Referenced	Number of References	Key Theme Total
Definitions	Social Scientist Identity	13	30	90
	Public Engagement	21	45	
	Public Understanding of Science	5	6	
	Public's	5	9	
Role of Social Scientist	Critical	12	18	164
	Embedded	15	32	
	Neutral/Facilitation	16	30	
	Methodological	21	42	
	Professionalisation	6	9	
	Theoretical	16	33	

Working with Scientists	Funding	7	11	108
	Understanding (Natural Science)	18	42	
	Understanding (Social Science)	18	55	
Social Science and Public Engagement	Time	3	4	148
	Complexity	9	10	
	The Media	4	7	
	Natural Science/ Social Science Shared Learning	17	21	
	Language	8	8	
	Engagement with PE	21	79	
	Impact	11	19	

Table 2. Educational Experience (Social Sciences Only) by Interviewee

Educational Experience	Informal Experience	UG Degree	PG Taught Degree	PhD	Total
Area and Development Studies	0	0	2	1	2*
Criminology	2	0	0	0	2
Demography	0	1	0		1
Economic and Social History	4	0	0	0	4
Economics	2	0	0	0	2
Education	1	0	0	0	1
Human Geography	1	0	2	3	5*
Linguistics	1	1	0	1	3
Management and Business Studies	2	0	0	0	2
Politics and International Relations	2	1	0	0	3
Planning	1	0	0	0	1
Psychology	1	1	0	0	2
Social Anthropology	4	1	0	0	5
Social Policy	2	1	0	0	3
Socio-Legal Studies	2	0	1	1	3*
Sociology	5	5	3	10	18*
Statistics, Computing and Methodology	3	0	2	0	5
Science, Technology and Innovation Studies	5	1	4	14	16*
Social Work	1	0	0	0	1

* Respondents allocated to more than one category

Table 3. Roles in Relevant work with Scientists by Interviewee

Roles in Relevant Work	Often	Rarely	Never	Total
Principle Investigator	10	3	4	17
Co-Investigator	10	5	4	19
Joint-Investigator	6	3	7	16
Named/Sub-Contracted Researcher	5	5	5	15
Facilitator	5	5	2	12
Teacher (e..g of science students/scientists)	6	6	4	16

Researcher (e.g. scientist as subject)	11	4	3	18
Other (please state)				
Speaking at PE events with other scientists	0	1	0	1
Research Collaboration in Multi/Trans-disciplinary Teams	1	0	0	1

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