Emergent Themes in Nuclear Decommissioning Dialogue: A Systems Perspective

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Abstract

This paper discusses the ontological and epistemological basis of a recently completed action orientated work based PhD entitled: "Participant Perceptions on the Nature of Stakeholder Dialogue Carried Out by the UK Nuclear Decommissioning Authority (NDA)". The research had the emancipatory aim of raising participant awareness regarding their role in the dialogue process, particularly the nature of the conversation being had and participants' influence on the UK Nuclear Decommissioning Strategy. During the research, the links between the work and systems thinking became apparent. The emerging themes of deliberation, influence and fairness within the ongoing NDA dialogue are introduced. A summary of the opportunities for systemic social research is provided, with the conclusion that despite initiatives such as the NDA Socio-economic Strategy and the West Cumbria Energy Coast™, there is currently an absence of ongoing social research on the societal impacts of the planned decommissioning of Sellafield and other nuclear sites. The social impacts of decommissioning are particularly poorly understood, requiring systemic social research that can inform a community and institutional response.

Key words: action research, ontology, epistemology, nuclear decommissioning, systemic social research.

Introduction

Christine Welch, in her Guest Editorial for the Anniversary Edition of Systemist (Welch 2009) summarises neatly what she considers to be the most essential concepts underpinning systems work. Accepting the various traditions that comprise systems approaches to tackling complexity, she states *"a systemist attempts to see the whole picture, entertaining shifts in perspective to reflect differing positions held by engaged observers"*. Also, *"as systems thinkers, we do not accept narrow and short term views"*. By constructing mental models to create conceptual systems, interdependencies are highlighted. In short, sysytemists try to make sense of unstructured situations.

Research by Whitton (2010) for a recently completed work based, action orientated PhD entitled *"Participant Perceptions on the Nature of Stakeholder Dialogue Carried Out by the UK Nuclear De-*

commissioning Authority (NDA)" used participants at the Nuclear Decommissioning Authority (NDA) National Stakeholder Group (NSG) - a standing forum that meets twice a year - as a representative sample to generate research data on their perceptions of the process. The NDA is the government agency responsible for the decommissioning of nuclear sites in the UK. The data received through the issue of two questionnaires allowed the author to gain insight into individuals' perceptions of the type of dialogue used to engage them and their influence as stakeholders on the NDA Decommissioning Strategy.

The action orientated approach of diagnostic research, reflection, data gathering followed by further reflection and the author's positionality as a member of the group provided the author with the opportunity to present the findings back to the group. This was to meet the emancipator aims of raising awareness amongst participants regarding their role, the nature of the dialogue used to engage them and their perceived influence on the NDA Strategy. This paper outlines the historical context of dialogue between the UK nuclear sector and its stakeholders, the ontological and epistemological basis for the research and the emergent themes of deliberation, fairness and stakeholder influence highlighted in the thesis. Following this, the author reflects on the opportunities for a systemic, long term approach to understanding the social impacts of the decommissioning of nuclear sites in the UK.

The Context of Stakeholder Dialogue in the UK Nuclear Sector

Historically, the relationship between the UK government owned nuclear industry and its stakeholders can be summarised as starting from a position of what Elam and Sundqvist (2007) have described as a technocratic strategy. They define technocracy as "the government control of society by an elite of technical experts". More generally known as Decide-Announce-Defend (DAD), the approach is based on technical risk assessments rather than engagement, and was the norm until relatively recently. At the other extreme is a form a dialogue based on the deliberation of stakeholders to derive a collective view to inform decision making. The shift in the national picture of dialogue informing government policy on a range of issues and also used to assess policy outcomes is discussed further below. However, despite this apparent movement towards dialogue, more specifically deliberative based dialogue, the nature of dialogue taking place for the nuclear decommissioning of nuclear facilities in the UK has been less clear.

In recent years, dialogue based engagement has been driven by a general willingness in Central and Local Government and Government Agencies to encourage public involvement in environmental, but also general decision making processes to inform policy and strategy on a wide range of issues. As Kos and Polic (2008) have pointed out, the impact of the post 1997 Labour Governments Third Way and policy learning between countries at international forums has been recognized as an important factor in understanding the move away from technocratic decision making towards more participatory methods in decisions surrounding nuclear waste and decommissioning. Bayley and French (2008) have also contributed this experience in the UK for a need to address public disillusionment; with central government, regulatory agencies handling of issues such as BSE ('mad-cow' disease), foot and mouth epidemics, and the National Health Service (NHS). As Cornwall (2008) has stated: *"public institutions in particular are responding to the calls voiced by activists, development practitioners and progressive thinkers for greater public involvement in making the decisions that matter and holding governments to account for following through on their commitments. Yet what exactly 'participation' means to these different actors can vary enormously"*.

Within the European context, the role and importance of stakeholder participation has been highlighted by Collins and Ison (2006), as set out in the Aarhus Convention (UN, 1998) and the Water Framework Directive (EU, 2000). According to the authors, this involvement is seen as an attempt to address the general decline in trust of decision makers and the increasing democratic deficit as underpinning reasons for participation activities. Lee and Abott (2003) have also identified the lack of legislative drivers to encourage participation, but recognize that there is a shift is taking place within central government to address this from a democratic and constitutional perspective. Low electoral turnout and reduced political party membership has challenged the government to reach those who are less than enthused by the political and democratic process in the UK, particularly the most disadvantaged in society where this problem is most evident.

The undoing of the technocratic approach to decision making in the nuclear sector was most visibly demonstrated by the failure of the Nirex repository concept in 1997 (Rock Characterization Facility at Longlands Farm, Cumbria), a deep geological store for nuclear waste. As Simmons, Bickerstaff and Walls (2006) have reasoned, *"the collapse of the deep repository programme left the UK with no agreed strategy for the long-term management of radioactive wastes"*. This was viewed as a significant political problem at the time as a large part of the UK's ageing reactor fleet was coming to the end of its operational life and due for decommissioning. The rest of the nuclear industry's current infrastructure is due to follow over the coming decades. Following the collapse of the Nirex project, the Government's Radioactive Waste Management Committee (RWMAC) reported that the DAD approach to policy formulation was inappropriate for the management of radioactive waste (RWMAC, 1999, 2000) and had proved to be unsuccessful. RWMAC favoured the use of a consensus-building approach to engender trust, which involved a wide and open discussion of the issues, as the means of developing future policy for the long-term management of the UK's solid radioactive waste. The committee considered this approach to offer the best chances of identifying a policy solution that could ultimately be delivered, although it conceded at the time that to reach full consensus between all stakeholders is not always possible.

The discussion regarding the UK nuclear legacy needed to be radically re-framed to satisfy stakeholder concerns regarding legitimacy of any organization taking major decisions on the future decommissioning and disposal of the UK nuclear legacy. As Kos and Polic, (2008) state: *"The side effect of these developments was a slow and reluctant transition from a technocratic decision-making model to a participatory decision making model. The recognition that perhaps the only chance to find a legitimate solution is the establishment of a complementary socio-technical decision-making model starts to gain ground"*.

Legally, public bodies in the UK are not required to carry out engagement activities to inform decision making. The recently revised guidance issued by the Better Regulation Executive department of UK Government, (2008) is often used as a basis for consultation activities by government departments, non-departmental public bodies and local authorities. The guidance is not legally binding, but the expectation is that it will be used by all government departments and their agencies, such as the NDA. Some government agencies, such as the Environment Agency have "recognised the need to sometimes go beyond statutory requirements and utilise more active methods to enable increased public participation in the decision making process, for the purpose of better informing itself as decision maker" (Environment Agency, 2002). The NDA have also recognized that progressing beyond basic consultation would provide a benefit to the NDA Strategy. The NDA Stakeholder Charter (2005) states that the NDA will *"establish an open and interactive relationship with its stakeholders"* and

"engage with stakeholders and consult widely to ensure there is ample opportunity to understand, comment on and influence its strategies and plans".

Action Orientation of the Research: Ontology

By working towards a critical theory epistemology as discussed by Cassell and Johnson (2006), the overall aim of the research was to facilitate democratic agreement and encourage the evolution of a critical consciousness amongst NSG participants regarding their role in the engagement process. Following diagnostic research on the nature of stakeholder dialogue carried by the Sellafield site and the NDA, the researcher issued two questionnaires to NSG participants to assess their perception of the NSG process and how this had changed over a period of 18 months and four, two day NSG meetings. By understanding stakeholders' perceptions of the NSG and the evolution of this perception, there was the opportunity to validate the findings of the research to NSG participants via a planned process of facilitated reflection as a basis for raising group consciousness regarding their role and influence at the NSG. This would also fulfil the emancipatory aims of the work. However, despite several requests to NDA this was initially declined. A summary of the findings was distributed to participants at NSG-8 in November 2008, followed by conversations with participants and telephone interviews following the event. The author was then surprisingly given permission to present the findings of the research back to the group and did so. This was followed by a discussion with the group to further encourage the evolution of a critical consciousness amongst NSG participants regarding their role in the engagement process.

Whitehead and McNiff (2006) describe Ontology as a theory of being, which influences how we perceive ourselves in relation to our environment, including other people. This has particular resonance in action research where the term positionality is used to define the position of the researcher in relation to their research subject. The range of possible positions as a researcher when conducting action research have been described in detail by Herr and Anderson (2005) and in a range of research settings by Hopkins (2007). Herr and Anderson (2005) use various terms to describe the positionality of the researcher in relation to the research subject. If the researcher is separate from the research, the role of "outsider" is assumed and the task would be to observe other people and offer descriptions and explanations for what they are doing. If the researcher assumes a position where they are part of the other peoples' lives, the position of an "insider" adopting a participatory approach is assumed. For the latter, it is important that the researcher offers a description and explanation of how they and the people that they are researching are involved in mutual relationships of influence. Of direct relevance to the research carried out for the PhD, Herr and Anderson state: *"With the advent of highly educated professionals who have acquired research skills and are enrolled in doctorate programmes, action research dissertations are often done by organisational insiders who see it as a way to deepen their own reflection on practice towards problem solving and professional development……they want to use the research to empower themselves professionally and personally to bring about organisational change"*.

Hopkins (2007) draws upon his experience of working on two research projects – one with young Muslim men (Hopkins, 2006) and one with unaccompanied asylum-seeking children (Hopkins and Hill, 2006) to reflect critically upon the ethics in action research practice, particularly multiple positionalities, and different knowledges and understandings of ethical practices. Although neither of these projects constituted a fully participatory research approach, they were both designed and conducted with participatory values in mind. Hopkins concludes that it is useful for researchers to think critically about the positionalities of researchers and the researched, to ask important questions about the ways

in which these are negotiated in practice and to question how this relates to issues of ethical research practice. Furthermore, many of these issues emerge, change and develop throughout the research process and may alter in nature during the research in ways that researchers are often unable to predict. It is crucial to be open, constructive and cooperative in negotiating ethical practices with research participants and other organisations during the research.

Although the two issues of "positionalities" and "knowledges" are presented separately by Hopkins, they do relate to each other. He highlights how positionalities may include aspects of identity – race, class, gender, age, sexuality, disability – as well as personal experience of research such as research training, previous projects worked on and the philosophical persuasion of the researcher. As he states: *"being sensitive to contextual ethical issues means being aware of, sometimes drawing upon and sometimes contesting our own positionalities in terms of our various identities as well as our previous experiences and preferences"*. Hopkins recommends the use of a transparent approach that acknowledges the continuing production, management and negotiation of positionalities and knowledges in different contexts.

The research carried out for the PhD did not make any claims to the neutrality of the researcher. As Cassell and Johnson (2006) point out, knowledge production can never be neutral, rather, it is produced with some interest in mind. If knowledge and human interests are inseparable, the claim of the objectivist that valid knowledge can only be generated via methodologies that are empirical-analytical in nature must be rejected. In the context of the research presented here, the positivist view that any social science researcher, provided they follow the correct methodological procedure, derived from the natural sciences, can neutrally collect data from an independent social reality so as to empirically test causal predictions was considered inappropriate. The author's positionality as a member of the research group (NSG), who is empowered to make a contribution to discussions, forming professional relationships with those involved would render this an impossible task. As a result, it was never the author's intention to be an independent observer of the NSG, this would have been considered a barrier to intervention and influence.

Midgely (2003), discusses this point from the perspective of systems thinking and the view that everything in the world is connected in some direct or indirect way to everything else. In this way, "the scientific observer is an integral part of the world s/he observes, not separate from it". As Midgley points out, the focus is often on the impossibility of both full understanding of phenomena and infallible prediction, because the complexities of the world slip the grasp of the human observer. This undermines some of the philosophical ideas that have traditionally been invoked in support of science. For instance, it becomes possible to question the reliance of the philosophy of science on the concept of independent observation detached from the values and idiosyncrasies that any observer holds. To remain objective in this respect, intervention by the researcher must be prevented. According to Midgely, systems and complexity theorists maintain that there are inevitable direct and indirect links between the observer and the observed. In this respect, observation free from intervention becomes questionable; Midgely goes on to argue that observation is just one aspect of intervention. The research carried out for the PhD did not attempt to hold positivist philosophical assumptions (that of remaining fully objective as a detached observer), whilst conducting action research in an organisational environment.

Whilst the research could not be considered full Participatory Action Research (PAR) as defined in the literature by Whitehead and McNiff (2006) and Reason and Bradbury (2005) where the researched participate fully and influence the direction of the research, neither can the author be considered neu-

tral or be expected to be immune from subjective perceptions. The 'work based' component provided an additional dimension to the ontological nature of the research. The convenience and presentation of opportunities in the workplace is a powerful motivation for this kind of researcher. Anderson and Jones (2000) provide an example in the field of educational research where they review dissertations in educational leadership. The authors suggest that the practitioners who have carried out the dissertations were partly motivated by the convenience of studying their own specialist area, where they had a *"deep level of tacit knowledge"*. More importantly, the practitioners wanted their research to make a contribution to their own setting and clients. Many of the practitioners wanted to use their work to *"empower themselves professionally and personally and bring about organisational change"*.

For the research carried out by Whitton (2010), the establishment of the NDA and a subsequent programme of stakeholder engagement via the National Stakeholder Group presented the opportunity to do research. Despite being a nuclear industry 'insider' in this instance the author is not employed by the NDA (i.e. the engagement convenor) but rather attends the group in the role of a researcher and representative of the National Nuclear Laboratory (NNL). In this respect, the author is an outsider like other attendees in terms of his position regarding the focus of the inquiry (i.e. other participants). In addition, the work did not form any part of the programme of engagement or provide an input to the organising body of practitioners responsible for the facilitated meetings.

The author's positionality of insider was essential to understanding the social system that he was operating in. By understanding this social system: that is the nature of the dialogue taking place between participants and between the convenor and participants it became obvious to the researcher that research regarding the social impacts of nuclear decommissioning did not inform the engagement process and that little was being done to address this.

Action Orientation of the Research: Epistemology

Epistemology is defined as the *"nature of knowledge, its possibility, scope and general basis"* (Hamlyn, 1995). As Reason and Bradbury (2005) have pointed out, the traditional scientific view has privileged *"knowing through thinking"* over *"knowing through doing"* and promotes an associated account of reality based on rationality as the primary vehicle of "knowing". According to Checkland (1981), this organised inquiry provided by the natural sciences is, for good reason, highly successful and is an approach based on the three fundamental principles which characterise it and give it power; reductionism; repeatability and refutation. If the observations through experimentation (to test hypotheses) are repeatable they count as a contribution to knowledge and turn the findings of experimentation into what Ziman (1968) calls *"public knowledge"*. Several writers have articulated the ontological and epistemological foundations of action research and contrasted them with those of the scientific method associated with a positivistic philosophy (e.g. Susman and Evered 1978, Reason and Torbert 2001), however, this aspect is not discussed further here.

The important influence of pragmatic theory on Action Research, such as the work of John Dewey (1859 – 1952) and Paulo Freire (1921 – 1997) where there is a focus on practical outcomes, was recognised as particularly relevant to the PhD research and is discussed by Greenwood and Levin (1998). Dewey applied his pragmatic principles in social and educational settings. According to Charles and Ward (2007), pragmatism in this respect is defined as *"a method of philosophy in which the truth of a proposition is measured by its correspondence with experimental results and by its practical outcome. It stands opposed to doctrines that hold that truth can be reached through deductive reasoning from a priori grounds and insists on the need for inductive investigation and constant empirical verification*

of hypotheses". Dewey's concern for participative democracy, where members of society generate knowledge through action and experimentation provided a basis for action research. Paulo Freire also worked in an educational setting and developed an educational methodology designed to enable previously illiterate people to understand and articulate a critical view of the world. As Charles and Ward (2007) state: *"he maintained that knowledge and action are both necessary for transformation to occur and argued for the right of everyone to be able to participate in the process of transformation and to be heard and respected".*

Bourner and Simpson (2005) have suggested four ways of "knowing"; through reason (that is through deduction or logic); by received knowledge (through written or spoken word); through empiricism (knowledge through sense based data); through introspection (knowledge from an inner source). As would be expected for any PhD, this research utilised the first three of these and, given the action orientation, the fourth due to reflection and the learning from experience taking place. Despite the contention surrounding any ontological and epistemological stance taken to justify the philosophical groundings of action research, the research was orientated towards action research, undertaken in the tradition of critical theory. Given the action orientation, a critical theory seeks to engage human agents in public self reflection in order to transform their world as agents construct what to observe via interaction with the observed (i.e. NSG participants).

The strong separation of moral decision making from the act of observation cannot be sustained within the context of critical theory because the two interact so should be available for analysis (e.g. Habermas, 1971, 1984a and 1984b). Habermas (1971) has pointed out that knowledge production is always driven by and cannot be separated from, human interest. He has argued against the objectivist claims that valid knowledge can only be generated through empirical-analytical methodologies, insisting that methodologies that seek to separate the bias of the researcher from those being investigated are an illusion due to the process of self reflection. Habermas' theory of communicative action (Habermas, 1984a, 1984b) has been influential in the research presented here from the epistemological perspective of the emancipatory function of democratic dialogue leading to a method for action researchers to work, collaborate, gather and reflect on the data. The work has also provided the philosophical basis for which the term deliberative dialogue is defined by Whitton (2010).

By working towards this epistemology in terms of the values that the research engenders, the work aimed to be aware of what Marcuse (1965) has termed *"nominally democratic communication"* in which the powerful deploy a rhetoric of democracy, or participation to impose their own preference upon, and silence or marginalize the less powerful. It became clear as the research progressed that an *"emancipatory intent is no guarantee of an emancipatory outcome"* as discussed by Acker et al (1991).

As Cassell and Johnson (2006) have pointed out, by working towards a critical theory epistemology, *"the role of the action researcher is redefined to one of facilitating democratic agreement and the evolution of a critical consciousness amongst participants"*. This is achieved by *"engendering, through reflection, self understandings that are consensual and simultaneously expose the interests which produce and disseminate knowledge which was taken to be authoritative and unchallengeable"*. This would allow participants to become fully aware of their role within the engagement process. It follows that reciprocity is seen as an essential component of deliberation, not just between the NDA and stakeholders but also between the researcher and NSG participants. To give participants a voice through the action orientated research process was a key aim of the work, although this could not be said to go so far as the process of cooperative enquiry discussed by Reason (1999), in which

participants take on a broad spectrum of role from designing the research questions to planning action strategies so that the positivist view of an action researcher as a detached expert is fully challenged.

Midgley (2003) maintains that observation is just one form of intervention and states *"Once the moral, subjective, linguistic, and other influences on observation are opened to critical reflection, scientific observation has to be seen as a form of intervention: observation is undertaken purposefully, by an agent, to create change in the knowledge and/or practice of a community of people. It is this purposeful action of an agent that is the defining feature of intervention"*.

The success of the research was assessed on how consensus had been established amongst stakeholders regarding their perceived role. The links to systems theory was also recognised (though not pursued), in so much as there are inevitable direct links between the observer and the observed bringing into question the role of the observer free from intervention, as discussed above with reference to Midgley (2003). As Flood (2006) points out *"Systems thinking is not an approach to action research, but a grounding for action research that may broaden action and deepen research. That is, action research carried out with a systemic perspective in mind promises to construct meaning that resonates strongly with out experiences within a profoundly systemic world"*.

Emergent Themes in Stakeholder Dialogue

As discussed previously, the UK nuclear industry approach has been to solve problems by the use of technical experts, rather than using other means such as the negotiated scientific approach (or "civic science") discussed by O'Riordan (1994). In this approach, parties apply other criteria such as legitimacy and fairness to the scientific negotiations. As O'Riordan points out, "this in turn involves widening the disciplinary representation on science advisory panels to include lawyers, economists and possibly philosophers".

According to Rowe and Frewer (2000), political theorists and social scientists have traditionally argued that concepts related to public acceptance (e.g. fairness) are of greatest importance regarding participation in policy setting, while those arguing from an economic and scientific perspective have argued that the quality of the decision and process is more important (and often, that lay persons—lacking knowledge should have little role to play in technical/scientific policy making). Using nuclear decommissioning as an example, the argument regarding the need for quality decisions, based on the best technical data available is hardly surprising. The demographic of the workforce, heavily biased towards technical disciplines adds to this perception that there is only one way to make decisions – the technical way. As discussed previously in this paper, this technocratic approach to decision making has failed spectacularly in the past when decisions made have been subjected to public scrutiny. The option based on the pinnacle of technical excellence may not be acceptable to the wider public.

Rowe and Frewer emphasise a role for both scientific quality and public acceptance aspects during decision making and engagement. After all, an exercise that is fair and has good acceptance, but poor process, is unlikely to be implemented by the convenors of a process, while an exercise that has good process but poor acceptance is likely to be met with public / stakeholder scepticism, dispute or boycott. According to Habermas (1970, 1987) in his Theory of Communicative Action *"good participation is seen as both fair and competent"*. But how does this fairness and competence translate during the engagement process? According to Beierle (2002), fairness is achieved by broad representation and equalization of participants' power, whilst competence often involves the use of scientific information and technical analysis to settle factual claims. Other authors have disputed this equalization of participants' power as an ideal not always represented in deliberative practice. Stokkom (2005) em-

phasises that deliberative processes to inform policy do not always meet equality and rationality ideals. Behind the ideal of rational dialogue between *"equal participants"* the author finds "an interplay of power and emotion dynamics that can aid or impede deliberation".

Any attempts towards the control of participants by a convening organization, or between participants themselves would appear to work against those ideals of fairness and the discursive validity of the freedom to participate and influence decisions, proposed by Habermas. The author stresses the need for greater levels of participation in all areas of life where important public decisions are made, but as White (1980) has highlighted some critics have pointed out that Habermas provides us with little information on what type of institutional forms are appropriate for this purpose. Habermas does not propose democratic institutional control by its citizens, but rather that the principle of participation should act as a burden of proof on the convening organization to demonstrate why there could not be greater participation in decisions which affect citizens. However, as highlighted previously with reference to Rowe and Frewer (2000), the concept of fairness also relates to the public acceptance of a particular process of participation.

The research carried out by Whitton (2010) concentrated on the dialogue used to engage participants and a concept of fairness, by empowering stakeholders not just to consider whether a meeting or process has been a "success" but also to consider their role in the dialogue process and how they perceive their influence on the decisions made. Influence through deliberation is considered by the author to add to Rowe and Frewer's concept of fairness. By moving away from technocratic decision making towards a deliberative model of engagement, stakeholders can realize a level of influence through fair dialogue. This is discussed in terms of the links between the engagement process and the decisions made. It has also been recognized by the same author, citing Reed (2008), that the structure of the convening institution (in this case the NDA) and its ability to institutionalize stakeholder engagement as a method to influence strategy is also fundamental to successful engagement and understanding the current approach adopted.

Reed (2008) concludes that many of the limitations experienced in participatory processes have their roots in the organisational cultures of those who sponsor or participate in them. For example, non-negotiable positions, or for the research carried out for the PhD a lack of clarity regarding the influence of participants may simply be the result of pre-determined positions decided at higher levels within the organisation prior to participation in the process that representatives do not feel able to negotiate. According to Reed, to change this position would represent a radical shift in the organisational culture of government agencies and other institutions. As Reed (2008) states, *"although many benefits have been claimed for participation, disillusionment has grown amongst practitioners and stakeholders who have felt let down when these claims are not realised"*.

Reed (2008) highlights the importance of institutionalizing engagement practice within an organization and states: *"…it is argued that to overcome many of its limitations, stakeholder participation must be institutionalized, creating organizational cultures that can facilitate processes where goals are negotiated and outcomes are necessarily uncertain. In this light, participatory processes may seem very risky, but there is growing evidence that if well designed, these perceived risks may be well worth taking"*.

The PhD research carried out by the author highlighted the extent of participants' confusion regarding the nature of the dialogue carried out and how the engagement process is influencing the decisions made by the convening organization. This is currently thought to represent a lack of institutionalized engagement by the convening organization. As an outcome of the research, the author has highlighted

the apparent importance and role of fairness or as Rowe and Frewer (2000) term "public acceptance". "Apparent" as further research is required to understand how a theory of fairness relates to participants' perception of what can be considered acceptable and fair dialogue. Smith (2001) contributes to the emerging theory of deliberative institutions by presenting three institutional models; mediation to resolve conflict; citizen forums where participants can deliberate on issues of policy; citizen initiative and referendum to allow participants to vote directly on policy issues. However, Smith cautions that *"the practice of these three possible designs takes place against a political, social and economic backdrop that is far from supportive of citizen participation"*.

A Systemic Approach to Dialogue

The opportunities for systemic social research is apparent at two levels in relation to the decommissioning of nuclear sites in the UK. The first is the NDA National Stakeholder Dialogue specific to the NDA Nuclear Decommissioning Strategy, where research on the form of stakeholder dialogue and influence is ongoing. The emergent themes of fairness and participant influence through deliberative forms of dialogue and the importance of working towards a form of dialogue that is institutionalized within the convening organization has been discussed above. The second level is on the societal interactions between institutions and communities as a response to the impacts of this strategy, where an opportunity currently exists for research to be carried out. The interdependency of the scientific and engineering systems that deliver the nuclear fuel cycle (fuel, energy, reprocessing and facility decommissioning) are complex but well practiced in the UK. In contrast, the societal aspects and subsequent interdependencies of this system are not well understood, particularly stakeholder perceptions of the current issues facing the industry, the impacts of the future decline of the nuclear industry on the mental health and well being of communities and the community and regional impacts of the closure of nuclear sites (such as Sellafield in West Cumbria).

The NDA National Stakeholder Group is the first standing forum that allows community representatives, industry and government representatives from each NDA nuclear site in the UK to meet and discuss issues that are important to them and relevant to the NDA Decommissioning Strategy. This was considered so important that the community representatives or Site Stakeholder Groups (SSGs) have their own meeting on the evening before the main NSG meeting. As a non-governmental department, the NDA funds decommissioning activities at nuclear sites and also to invest in local communities; a requirement of the Energy Act (2004). As stated in the NDA Socio-economic Policy (NDA, 2008): *"The Energy Act 2004 requires the NDA to consider the socio-economic impacts of its activities on local communities and gives it a function of giving 'encouragement and other support to activities that benefit the social or economic life of communities' living near our sites. In addition, the Act gives the NDA the 'power to make grants or loans to persons undertaking activities that benefit the social or economic life of communities' living near our sites"*.

What is less clear is how the information gathered and discussed by SSG representatives is then communicated back to the community they represent and what impact this has. Also, how the issues discussed at the NSG, the impacts on NDA Strategy and subsequently the potential societal impacts of strategy outcomes is measured within communities or as an institutional response. What impact is this likely to have on local employment at each site and those services that rely on the site for business? Assuming a rise in local / regional unemployment over time as sites progress decommissioning, what is the impact on the health and wellbeing of these communities, health outcomes, and demand on health services?

Local communities are dependent on nuclear sites as a source of primary and secondary employment, either providing direct employment or services. Until recently, the indecision of the UK government regarding the role of nuclear energy within the energy mix of coal, gas and renewables combined with narrow and short term concerns regarding the public perception of nuclear has resulted in an industry that has been allowed to stagnate rather than develop and / or diversify. As this paper was being written and despite a well publicised nuclear renaissance, the Sellafield site announced the loss of 800 jobs at a time when the site is preparing for large scale decommissioning (BBC, 2010).

Regionally, and using West Cumbria as an example, the Energy Coast™ initiative*; "a £2 billion package of regeneration projects that will establish the West Coast of Cumbria as a major national hub for low carbon and renewable energy generation"* (Energy Coast™ 2010), recognises new employment opportunities will be required following the decommissioning and closure of the Sellafield site. 11,000 people currently work at the site, with a further 2500 estimated to rely on the site for employment. 8000 of these positions will be lost by 2011/2012 as a consequence of decommissioning. Without new opportunities, skills migration and significant detrimental impacts on local communities in West Cumbria are expected. Systemic social research is required to support nuclear communities, where the local economy relies the sites for employment and also social structures that are formed as a result of this employment. The impact of nuclear decommissioning should be understood in this context, so that the community and institutional response is appropriate when sites close.

Conclusions

Despite initiatives such as the NDA Socio-economic Strategy and the Energy Coast™, there is currently an absence of ongoing social research on the impacts and societal response to the planned closure of Sellafield and other nuclear sites. The associated social impacts of decommissioning are particularly poorly understood, requiring social research that aims to understand the complexity and interactions between social systems at the local community and regional level.

The societal links between investment as part of the NDA Socio-economic Strategy, resulting employment outcomes, loss of jobs at nuclear sites, population migration due to a perceived lack of employment, opportunities as part of the Energy Coast initiative requires research. In short, what outcomes are expected from this investment and how does this relate to the decommissioning of nuclear sites? Systemic social research would inform this process and would represent a more sustainable approach to the inevitable consequences of the NDA Decommissioning Strategy.

A systemic and sustainable approach to research to inform a societal dialogue is needed; one that captures the views and concerns of the wider stakeholder community and considers, particularly, a post Sellafield situation in West Cumbria. To do this would promote a dialogue that is institutionalized (Reed, 2008) within and between those public institutions that will be required to provide services and support to communities following decommissioning. A programme of social research is required to support this dialogue, so a full assessment of the impacts of decommissioning and the desired outcomes of local and regional investment and initiatives can be made.

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