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Manuscript title: Social Value for Whom, by Whom and When? Managing Stakeholder Dynamics in a Megaproject

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Abstract

Studies of project success have generally recognised the role stakeholder management plays in shaping a collective understanding of value. While these studies have typically focused on new-build, few studies have examined stakeholder management at the end-of-life of a built asset. This paper draws on a single megaproject case study into social value in nuclear decommissioning and remediation to examine how 'success' or 'failure' in projects is framed, and the implications of stakeholder management in shaping these notions of performance. By tracing historical developments of Dounreay, an experimental nuclear energy site at an advanced stage of decommissioning, it was found that key stakeholders change over time as those most affected by the changing dynamics of the megaprojects come and go, with resulting impacts on the ways conditions for success are framed and social value is defined. Our findings stress the importance of taking a pluralistic and processual view of stakeholders, and demonstrate the need for policy-makers, practitioners and researchers to pay greater attention to fragmentation and integration of stakeholders' interests and influences as they change over time. These dynamics of stakeholder management will in turn challenge pre-conceived ideas of success that are often framed in the early stages of a project.

1. Introduction

Ever since Freeman (1984) argued for the need to think beyond the shareholder to consider the needs of stakeholders, there have been numerous studies that examine stakeholder management practices in project contexts (see e.g. Mok, Shen and Yang, 2015). Consideration of broader stakeholder needs has since challenged the orthodoxy that project success is merely the meeting of such traditional measures as time, cost and quality (Atkinson 1999). There is growing recognition of the tensions that can arise from attempts to meet the short-term 'iron triangle' of project time, cost and quality performance and the capturing of long-term, lasting impacts of projects (Eriksson et al., 2014). Indeed, as Eskerod, Huemann and Ringhofer (2015) argued delivering valuable impacts to project stakeholders can be a challenge as they noted that stakeholder disappointment continues to be a common feature of unsuccessful projects.

In a recent systematic review of scholarship on project stakeholder management, Mok, Shen and Yang (2015) identified how studies have tended to focus on formalising stakeholder management processes often in small-scale projects and typically focussing on the early planning stage of the project life cycle. Such emphasis has come under critical scrutiny. For example, in finding universal, systematic approaches to managing stakeholders, Engwall (2003) argued that there has been relative neglect in understanding the unique specificities of the institutional context in which projects are situated. Moreover, by focussing mainly on the planning stage of the project life cycle, there is an implicit assumption that project managers can design interventions that satisfy often conflicting needs of a multitude of stakeholders at

the front-end of projects; this ignores the reality of stakeholder management as an ongoing process rather than a 'done deal' achieved through planning (Eskerod, Huemann and Savage, 2015; Eskerod and Larsen, 2018). The need to examine stakeholder management as an ever-changing, ongoing process (Friedman and Miles, 2002; Turkulainen et al., 2015; Chan, 2016) is further underscored where megaprojects are concerned, a context that has been relatively overlooked in stakeholder management scholarship (Mok, Shen and Yang, 2015).

In this paper, we address these deficiencies by drawing on case study research into a megaproject in nuclear decommissioning to examine how stakeholder management - as an ongoing process - can have significant consequences for the ways in which project 'success' and 'failure' is defined. We situate this case study within the contemporary and growing concern over delivering social value in the megaproject context. In the UK, for instance, the introduction of the Public Services (Social Value) Act in 2012 mandates that the provision of public goods and services, including the delivery of public-sector projects, must consider how the work "might improve the economic, social and environmental well-being of the relevant area" (p. 2, Public Services (Social Value) Act 2012) . While delivering social value along this triple bottom line seems reasonable, defining what this means is less straightforward since there is no accepted definition of what social value means (see Nakamba et al. 2017). Furthermore, growing interest in social value in construction (Cartigny & Lord 2017; Raidén et al. 2019; Daniel & Pasquire 2018) has often focussed on client perspectives in the procurement of construction projects (Cartigny & Lord 2018; Awuzie & McDermott 2016; Loosemore 2015) with relative less attention paid to a wider range of stakeholders affected by construction. Thus,

our case study context of examining the dynamics of stakeholder management in Dounreay, an experimental nuclear facility that is at an advanced stage of decommissioning, is unique; while much research, even on mega construction projects, is on new-built, the context in this study is on nuclear decommissioning and remediation (Mulholland et al. 2019; Invernizzi et al. 2017). Thus, we also contribute to the literature by broadening out beyond (front-end) planning to consider the dynamics of stakeholder management during the end-of-life stage of the asset/project life cycle.

In what follows, we first review the literature on related fields of stakeholder management in (mega-)project studies. We then explain the case study methodology before reporting and discussing the findings of the implications of stakeholder management dynamics and the notions of project 'success' or 'failure'.

2. Stakeholder management: a planned or emergent process?

Good governance of and engagement with stakeholders, with defined roles and responsibilities and dedicated communication channels, have long been attributed as a key condition of megaproject success (see Caldas and Gupta, 2016). To satisfy the needs of project stakeholders, scholars have developed frameworks to characterise stakeholders based on their relative position within or beyond the project organisation and their respective influence and interest on project outcomes (e.g. Savage et al. 1991; Karlsen 2002; Olander 2007; Ackermann & Eden 2011). These frameworks, often depicted as two-by-two matrix of power and predictability of outcomes, are used to visually group and prioritise stakeholders based on their power, legitimacy and urgency (see Mitchell et al, 1997), so that the management of stakeholder

expectations can be more effectively planned and managed so that surprises and disruption to projects can be minimised. Others have developed more nuanced, graphical methods to help project managers visualise the scale and scope of a stakeholder's influence, the extent to which a stakeholder is more or less powerful, and the depth of impacts to help identify where a potential stakeholder is coming from and anticipate what is in it for the stakeholder (e.g. Bourne and Walker, 2005; 2006; Walker et al., 2008). These tools are intended to guide project managers when seeking the cooperation of, collaboration with or even containing stakeholders early on in the planning phase of a project, which in turn creates the social license for a project to go ahead (Aaltonen and Kujala, 2010; Aaltonen et al. 2015; Sánchez 2015).

These models have however come under critical scrutiny in recent times. For example, Davis (2014; 2016) noted that how failure or success is viewed depends on the point in time when a project's performance is measured. Shenhar and Holzmann (2017) re-evaluated the success and failure of 14 megaprojects to show how 'failure' or 'success' can change depending on whether one focussed on the immediate utility at the point of project delivery or whether one considered the longer-term societal impacts that the project yielded. Shenhar and Holzmann (2017) added that while alignment of all stakeholders to a shared goal is desirable, the reality requires constant adaptation to complexity. This is especially true in the megaproject context. For instance, in the nuclear energy sector, Locatelli et al. (2014) reinforce this need for ongoing flexibility by arguing for looking beyond the attainment of technical success to ensure that project teams build and sustain community and political support. So while scholars have long called for a dynamic approach to engaging with

stakeholders (e.g. Bourne and Walker, 2006; Walker et al., 2008), prevailing frameworks tend to focus on the identification of stakeholders and their needs and influences at a point in time rather than to account for how these change over time (Jepsen and Eskerod, 2009; Aaltonen and Kujala, 2010, and; Eskerod, Huemann and Savage, 2015). Thus, in line with these recent calls to take a more processual view of stakeholder management, this study focuses on the process of sensemaking as the identification and influence of who and what matters changes over time.

3. Making sense of social value in megaprojects

Turning our attention to social value, there are also parallels that can be drawn between the brief review of studies on managing stakeholders in (mega-)projects above and developments in thinking about social value creation. Early scholarship on social value has often focussed on the development of measurement frameworks with the identification of stakeholders and their needs central to many. In the UK, examples of measurement frameworks include the Social Value Evidencing Toolkit (SVET) developed to manage the social value reporting processes for Highways England (Daniel & Pasquire 2017); applying ecosystem services thinking to geographic information systems (GIS) Mapping to determine the perceived use value of places, and; using a Social Values for Ecosystem Services (SolVES) tool to capture the benefits of the natural environment on human wellbeing (Sherrouse et al. 2011). These frameworks are predicated on the assumption that engagement with stakeholders is key in collecting information about what matters and assessing the social value impacts created by projects.

Of the many frameworks available to capture social value, the Social Return on Investment (SROI) methodology that attempts to quantify the monetary value of social investments is the most commonly adopted approach. It has been used to underpin common tools such as Social Profit Calculator and Social Value Portal (REF), with the latter creating the National TOMS (Themes, Outcomes, Measures) which is being adopted slowly within the built environment (REF). The SROI methodology developed in 2001 by the Roberts Enterprise Development Fund (2001), a California-based employment social enterprise and refined by the New Economics Foundation (NEF), seeks to produce a replicable, reliable methodology to facilitate objective comparisons of social outcomes of projects. This SROI process relies heavily on the use of agreed proxies (for example the Housing Associations' Charitable Trust (HACT) Wellbeing Evaluation approach (Cabinet Office 2015)).

Although establishing an objective set of proxy measures can make it easier to compare the social value outcomes across different projects, critics have also identified a number of major shortcomings. For instance, Gair (2005) argued that the emphasis on quantifying social returns of investment obscures the more qualitative aspects that give specificity to the context of these economic and socio-economic measurements. In privileging what is perceived to be objective and quantitative measures, there is also a sense that SROIs highlight what is universal rather than what matters at a local level. Thus, even though the New Economics Foundation (2007) suggests that stakeholders should be engaged in the process of identifying what gets measured are the 'right' things for stakeholders concerned, power is still implicitly placed with those who are considered "primary stakeholders, people directly involved in the creation of

social value, for example, project participants, or employees"(p. 35) as these determine what kinds of data get collected. Thus, there have been calls to move towards a more bottom-up approach of assessing cost-benefits and impacts (Nicholls 2016; Gair 2005). Indeed, as Watson and Whitley (2017: 887) reflected in their application of SROI in a construction project, "the data-crunching stages of the method are far removed from the qualitative focus group data about specific design features". Watson and Whitley (2017) also noted how it is not always possible to measure social value simply by tracking what has changed before and after a design intervention because, and especially in the case of new-built, the stakeholders have not experienced the built environment before the transformation, and so what can only be captured are the experiences of the new environment.

Thus, our salient review of social value reflects similar concerns already raised in our critique of scholarship on managing stakeholders in projects in two ways. First, while there is recognition that social value can mean different things to different people, there is a tendency to focus on measuring and presenting social value as monolithic, objective 'truth', in part because of the desire to enable comparisons in an audit society (see Power, 1997; Shore and Wright, 2015). Second, the push towards quantification also means that focus is placed on measuring social value at a moment in time, rather than to examine how social value changes dynamically over time. In the context of megaprojects, tracking the ongoing process of change over time, as opposed to leaving it to the end of the project, is paramount as it is crucial not only to build political and community support for the project but also to sustain that support over time.

Yet, in privileging the measurement and quantification of social value, a crucial step in the process of establishing which aspects of social value matter to those affected by projects is often overlooked; that is, there is a first of all make sense on who the key stakeholders are. But, the question as to who are 'key' stakeholders changes over time. This is especially the case in megaproject contexts. As Clegg et al. (2016) argued, as a project unfolds there is a need to keep making sense of how stakeholders are changing and developing, and how this evolution changes what they value, particularly since there are often complex and divergent needs that change over the long timeframes that characterise megaprojects. Thus, rather than to focus only on the quantitative measure of social value at a particular point in time, it is important to pay greater attention to the unfolding narratives and changing discourses on who and what matters over the project lifecycle (see Kornberger et al. 2006; Aaltonen and Kujala, 2010).

Project studies have often been dominated by claims to rationality early on in the project lifecycle (Clegg et al., 2016). For instance, it is typically the case that scholars argue for the need to engage with stakeholders early on in the project lifecycle so that the power and predictability of stakeholders can be mapped out to ensure the success of megaprojects (Zidane et al. 2015; Ninan & Mahalingam 2017). Yet, this belief downplays the realities of contestation and change, and the role resistance can play to generate productive value in projects (Courpasson et al., 2011). In this paper, we join the growing line of scholarship that emphasises the dynamic process of managing stakeholders and the creation of social value

through a single case study of decommissioning an experimental nuclear site in Dounreay in Scotland.

4. The decommissioning case study

Social impacts of transforming society that could affect the livelihoods of millions of people are a defining characteristic of megaprojects (Flyvbjerg, 2014). The scale of these social implications means that there is, more than ever, a significant need to engage with stakeholders to define the performance (Mišić and Radujković, 2015) and to account for the socially responsible outcomes of these projects (Ma et al., 2016). With the introduction of the UK Public Services (Social Value) Act in 2012 the public sector needs to demonstrate 'social value' as part of any project delivery, and this calls into question as to what 'success' is in terms of a socially valuable project.

In this paper, we draw on a case study in the UK nuclear decommissioning sector. The Nuclear Decommissioning Authority (NDA) as a non-departmental public body reporting to the Department for Business, Energy and Industrial Strategy, owns and is responsible for decommissioning 17 nuclear sites in the UK. The programme is estimated to last 120 years, with a projected cost of £120 billion. Delivering value for taxpayers' money whilst addressing challenging technological and social complexities is therefore a wicked problem that the NDA has to deal with. In this case study, we focus on Dounreay, the site of an experimental nuclear facility constructed in 1955 to house what was then a first-of-a-kind technology known as the ‘Fast Breeder’ reactor. Now Scotland’s largest nuclear clean-up and demolition project, the decommissioning and site remediation work is being contracted since

2012 on a target cost basis to Dounreay Site Restoration Limited (DSRL) , one of the site license companies (SLC) directly funded by the NDA.

5. Data collection and analysis

Our case study of Dounreay was informed by data collection that allowed us to trace how Dounreay, its site and the local community, evolved from the time of its construction to the present day. Documents were collected from a wide range of sources as is common for case studies (Ridder, 2017), including official reports and publicity materials from DSRL and the NDA, web-based information such as blogs and discussion boards, research papers and theses about Dounreay, paraphernalia from local museums and places of interest to piece together this historical overview, which enabled the reconstruction of how the concept of 'social value' was framed over time. 'Social value' was assessed against a typology developed from academic literature, listed in Figure 1. The richness of the documents (circa 200) collected with a case study approach (Ridder, 2017) also allowed us to retrospectively see how decisions made in the past had intended and unintended consequences for delivering social value to those living in the area. We were able to investigate how relationships between those working in Dounreay, and more recently DSRL and the NDA, and the local communities changed over time, with resultant implications on perceived social value.

The historical perspective, along with how 'social value' is perceived in the present day and projected in the future, were also gathered through interviews with key stakeholders representing DSRL and the local community. These interviews (n=9) were chosen through a purposive sampling process through our connections with the NDA and Dounreay Limited

using a snowballing process (Ridder, 2017). The interviewees all lived within proximity of Dounreay, representing either a 'community member' or 'working on site' as detailed in Table 2. The interviews were compared with the documentary analysis to enable us to corroborate insights into how notions of 'success' and 'failure' were framed by the actors concerned as they and how these framings changed over time. Thus, we attempted to follow the actors to capture the perceptions of how thinking about social value has evolved in the past and how these are changing in the present and for the future in Dounreay.

Semi-structured interviews focused on the participants' role and involvement, if any, with the site and its social value following an interview protocol (Spradley 1979), with the core questions:

- Tell me about your background (professionally and personally)
- What are your views on nuclear decommissioning, remediation and regeneration?
- Have you heard of 'social value'? If not, what do you think it means?
- How does social value link in the work you do in decommissioning or regeneration?
- What do you think is the future of nuclear energy [and decommissioning] in your community?

The participants were encouraged to talk freely and asked to elaborate on how and why things happened in the ways they did in their interview accounts where appropriate. The interviews were audio-recorded and transcribed verbatim. In addition to the interviews, the first author also observed two private Site Stakeholder Group sub-committee meetings, one focused on socio-economic impacts and one on decisions regarding site-end state, with around

20 community representatives invited to sit on the committee to open dialogue with site representatives. Furthermore, following the ethnographic walking methodology (Evans & Jones 2011) she also did a number of site visits (see Table 2) to the decommissioning site, local archives, nuclear museum, and heritage museum. Extensive notes were taken (circa 100 pages) along with photographs (n=380) of the local area to add richness of information about the local context. These notes also allowed the first author to reflect on what was observed and to identify emerging themes (Eisenhardt 1989).

The interview transcripts, field notes from observational research and site visits, and documentary analysis were analysed to identify key emerging themes using qualitative data software coding (Braun and Clarke, 2006), which we then compared with themes identified in the stakeholder management and social value literature. In particular, we reflected on how our analytical categories inform us about who had interest and influence in Dounreay (e.g. Olander 2007), and who were deemed to have power, legitimacy and urgency (Mitchell et al., 1997), paying careful attention to how these changed over time. We also examined how 'success' or 'failure' was talked about and, where possible, identified how these connected with the proxy measures of social value found in the literature, listed in Figure 1. In line with inductive research, our analysis began as soon as our fieldwork began, and the number of interviews in our snowball sampling was deemed sufficient when we reached saturation, i.e. when our analysis was beginning to yield no significantly new insights (Guest et. al, 2006).

6. The Dounreay social value timeline

Dounreay is one site of the NDA's wider estate. It is situated in a rural community with the

nuclear work playing a significant role in the lives of the district. The area was initially chosen for nuclear energy development due to the remote location, but also because the local community was declining in the 1950s and so the siting of the experimental nuclear facility was seen by politicians in Westminster as a means to create a new lease of life for the locality. As nuclear energy is being decommissioned in the area the NDA are managing a sustainable transition to site closure.

There have been drivers and demands created by stakeholder input from both locally and nationally (as shown in Table 3). Change of mission due to higher-level organisational changes impacted progress, causing Dounreay to pass through three phases of social value focus aligned with changing priorities. As the interacting local and national stakeholders negotiated these changing priorities, shaping the social implications, local communities and interested groups have been given opportunities to contribute through development of practices such as Site Stakeholder Group meetings of community representatives.

The story of the social value success or failure has been defined by different criteria, developed and changed over time. With three main phases being seen in the changing environment over time, as outlined in Table 3, it is also worth considering how the opportunities for success and failure differ from the local to national perspective, that is to say stakeholders in different places make sense of the impacts differently.

6.1 Phase 1. New nuclear: excitement of building a new society

The building of a nuclear site is reflected on by all interview participants as a positive thing for the area: there was a decline of the agricultural and fishing industries, so the prospect of new

jobs was appreciated. Furthermore, participants spoke favourably about the legacy they felt it brought. With the influx of scientists working on a first-of-a-kind experimental facility at the time, the newcomers not only created international scientific impact, but also brought with them many pastimes that helped produced a more "cosmopolitan" society.

6.2 Phase 2. Nuclear shut down: showing resilience through changing times

A chemical explosion in 1977, however, caused damage on site and the first radioactive particles were detected in the environment, adding to growing mistrust of nuclear energy long before the Chernobyl accident in 1986. This led to a turnaround on a planning decision in 1986 to build new reprocessing plants, as in 1988 the UK Government then announced a phased end to research and development at Dounreay. This coincided with the Government's decision to privatise energy in the 1990s, halting all government nuclear build projects.

Without a clear mission of what decommissioning meant for site-end state many employees were unsure of their future, still hoping for jobs for life.

6.3 Phase 3. Site mission to decommission: planning for alternative industries and investing in the future

This phase slowly emerged, responding to planning uncertainties on the site as decommissioning as a goal was refined. A 60-year decommissioning plan was introduced in 2000 costing £4.3 billion, but after the NDA was established in 2005 a review was undertaken in 2007 bringing decommissioning targets brought forwards to 2032 at a reduced cost of £2.9billion. A senior member of staff labelled this phase as the “mission to solely turn the site

into waste". This change in mission was in response to pressures from Westminster, as well as organisational restructuring at Dounreay as a result of safety lapses found in an audit by the Health and Safety Executive (Health and Safety Executive, 1998).

7. Influencing success and failure: stakeholder dynamism demonstrated with changing characteristics and priorities

To examine the dynamics of Dounreay stakeholders a fragmented history of Dounreay and its shifting contexts has been explored and outlined using three example stakeholder groups. Framing patterns were chronologically analysed, which showed that when matters of concern at Dounreay changed over time (e.g. from one of ensuring energy security to mitigating against the impacts of employment insecurity in decommissioning), the key stakeholders in terms of those creating and influencing the conditions for success and those affected by interventions made changed. However, identifying the stakeholders that mattered were far from straightforward; often, a stakeholder could fall into two different groups with differing levels of influence and conflicting needs. For example, one of the interviewees worked on site as a previous union representative, but was also active in local politics with the Scottish Green Party known for their anti-nuclear stance. Thus, these two identities are embodied in a single individual and can clash with each other, as positions on whether nuclear energy is seen as a friend or foe dependent on which "hat" the participant is wearing. Thus, frameworks that neatly categorise the identities of individual stakeholders fall short of accounting for these intrinsic struggles.

Not only do the characteristics and structure of the stakeholder groups change, but also

their priorities and needs. Consequently, the goals and targets for success and failure also shift.

While this paper does not outline all stakeholders involved, three key stakeholder groups are highlighted to demonstrate the complexities of how stories, characteristics and priorities are changing:

- Regulators: currently Office for Nuclear Regulation (ONR)
- Site owner: currently the NDA, how has it changed over decades
- Local community

The stakeholder groups were chosen due to the richness with which they featured in the case study data collection. The simplified timelines presented below were derived from the multiple data sources and unpacked to make sense of the complexity of stakeholders contained within Dounreay's (hi)story.

8. Regulating 'safe and secure': industry learning and target setting

In the rush to embrace new energy possibilities in the 1950s, environmental safety was not fully understood. Over time, the guidelines and targets for environmental safety have changed considerably over the decades. Following a major incident on the Windscale (now Sellafield) site in 1957 the Nuclear Installations (Licensing and Insurance) Act 1959 established the Nuclear Safety Division as the Inspectorate of Nuclear Installations within the Ministry of Power. This resulted from a recommendation from the UK Atomic Energy Authority (UKAEA) for a body to oversee licencing new sites. In 1968, the Nuclear Safety Division transferred to the Ministry of Technology and changed its title to Nuclear Installations Inspectorate on

recommendation of the Nuclear Installations Act, 1965. This landscape has changed significantly since then with all parties involved now operating in a new form, having subsequent on the strategic relationships within the industry and for Dounreay.

At Dounreay, a series of safety incidents also triggered an audit (Health and Safety Executive, 1998), which in turn led to major changes. A decade after ceasing operation, but without a clear mission for the site, the safety audit provided the guidance needed to strengthen the quality of work happening on site and set targets for decommissioning and remediation.

"To a degree it was also the straw that broke the camel's back…when this happened they said, "Right, stop". And they conducted a '98 major audit in the safety and management of the site" - D04 Site manager

In the review of the nuclear regulatory system (Stone 2008) there were many observations made of the effectiveness of the industry. The most urgent issue identified was the lack of skilled staff suitable for the Nuclear Inspector roles: it was difficult to retain staff due to salary restrictions working in a public organisation, which was part of the reason for it becoming a Public Corporation in 2014 after the 2013 Energy Act (Department of Energy and Climate Change 2013). Several other recommendations were made for a more reliable regulator: to restructure the organisation, and to create a single nuclear regulator for safety, security and environment (previously Health and Safety Executive, Environment Agency, and the Dangerous Goods Division of the Department for Transport). The umbrella organisation became the Office for Nuclear Regulation formed as an agency of HSE.

"... nuclear is really tightly regulated... But it needs to be very closely regulated to give people reassurance." - D01 Environmental specialist

All stakeholder groups benefit from this strategic relationship between the site and regulator, as the reassurance of the safety and security from a widely-feared technology. This regulation helps provide a sense of reliability beyond what is expected from many other contentious industries. However, it is of interest to note, the focus on "safe and secure" in dialogue with stakeholders has been highlighted as an issue. Both in keeping the focus on more negative aspects of nuclear energy, and by using technically jargonistic language to convey robustness which may be inaccessible to many can have the effect of many stakeholders not understanding the safety and security measures in place.

9. Following which leader? The shifting of responsibility and priorities

The UK Atomic Energy Agency (UKAEA) was established under Government ownership in 1954 to do nuclear research and development for the burgeoning UK nuclear industry, with Dounreay the centre for the Fast Breeder Technology. UKAEA's role changed significantly as the Science and Technology Act 1965 broadened their work beyond atomic energy research. The UKAEA divided itself into 3 business groups, preparing 2 for sale and privatisation. This left a split of staff onsite, with the Government Division responsible for decommissioning installations, but with much of the technical skill needed lost in redundancies (Health and Safety Executive 1998).

"There wasn't a clear strategy. It was "OK, you don't want us to do this, what do you want us to do next?" So there was a real hiatus... And then within that, you had this

idea that one of the solutions was OK we set up all these units. Off you each go away and try and win business, and try and sustain. And some teams worked together, others were competing against each other, and AEAT in the middle of it of course was set up as a private organisation which was still present on site. We had this huge antithesis between AEAT and the sort of UKAEA people" - D04 Site manager

Previous to the changes in 1980s, British Nuclear Fuels Ltd (BNFL) had been created as a split of activities in UKAEA in 1971 for nuclear production to be managed separately. Later becoming a public limited company owned by the UK Government, this created potential for a business focus and encouraged technology spin offs. Further commercial parts of the UKAEA were separated in 1995 to create the Atomic Energy Authority Technology (AEAT).

AEAT later went on to be re-merged with UKAEA, and eventually UKAEA and BNFL merged to form the NDA in 2005 after Government White Paper recommendations in 2003 led to the 2004 Energy Act establishing the organisation to bring the works together.

Commercial arms continued with several restructures and buyouts, under names such as British Nuclear Group (BNG), Westinghouse, Nexia Solutions and Nuclear Sciences and Technology Services (NSTS). These organisations do not now directly interact with Dounreay from the NDA perspective, but this complex shuffling and reshuffling of operations and ownership reflects well the changing stakeholder responsible for directing Dounreay work priorities. Dounreay has consistently responded to the calls for change as they put in place what the influential stakeholders requested: as government changed policies, this was implemented on the ground and encouraged through changes in the site "mission".

The creation of the NDA in 2005 established a clear industry mission:

"Our mission remains absolutely unchanged - to clean up the legacy from the UK's earliest nuclear sites, safely, securely and with care for people and the environment" - NDA Business Plan 2019-2022

And this is in stark contrast to the origins of Dounreay. Beginning as a Government project, pushed by Westminster, this was a nationally critical infrastructure project – as a matter of national safety and security.

"UKAEA built a lot of houses in Thurso, a school, new high school, technical college, hospital facilities" - D04 Site manager

The predecessor of NDA was involved in the active building of society, but this now falls beyond the remit of NDA's work. There are still expectations of some stakeholders who have lived within the community for several decades and suffered through withdrawal of services that this is NDA's responsibility and there has been a difficult change in mindset in how these services are provided.

10. Shifting identities: Who is the "local community"?

"*...this was a very close-knit community. Everybody knew everyone. If you think of an isolated community of 2 ½ thousand people, where do you meet your life partner? At the village dance. So everybody was related to everybody. You grew up surrounded by aunties, uncles, … Now when Dounreay came you'd this mass import of incomers. Now, obviously Atomics married locals and locals married Atomics, and it all became quite a mix. By the*

time I came it was much more difficult to work out who was who." - D09 Clergy community leader

At the conception of nuclear energy at Dounreay, the community was in decline. The shrinking agriculture and fishing industries, particularly during the wars, meant that people were moving south to bigger cities with more employment opportunities. This was partly why Dounreay was chosen to locate the new, untested and unsure, nuclear energy technology that emerged from the Government weapons programme in World War II at Windscale (Sellafield).

New industry, and on such a large scale, meant the necessary influx of employees. Leading scientists and engineers, with their families, moved from all over the UK, and quickly became known as "the Atomics". The interesting thing is how over the years these people stayed and become the local community. Now, decades later, those 'atomics' view new incomers with suspicion. This is even more noticeable with the American employees who come to work on-site temporarily as part of the Cavendish Dounreay Partnership (of UK owned Cavendish Nuclear Ltd, US headquartered Jacobs Engineering Group, and American-owned AECOM) which emerged as part of the new site management structure. It was mentioned through participant interviews and during SSG observations that these American-incomers made no attempt to integrate with the community, creating a sense of distrust.

"So it's more cosmopolitan in Thurso because, myself included, when I moved up I wanted to be nearer to Dounreay than other towns. And I think that's what's happened with other people. They live up in other parts of the country…. not so many people that work at Dounreay that live in Wick. They haven't had many infiltrations, or whatever the

word that the locals use. I got called an 'incomer' recently, and I thought I've been here 14 years. The joke is unless you've got two generations in the graveyard, you're still an incomer." - D06 Previous union rep

The changing idea of who should be included as the "local community" creates challenges around how to define "successful" decommissioning and the social value or impact of the work. The stories emerging of changing identities over the previous decades, and who is included in stakeholder plans, points towards uncertainty in future decades of decommissioning work and "local communities"

11. Discussion and conclusions: The ever-changing stakeholder and the difficulties of delivering social value in megaprojects

Our case study shows that the stakeholder characteristics and their perceptions and requirements can change and have changed over the decades, in turn highlighting the challenges and complexities of holding down who and what matters in achieving social value outcomes in a megaproject setting. Existing literature does not adequately grasp the possibilities of the plurality of stakeholders when discussing stakeholder management, even though some scholars like Bourne and Walker (2005; 2006) and Walker et al. (2008) have recognised the need to provide a more nuanced picture of the scale, scope and depth of influence of multiple stakeholder groups. Our analysis of the ever-changing stakeholder management dynamics over time throws up two key concerns. Firstly, stakeholders come and go, or emerge as important and less important over time. As some fall out and others emerge as influential, this would alter what is regarded as valuable by those affected by the project.

Thus, we add to a growing body of literature that shows that project success is not a fixed entity but that success is only success at a particular point in time and in a specific place (e.g. Davis, 2014; 2016). Second, a stakeholder can also intrinsically change in character, thereby shifting their position. Thus, change also happens where a stakeholder changes their own position in/over time. While these two concerns may seem unsurprising, changes in who and what matters over time can have more pronounced impacts in a megaproject context. In our case study of Dounreay, these impacts are manifested in what appears to be moving targets for the megaproject as government policies and priorities change, with consequences of the restructuring of delivery organisations and reshaping of local communities. Moreover, megaprojects are likely to involve not only many different stakeholder groups, but also individuals who may hold several, often-times conflicting positions at the same time as our interview participants who worked as an employee on site and who is also part of the local community testify.

The complexities and ever-changing character of stakeholders can also have significant consequences for the ways project success in terms of delivering social value are defined and delivered. As explained earlier, social value measurements through frameworks such as the SROI tend to be used to quantitatively assess the impacts that decisions on project actions can have on stakeholders. Yet, such frameworks tend to assume a cause-and-effect linearity that, we argue, is too simplistic in a megaproject context that stretches over a long period of time. Thus, while frameworks like the SROI focuses on reporting social impacts of decisions, a much greater challenge lies in making sense of who and what matters and how these matters of

concern changes qualitatively over time, and how best to communicate such changes (Clegg, 2016; Watson and Whitley, 2017) – see also Table 1 below.

It is by figuring out who and what matters and, more crucially, how these change over time (i.e. when) that we can begin to examine in more detail the social value outcomes-in-process. Just as scholars have begun to recognise stakeholder management as a dynamic process rather than a 'done deal' performed simply at the planning phases of a project (Eskerod, Huemann and Savage, 2015; Eskerod and Larsen, 2018), the measurement, reporting and delivery of social value is an ongoing process of replying to specific political concerns and priorities at a given point in time and situated in a particular place (Chan, 2016). This is not to diminish the importance of evaluation frameworks, in both identifying and assessing stakeholders and social value, since these frameworks as Brookes et al. (2017) would put it can offer an island of stability (or stabilising requirements) in a sea of chaos. But, by privileging the management of stakeholders and delivery of social value as a concrete thing to be delivered ignores the pertinent point that, in megaproject contexts, there is a need to also account for ongoing negotiation and construction of what 'success' looks like as stakeholders change in their interests and influence over time. Thus, manag*ing* stakeholders and deliver*ing* social value can only be, at best, limited if these are simply reduced in evaluation frameworks performed at the start of a project. There is a need to look beyond stakeholder management and delivery of social value as a concrete thing that project managers do, and appreciate the inevitability that who the stakeholders are and what they value are constantly being constructed. Thus, in making sense of what is socially valuable for whom and by whom, there is a need to

regard the management of stakeholders as both a noun and a verb (Bakken and Hernes, 2006). This paper contributes to growing interest in defining what social value means in practice (Cartigny & Lord 2017; Raidén et al. 2019; Daniel & Pasquire 2018; Mulholland et al., 2019), which includes a wide array of stakeholders beyond the common procurement focus (Cartigny & Lord 2018; Awuzie & McDermott 2016; Loosemore 2015).

One limitation of this work is that all participants interviewed were local stakeholders to the Dounreay site. However, in responses they spoke of both the local and national environment of social value. These two levels of scale highlight an interesting question of how social value outcomes vary between on-the-ground and higher level. This links with Goldthau's (2014) work on the scales of investigating the sociotechnical relationships of energy infrastructure governance but may have further implications in placing stakeholders and their perspectives of social value on different scales. Thus far, Social Value studies have tended to focus on local stakeholders and value so this study raises questions around adequate boundaries of measurement (discusses further in Mulholland et. al, 2019).

Recommended future work for this study would be to compare this to another case study to allow for comparison if the challenges of stakeholder dynamism the idea of fragmentation always holds up for megaproject work. In particular. Looking at stakeholders on different scales – regional, national, international – in future work would push discussion around stakeholder management and social value. It would be interesting to analyse the influence and impact of stakeholder groups further, to demonstrate the usefulness and impact of fragmentation for social value outcomes.

12. Closing remarks on using SROI for social value

As stakeholders have been demonstrated to be ever-changing, this presents a challenge with the first (and therefore all subsequent) steps of the SROI process. The impact of identification and definition of stakeholders at the beginning of the SROI process will be seen in the final reporting stage (seen in Table 1)– this shapes who the focus of the study is and the resulting communication, a common problem with project sense-making (Clegg, 2016).

It is by figuring out the who, where and when of social value that we can begin to examine the more detailed social value outcomes of megaprojects and how they are best communicated. Applying any approach for social value, particularly the more detailed SROI approach, brings difficulty in applying a coherent approach across the whole timescale and locations of a complex project raising boundary questions: For who? When? Where? For how long? Therefore, Social Value measurement and reporting can be viewed as only an island of stability in a sea of change (Brookes et al. 2017). The ever-changing stakeholder lives in an ever-changing world, exacerbated by the non-permanent nature of projects. However, with such long timescales in megaprojects, utilising islands of stability allows sense-checking to occur.

Social value is both a process and an entity, it can utilised as a verb or a noun (Bakken & Hernes 2006). The process is an attempt to create islands of stability. Attempting to categorically measure and define the social value of a megaproject simplifies the complexity, not telling the whole picture, but it creating signposts for an interaction between static and dynamic identities.

With the growing concern for social value in infrastructure (Cartigny & Lord 2017; Daniel & Pasquire 2018) and the reported high likeliness of megaproject failure (Flyvbjerg 2014) the engineering community needs to move forwards with finding ways to report on the social impact of their work, particularly for publicly funded projects. SROI offers one method to do this.

However, the limitations of SROI have been acknowledged (Watson et al. 2016) and have yet to be applied in a robust, systematic way in larger more complex contexts. This paper outlines the challenges that will be faced by the engineering community in embracing the methodology, but also the potential opportunities. SROI needs further investigation in infrastructure and general megaproject case studies to unpack the opportunities of focusing on the stakeholders and boundaries in creating meaningful SROI reports.

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Table 1. The SROI process as outlined by NEF, SROI Network and Cabinet Office Guidelines (Nicholls et al., 2009)

SROI Method	What is involved	Challenge for Megaproject Application
Stage 1. Establishing scope and identifying key stakeholders	*The nature of what you want to measure, scope of analysis; Create analysis framework and gather background information; Identify key stakeholders*	Identifying why the process is being done when other project complexities demand attention; what is the scope of the process? Can the whole megaproject be looked at?
Stage 2. Mapping outcomes	*Map how stakeholders interact with inputs, outputs, outcomes and impacts*	This will be complex to map and unpack, which requires considerable resources. Especially for an ongoing process throughout the project.
Stage 3. Evidencing outcomes and giving them value	*Collect and collate data; Examine financial accounts to see links to social, economic or environmental objectives*	Large amounts of information, with many unknowns
Stage 4. Establishing impact	*Can monetised values be predicted for future years?*	Within uncertain financial projections megaproject cost overruns are common, is it beneficial to project? Defining future success criteria
Stage 5. Calculate the SROI	*Create discounted cash flow model with present value of benefits and investment, total value added, SROI ratio and payback period*	Large amount of data to work with, so new tools will need to be developed from traditional SROI approaches. Issues of conflicting data are also likely.
Stage 6. Reporting, using, embedding	*Present results, bringing out sensitivities and underlying assumptions*	Identifying who the report is for; choosing an appropriate communication style

Table 2. Data collected

Interview participants	**Observations**	**Site visits**	**Documents**	**Supporting, informal interviews**
9	2	5	Circa 200	6
Work on site D01 Environmental specialist D02 Sustainability advisor D03 Heritage D04 Site manager D05 Stakeholder engagement D06 Previous union rep	Site Stakeholder Group sub-committee meetings (socio-economics, and site-end-state)	Decommissioning site, archives, nuclear museum, heritage museum, tourist trail	Local newspapers; site published grey literature; relevant policy documents; local flyers for community groups sites of interests etc.	D10 Conservation volunteer D11 Nuclear graduate D13 Hotel staff member D14 Shop owner D15Museum employee D16 Stakeholder rep
Community member D07 Museum volunteer D08 Archive staff D09 Clergy community leader				*Questions focused on their perception of nuclear*

Table 3. Phases of organisational social value

	Phase 1	Phase 2	Phase 3
	Anticipation of new nuclear ***Begins 1954***	***Responding to shut down*** ***Begins 1988***	***Clear site mission for closure*** ***Begins early 2000s***
Local threats	Development of unknown nuclear technology in a rural area characterised by traditional subsistence farming and fishing	Fear of loss of jobs; uncertainty of site future	Continued fear of loss of jobs, with the area losing the nuclear community focus so again shifting identity
Local opportunities	Reviving a declining community – though building a new cosmopolitan community was an unintended consequence	Unintended consequence of a safety audit which slowed the need for job losses, initially responding to environmental and safety concerns onsite	Investment in other local industry and infrastructure, and returning back to traditional industries
National threats	Large financial investment and development	Change in political support for nuclear energy (research)	Many rural areas need focus for regeneration
National opportunities	History in the making for the UK to be a market leader in 'Fast Breeder' technology	Focus on securing sustainable energy sources in the future	Creating a lasting legacy; learning about and saving the nuclear heritage through nuclear decommissioning and site remediation

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Figure 1. Typology of social value based on academic literature (Mulholland *et. al.,* in 2019)