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“It’s not talked about”: The risk of failure in practice in sustainability experiments

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ABSTRACT

Scholars of sustainability transition have given much attention to local experiments in ‘protected spaces’ where system innovations can be initiated and where learning about those innovations can occur. However, local project participants’ conceptions of success are often different to those of transition scholars; where scholars see a successful learning experience, participants may see a project which has failed to “deliver”. This research looks at two UK case studies of energy retrofit projects – Birmingham Energy Savers and Warm Up North, both in the UK, and the opportunities they had for learning. The findings suggest that perceptions of failure and external real world factors reducing the capacity to experiment, meant that opportunities for learning were not well capitalised upon. This research makes a contribution to the sustainability transitions literature which has been criticised for focusing predominantly on successful innovation, and not on the impact of failure.

1. Introduction

A transition away from the use of fossil fuels to heat and power inefficient homes is urgent if the worst climate change predictions are to be avoided. Such a transition is complex, long term and uncertain, requiring change in multiple subsystems which are locked-in to high carbon usage (Unruh, 2000). Scholars of transition have therefore given much attention to local experiments in ‘protected spaces’. This protection shields innovation from the harsh competition of the incumbent regime’s solution; allowing the innovation to improve and for a supportive community to be built around it (Karvonen and van Heur, 2014; Schot and Geels, 2008). According to the literature on sustainability transitions, experiments can take place within these niches which provide opportunities for learning about improvements to the innovation. They allow innovators and front running regime actors to learn from each other and feed back their learning to the regime, in an attempt to move beyond the confines of the experiment (Raven et al., 2008). Increasingly, municipalities are leading and co-ordinating such experiments in order to speed up change and direct it towards low carbon ends (Bulkeley and Castán Broto, 2013).

Drawing on ten interviews and documentary evidence, this paper takes an exploratory look at the practice of two domestic energy retrofit projects led by UK municipalities; Birmingham Energy Savers (BES) and Warm Up North (WUN), which provide good examples of experiments. Energy efficiency retrofit is a significant challenge in the UK where a proportion of the housing stock

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is very poor; one fifth of all homes do not meet the Decent Homes Standard¹ and only half of all homes have some form of wall insulation (MHCLG, 2018). This has led to high levels of fuel poverty (11%, or two and a half million households in 2015) and excess winter deaths, of which there were over 50,000 in the 2017-18 winter (BEIS, 2017; ONS, 2018). Some policy workers and academics also see addressing this problem as an opportunity to drive job creation and economic regeneration (for example Crawford et al., 2014). Both BES and WUN aimed to address these challenges by taking advantage of legislation which had recently been passed (in 2013) which brought in the Green Deal and the Energy Companies Obligation (ECO); both designed to help householders to pay for energy efficiency improvements. At its commencement, the Green Deal was heralded by the then Secretary of State for Energy and Climate Change as a flagship policy which would respond to the “huge positive business opportunity” through domestic energy efficiency retrofit (Davey, 2013). It was estimated by his department that it would support the retrofit of 14 million homes by 2020 (DECC, 2011).

Based on the sustainability transitions literature both projects can be viewed as local experiments. This is because they were the first to take advantage of this central government legislation which formed a protective niche for energy efficiency retrofit and to direct it towards providing greater benefits for local citizens. Energy retrofit in the UK is itself still piecemeal and limited (Rosenow et al., 2018). Much has been done to insulate lofts and cavity walls and replace inefficient heating systems, but ‘hard to treat’ properties, (of which remain millions within UK housing stock) still need addressing. Furthermore, both BES and WUN viewed *themselves* as pioneering ‘pathfinder’ projects (NCC, 2015; BCC, 2015).

This paper seeks to interrogate failure within transition experiments, in order to provide insight into the impact this has on learning, both within the micro level of the experiment itself, and at the niche level of aggregation of multiple experiments. Much of this literature views experimentation as potentially positive (Lammers and Diestelmeier, 2017; Sengers et al., 2019; Karvonen and van Heur, 2014; Bulkeley and Castán Broto, 2013); as opportunities to learn about what facilitates or inhibits the spread of innovation and to learn from that how to drive towards a societal transition. Sengers and colleagues highlight that given the ground breaking nature of experiments, many (conflicting) views about meaning, function, problem framings and (moral) assumptions might be at play. However, Heiskanen et al. (2015) demonstrate that in real life circumstances such conflicts or difficult experiences may be viewed very negatively, rather than a valuable learning experience of what does not work and how to improve, and hence provide an obstacle to the transfer of learning. Following Heiskanen et al. (2015) this paper explores how the stakeholders delivering projects perceive these difficulties of practice; the implications of perceived failure for learning for future experiments, and hence the continuation of sustainability transitions.

This paper first reviews the nature of experiments for sustainability transitions and discusses the role of learning within them and the importance of perceived success or failure. This is then explored in two case study projects where data were collected through ten interviews (conducted in 2017) and documentary evidence including the author’s own journal of experiences working as a staff member of one of the projects (from 2014 to 2015). The findings and analysis discuss the perceptions of the achievements of the two projects, and then tentatively demonstrate how the perception of failure and the difficulties with the protection of the experiments in a real world context proved a barrier to learning.

2. Success, failure and learning in local sustainability experiments

The multi-level perspective of socio-technical transitions sees transitions taking place when a regime experiences destabilising pressure from landscape challenges and from new innovations which have emerged from protective niches (Geels, 2004). These protective niches shield new (and potentially crudely performing) innovations from competition with established technologies and practices until the innovations have become better adapted and can therefore compete on a more equal footing (Schot and Geels, 2008). There are many approaches to driving transitions by providing protected spaces, such as Strategic Niche Management (Kemp et al., 1998), Transition Management (Loorbach and Rotmans, 2010), and more general social learning (Seyfang, 2010). Much attention has recently been paid to the concept of experiments, which take place within protective niches to drive transitions (see Sengers et al., 2019, and Laakso et al., 2017 for reviews). The concept of experimentation, however can be understood in many ways. Ansell and Bartenberger (2016) distinguish between controlled experiments, Darwinian experiments and generative experiments. They argue that individual transition experiments are often described according to a generative logic; a logic of discovery, (rather than traditional controlled experiments). According to this logic, an experiment is taking action to achieve a purpose and evaluating whether that purpose has been achieved; as such participants ‘learn by doing’ (Hoogma et al., 2002) and so are able to refine and recalibrate the action taken until it ‘works’. Following this logic, the success of such an experiment is evaluated in terms of whether it meets the expectations of the involved stakeholders about what the action taken (or innovation) is to achieve; i.e did the stakeholders perceive the experiment (or later, recalibrated iterations of it) to have ‘worked’. Transition experiments can be set up explicitly, or they can be serendipitous. Caniglia et al. (2017) demonstrate this latter with their conception of niche experiments. Here, researchers cannot control the intervention nor the changes induced, but they can nevertheless evaluate the changes in the system, and learn from them.

Learning is therefore a critical part of experiments with a generative logic; it is a key conception of success. Laakso et al. (2017) argue that a key function of transition experiments is to provide conceptual and collective learning. This could be about technol-

¹ The Decent Homes Standard is a technical standard introduced by the UK Government, and states that a home is ‘decent’ if it meets the current statutory minimum for housing, is in a reasonable state of repair, has reasonably modern facilities and standards, and has a reasonable standard of thermal efficiency (DCLG, 2006)

ogy, user preferences, regulation, symbolic meaning, infrastructure and production systems (Geels, 2005). This learning is critical for scaling up experiments to destabilise the incumbent regime (Luederitz et al., 2017). Many kinds of learning happen in experiments, as Van den Bosch (2010) describes in highlighting the deepening, broadening and scaling up of experiments. Each of these steps refer to different learning mechanisms, first about the experiment itself and its conditions and restrictions (deepening), secondly about related experiments, or similar experiments in new contexts (broadening), and thirdly about regime change and broader developments (scaling up). Raven et al. (2008) points to specific examples of this in their example of two biogas experiments where specific mechanisms were put in place to expand learning outside the locality of the experiment. Furthermore learning can be argued to happen more easily within local areas, as experiments can be tailored to local concerns and characteristics (Raven et al., 2008) and can benefit from proximity (Neij et al., 2017). Indeed, much of the literature on experiments focuses on the local scale. Bulkeley and Castán-Broto (2013) demonstrate that increasingly, cities are leading the way in driving purposive change to socio-technical systems through urban experiments; they are well placed to lead these as they best understand 'real world' local challenges.

Following a generative logic of experiments, the failure of an innovation or action taken is an important opportunity for learning about how to improve or recalibrate the innovation, and the possibility of failure is therefore seen as necessary within experiments (Karvonen and van Heur, 2014; Laakso et al., 2017). The failure of the innovation does not necessarily mean the failure of the experiment, as it is seen to be useful and creative if the recalibration of the innovation as a result of learning can happen (Naor et al., 2015). And yet, other scholars demonstrate that there exists a reluctance to entertain the possibility of failure in innovations in the 'real world'; that not all stakeholders share this positive view of failure. Heiskanen et al. (2015) point to the difference in perceptions of success between residents and 'technologists' and point out that the residents in their study were only interested in taking action to mitigate climate change if it was *inherently* justifiable, i.e. if climate change projects provided immediate and concrete benefits, (often to the local economy, or for personal/local self-sufficiency). They problematize the supposed neutrality of experiments, and hence of the conception of failure of the innovation as valuable and positive for learning about how to recalibrate that innovation. This is supported by Geels and Raven (2006) who in their study of Dutch biogas development showed that stakeholders only perceived an experiment to be successful if it met their initial expectations. Furthermore van den Heiligenberg et al. (2017) reported that in their study respondents did not highlight the importance of learning from failure. As such, it is not well understood how the failure of innovations in experiments impacts upon learning, and for whom.

The issue of failure is also complexified by the tension between protection and the real world nature of local experiments. Protection is understood as providing a 'safe space' where relevant actors can try out new routines or extreme pathways with reduced or even no risk (Laakso et al., 2017; Gugerell and Zuidema, 2017). It is recognised that new innovations often cannot survive in the early stages without such protection (Schot and Geels, 2008). This protection can be provided in a number of ways (see Smith and Raven, 2012), but a particularly prominent method is through enabling national (or international) policies or legal frameworks (Young and Brans, 2017; Hickmann, 2017). That experiments take place in the 'real world' is also important; Luederitz et al. (2017) highlight that experiments are often carried out in real-world labs, or transition or social innovation labs, as this allows for participation and user involvement, and therefore greater learning. These two assumptions *can* contradict each other, for instance the serious game exploring potential energy pathways described by Gugerell and Zuidema (2017) does indeed provide a protective 'safe' space, but is not realistic. This raises the question as to whether adequate protection can be provided for such complex interactions. This (sometimes implicit) tension is not well understood or explored in the literature.

Therefore, there are a number of gaps in the literature pertaining to the role of failure of innovations in experiments for transitions. Experiments must be situated within the 'real world' in order to provide contextualised learning about real challenges. And yet despite the language of "testing" an innovation in the "metaphorical laboratory ... with the eventual aim to achieve a societal transition" (Sengers et al., 2019, p19) seeming value free, not all stakeholders in real world experiments will value equally all potential outcomes. Collins et al. (2017) point out that there are many different perceptions of success in their presentation of local sustainable energy projects, prioritised differently by different stakeholders. Heiskanen et al. (2015) points out that for local residents in their study, success meant concrete benefits for themselves; learning about what solutions are unfeasible was secondary to them. Furthermore the real world is constantly changing, which may lead to the unexpected weakening of protection in experiments; as for example, the fluctuations in global climate policy in recent decades demonstrate (Hickmann, 2017). This may undermine the experiments and cause them to falter. As such, it is not well understood what the implications of these elements are for learning. In order to explore these questions, I now turn to the case studies.

3. Methodology

This research is based on a comparative case study (Yin, 2003) of two local experiments. Elements of Grounded Theory (Strauss and Corbin, 1998) were used to guide the systematic exploration of the two cases – and to uncover the themes that project stakeholders themselves considered to be important, as well as exploring the themes of protection, success and failure, and learning that were provided by the literature. Qualitative data were gathered from ten interviews conducted in 2017, a journal kept by the author when she worked for 18 months on one of the case study projects (BES) between 2014 and 15, and other documentary evidence (see below). The two case studies chosen for this study were Birmingham Energy Savers (BES) based in the city of Birmingham, England, and Warm Up North (WUN) based in the North East region of England. These were chosen because they were typical examples of sustainability experiments according to Sengers *et al*'s criteria (see below). Here, the experiments are testing what

are considered to be complex innovations; BES and WUN incorporate technical solutions, funding mechanisms and new institutions and rules all at once.

Both projects began in 2013 in the context of newly introduced and innovative “Green Deal” legislation. This was the UK Government’s plan to kick start an energy efficiency retrofit revolution by making available a ‘pay as you save’ finance mechanism. Householders could take out a Green Deal Plan (a loan) to pay for energy efficiency measures to be installed, with repayments made through a fixed charge on their electricity meter over a period of up to 20 years. Repayments had to be less than or equal to the savings on energy as a result of the measures; this was the Golden Rule. For more expensive measures unlikely to meet the Golden Rule such as solid wall insulation, or for those people on social security payments, the Energy Company Obligation (ECO – an obligation on energy companies to invest in energy efficiency measures or face crippling fines) could be used in addition (DECC, 2012; Hough and White, 2014). The Green Deal was about individuals taking the initiative to privately arrange for installations and loans through the Green Deal system. However Birmingham City Council (BCC) and the Association of North East Councils (ANEC; 9 local authorities) both saw an opportunity to run area-based, local authority endorsed Green Deal programmes that would drive investment towards hard-to-treat properties and the fuel poor, deliver measures in a way that would also provide local jobs, training and support for local supply chain companies, and protect local residents against “cowboy” traders (NCC, 2015; BCC, 2015).

3.1. BES

BCC began procurement for a lead delivery partner for Birmingham Energy Savers through a process of competitive dialogue in 2012. They awarded the contract to a multi-national construction company (hereafter called the BES Delivery Partner) who began delivering BES in 2013. The contract contained a number of very ambitious Key Performance Indicators (KPIs): to improve the thermal efficiency of 29,000 homes, create 360 jobs, provide 16,000 training weeks to jobseekers and help 26,000 people out of fuel poverty over eight years. It also aspired to support the local economy by directing 90 % of the money spent as part of the project within BCC’s boundaries. BCC also invited a number of other local authorities and social housing providers to make use of their procured delivery partner and set up their own ‘Energy Savers’ programmes – meaning the contract was worth potentially £1.5bn to the BES Delivery Partner. The contract made use of a break clause to terminate after only three years, in April 2016.

3.2. WUN

Nine local authorities within ANEC began procurement for a delivery partner six months later, also through competitive dialogue, and awarded the contract to a major utility company (hereafter referred to as the WUN Delivery Partner) in July 2013. Newcastle City Council acted as the lead partner and project manager. Again, there were ambitious targets for the project – delivering improvements to 10,000–15,000 houses within the first five years, delivering local economic and social benefits, creating jobs and cutting carbon emissions. However the contractual KPIs that were eventually negotiated were more focused on quality and targets to reach householders. As a partnership of 9 local authorities representing 65,000 properties, this was an attractive business opportunity. The contract was ongoing at the time of data collection and has since run to completion as planned.

Sengers et al. (2019) describe experiments to be socio-technical, in the context of system innovation, trying novel things which are challenge led, aspiring to social learning and practice based. Both case studies match these descriptions; hence they can be described as experiments for sustainability transitions, and as such are justified for this research. They were both trying something novel in response to a challenge: they were the first city-led attempts to take advantage of the protected space afforded by the Green Deal to address the persistent problem of poor energy efficiency of domestic properties in their areas, and in a way that created as much ‘social value’ as possible. The projects were both socio-technical, attempting to introduce technical measures into people’s homes where they live their lives. The context of both projects was system innovation, and was trying to move people away from traditional ways of thinking about how to keep homes warm (through insulation and efficiency, rather than fuel) and how to fund such improvements (through the Green Deal loan system, rather than private funds). Both projects were obviously practice-based, being live projects taking place in the ‘real world’. Finally, the projects saw themselves as pioneers (using the term ‘pathfinder project’) in this new regulatory space, and built in opportunities to share their learning beyond their boundaries. It can certainly be argued that these projects were not fully formed transition experiments based on a theoretical understanding of their use for driving transitions and with the aim to learn specifically about niche development and driving transitions. However, following Caniglia et al. (2017), it is useful to see these projects through the lens of niche experiments, where researchers cannot control either the interventions or the changes induced, as they still provide useful learning to transition scholars about the nature of transition in countries like the UK where governance for transitions is not well embedded.

In total ten interviews were carried out in Spring 2017; six with Warm Up North, given the greater number of local authorities involved, and four with BES. A further two BCC employees working in the construction management of the retrofit works were asked for interviews, but they declined. The Programme Manager (PM) from each project was interviewed. Three interviews were conducted with staff from South Tyneside, Newcastle and Darlington local authorities for whom WUN was part of their remit. One staff member from BES who had been recruited as part of a team to assist with the implementation of BES was also interviewed. An interview with a former member of staff of the BES Delivery Partner was conducted, and a second interview with a current member of staff who had been involved from the beginning. A final interview was carried out by phone with two WUN Delivery Partner staff – one of whom was no longer employed by that company. Although there were 9 local authorities in WUN, around 10 people working in Birmingham City Council on BES and high turnover of relevant staff in both delivery partners, it was not considered neces-

sary to interview all individuals as theoretical saturation was achieved quickly within the ten interviews (Eisenhardt, 1989). Interviewees were asked about the original expectations of the projects, whether they had met them and why, and about opportunities for learning from these projects. Drawing on the key themes of the literature reviewed, questions were designed to understand the daily practice of the projects, the lived experiences of those delivering them, and how participants felt about the outcomes of the project and opportunities for learning (Table 1).

Publicly available project documentation, press releases and government documents were also studied to ‘fill in the gaps’ of the stories of both projects that was not provided by interviews (Strauss and Corbin, 1998) and also to triangulate key issues that had arisen in interviews. Additionally, the author worked for BCC part time for 18 months as a BES Implementation Officer from 2014 to 2015, and kept a diary of her experiences. This raises broader questions of positionality: the author is part of the case under study, and was positioned as such by the interviewees (Plowman, 1995). Certainly the author was viewed as a former colleague by BES interviewees; for WUN interviewees a shared understanding of working under the Green Deal was helpful at establishing rapport. Given this positioning of the author by others based on the shared experiences that diary records, the diary (despite its subjective nature) is included for completeness.

3.3. Data analysis

The idea that failure can be damaging in sustainability experiments and that this might have negative consequences for transition is drawn from Heiskanen et al.’s (2015) study. The author’s own experience working on one of these case studies sensitised her to this issue, and particularly to the impact of failure on opportunities to learn from experiments; learning being an important function of sustainability experiments (Laakso et al., 2017). Blaxter et al. (2001) argue that ‘hunches’ based on critical incidents experienced by the researcher can provide fruitful directions for research. Heiskanen et al.’s (2015) study further demonstrated that this ‘hunch’ raised important questions for research into sustainability experiments in particular. Following this, analysis started with the interviews which were transcribed in full and the transcripts coded for 1) perceptions of failure, 2) reasons for such perceptions, and 3) the implications of perceived failure for learning. Another theme emerged from the data; 4) that of the impact of contextual factors on learning, so transcripts were also coded for this. Documentary data was then reviewed and used to triangulate the issues around failure arising from the interviews. Finally, the researcher’s diary was used to provide further examples of the themes discussed in the interviews. The diary was *only* used in this way, to help reduce bias.

4. Findings: the experiences of stakeholders in local experiments

The findings are laid out in a way that gives chronological coherence to the stories of the projects, but are related to the analytical themes described in the previous section. Sections 4.1 and 4.2 on expectations that the projects would be large scale, and on central government changes to legislation relate to code 2) reasons for perceptions of failure. Section 4.3 on perceived failure, relates to code 1) perceptions of failure. Section 4.4 on lost opportunities for learning because of failure, relate to code 3) the implica-

Table 1
Interviewees from BES and WUN.

	BES	WUN
Municipal Staff	Programme Manager (BES PM) Former BES Officer (BES LA)	Programme Manager (WUN PM) Council Officer South Tyneside (WUN LA1) Council Officer Newcastle (WUN LA2) Council Officer Darlington (WUN LA3)
Delivery Partner Staff	Account Manager (BES DP1) Former Energy Assessment Manager (BES DP2)	Project Director (WUN DP1) Former Account Manager (WUN DP2)

tions of perceived failure for learning. Finally, Section 4.5 on lost opportunities for learning because of other factors, relates to code 4) the impact of contextual factors on learning.

4.1. Expectations that the projects would be large scale

Interview and documentary evidence demonstrated that both projects had ambitious expectations for their projects. Both projects were hoping to address the issues of their local area (deprivation, fuel poverty and inefficient housing stock) by projects that were big, area-wide and would benefit huge numbers of local citizens. Both projects had highly ambitious KPIs around the number of people made aware of the projects and BES had a KPI on the number of retrofits completed, to reinforce this.

“The expectations were that this was going to be a, a game changer, for the industry and for the population” (BES PM).

“I remember reading in the news about naysayers saying this is never gonna work, and I was just thinking you know, we’ll show them, ..., because of the scale, the amount of resource that we were throwing at this” (BES Delivery Partner employee)

Warm Up North awarded their contract to the WUN Delivery Partner based on the understanding that they would “ringfence” their entire ECO budget for the North East, i.e. spend their entire national budget in that one region;

“So we ended up choosing [the WUN Delivery Partner] and one of the main reasons was their ability, or their, their commitment to ringfence ECO funding to the Warm Up North partnership” (WUN PM).

Given that the WUN Delivery Partner was a very large energy company in the UK and hence had a very large obligation to discharge, this was going to mean a huge scale project.

These quotes illustrate that both projects were perceived by those running them as projects that were meant to deliver huge numbers of energy efficiency improvements within their localities, with immediate benefits for those in the two localities that were in fuel poverty or were struggling to find work. This was therefore a key criterion by which they would go on to judge the success of those projects. This is quite different from the success criteria of experiments presented within the literature, which are about learning about innovation (Schot and Geels, 2008; Laakso et al., 2017).

4.2. Central government changes to legislation

The interviews and documentary evidence show that both projects were soon heavily disadvantaged by problems with the national level Green Deal and ECO legislation that emerged by 2013. Nationally, despite initial targets, only circa 1500 people signed up to the Green Deal in the first year against a target of 10,000 (DECC, 2013). It emerged that privately renting tenants could not participate, further reducing the market. The cost of the finance (7%) was much higher than that of personal loans available at the time (3–4 %). The process as a whole was extended and complex. Finally, in December 2013, the UK Government made a number of changes to ECO. The WUN PM described these as: reducing energy efficiency targets, extending the deadlines to meet them, and allowing those targets to be met through ‘easy’ measures such as loft and cavity insulation and boiler replacements. The WUN PM perceived that this change to ECO had happened to reduce energy bills for consumers, in direct response to a recent pledge by the Labour Party (the Opposition) to freeze energy bills for two years if they were to be elected. As a result, for both Birmingham and the North East who had a number of difficult to treat properties, a major avenue to address those through these projects was thereby removed. Interviewees in both projects were unanimous in perceiving this change in ECO and the low take up of Green Deal to be key moments when their own local projects began to fail against their original expectations.

As such, both of the projects, being situated in the real world (Sengers et al., 2019) and in the increasingly politicised context of energy policy in the UK, had the ‘protection’ afforded to them by these national policies removed. Without subsidies or a legal mechanism to support the mass delivery of energy efficiency improvements, the innovations of these experiments were at the mercy of ordinary market forces, which do not normally drive the uptake of energy efficiency. This chimes with literature presented above (eg Young and Brans, 2017), that highlights the importance of enabling national policy in providing protection.

4.3. Perceived failure

That BES was perceived to be a failure is primarily signified by the fact that the contract was terminated early. The contract was initially signed for 8 years, but included a break clause at the end of March 2016 (after three years). The reason given for resolving to exercise this break clause was that the BES Delivery Partner had not achieved at least 15,000 Green Deal plans in Birmingham, including 40 public non domestic buildings by the break clause date, as contractually obliged. Instead only 3100 properties had been improved and only 16 properties had used the Green Deal to pay for the works. As the Public Cabinet Report on BES demonstrates, BCC felt it had to take action;

“BCC recognises [the BES Delivery Partner] has not achieved the date break criteria specified in the PA [Project Agreement] and takes appropriate action” (BCC, 2015, p10).

In the local press, local councillors were clear that the project had been a failure, although they attributed that failure to central government;

“With government constantly moving the goalposts there was absolutely no chance anyone could have hit the final target of 60,000 homes and 1000 non-domestic buildings across the city at no net cost to the council. ... This is about the failure of Green Deal and the failure of the Government to show leadership in terms of actually responding to the needs of energy efficiency...” (Councillor Trickett quoted in Birmingham Post, 15th September 2015)

One of The BES Delivery Partner’s (former) employees described the project in stronger terms:

“There’s no question really it’s been a complete disaster”

The diary kept by the author during her time working as a BES Implementation Officer supports this and gives further examples of the lived experience of the project. Green Deal customers were not materialising after a year of the project, and as such, The BES Delivery Partner planned to pass on this element of the contract to another company to deliver:

“Basically, [the BES Delivery] Partner have just this afternoon met with [PM] and are discussing the possibility of transferring the whole Green Deal Domestic ‘stream’ (really, the majority of what we wanted them to do) to another company, to whom they would pay a management fee. The company ... is based in Warrington (so much for 90 % of spend in BCC boundaries!) and would do everything [the BES Delivery Partner’s] supposed to do, at lower cost to the customer. I think we were all incensed at first, at [the BES Delivery Partner] ‘getting out of’ their obligations. But we began to think that really, things can’t carry on as they are, with nothing happening, so any change is (bound to be!?) positive” (Author’s diary)

The detail aside, this quote supports the interviewee data by giving insight into some of the frustration experienced by project staff with the failure to deliver a key element of the project, and a growing cynicism about whether this could be resolved.

The BES Delivery Partner itself lost £30million as a result of mobilising for the Green Deal, which never took off. They too, described the project as a failure, although less directly.

“It wasn’t a big success ... I think we as a company have made. . decisions internally that mean that we won’t do this type of work again” (BES Delivery Partner employee)

For a project that was about *large scale* energy efficiency retrofit, this project was recognised by all interviewees as a failure.

WUN also suffered from the national failure of Green Deal: the PM pointed out that only one Green Deal funded installation was done. The ECO-funded stream of work around hard to treat properties that had been in the pipeline was all but stopped:

“The schemes that were carried out ... it was so politically important for that local authority, they had to carry it out anyway. ... But it was never to the scale that we envisaged” (WUN PM)

However WUN continued and essentially became a boiler replacement scheme, which was no different to the WUN Delivery Partner’s offer around the country.

“We did a hell of a lot of boilers, it’s got to be said. But that wasn’t really what Warm Up North was set up to do. And you could argue that, that boiler proposition was no different to what they [the WUN Delivery Partner] were offering nationally. So what was the benefit of having got a partnership? (WUN PM)

The interviewees indicated that the partnership was itself very difficult. The local authorities used private data on social security payments and taxes (after a robust process of justification) to target people eligible for free boilers, which would be paid for through ECO funding. The authorities sent out letters to these residents, only to be told that the WUN Delivery Partner had decided to rescind the ‘free’ boiler offer, and require the customer to pay £400. This led to some complaints from local residents. This perception of ‘tension’ between the partners was felt on both sides; the WUN Delivery Partner also felt that some of the local authorities could have done more to attract more eligible householders;

“Some of [the local authorities] was far more actively putting [the message] in their local magazines, getting the message out to their health workers, whereas some of them really just relied on the benefit data to generate the number of referrals. So it was a challenge from time to time” (WUN Delivery Partner former employee)

At the time of interview, WUN were considering letting the contract run its course, but not put any resource into it, just *“let it die” (WUN PM).*

Overall, all sources indicated that both experiments were perceived by their stakeholders to have failed, so much so in the case of BES that action was taken to terminate the contract. WUN did continue, but ‘failed’ when compared to the original expectation that it would address ‘hard to treat’ homes. The literature reviewed earlier argues that failure is not necessarily a bad thing; that it can provide opportunities for learning (eg Lammers and Diestelmeier, 2017; Naor et al., 2015). However the above data gives voice to the real frustrations that were felt by the project delivery staff as a result of this. The section below explores in more detail the impact of those experiences on the opportunity for learning.

4.4. Lost opportunities for learning because of failure

According to the former Programme Manager of BES, the programme is no longer talked about:

“It’s not [talked about]. That’s the thing you see, it’s not. We’re not doing any retrofit in the organisation, or not that I know of – we’re not doing anything on the scale that we were doing there before. Housing, retrofit, doesn’t seem to be a priority for the, for the City at the moment.”

Additionally, The BES Delivery Partner have moved away from Energy Services provision, meaning that the potential for them to feed their experience from this project into future activity is also lost.

“It was more about recognising what we do well. . and playing to our strengths. . [BES] was trying to do something new, well why are we doing that, when we can grow successfully in areas that we know are tried and tested and we understand better”.

Additionally BES was not a success, there was also little opportunity for the surrounding local authorities and social housing providers to use the procurement framework to start their own projects in their own areas.

As for WUN, the lived experience of the project from the PM’s point of view was ‘painful’, and this had an impact on his perception of his colleagues’ willingness to learn and try again;

“I think we’ve all had enough of it really, and we just wanna get out of it.”

“I think from the people that run it, we don’t really want to discuss it, it’s been so painful ... I think local authorities would be a little bit reticent to committing ourselves in the same way”.

Although future energy projects are currently being explored, housing retrofit is no longer a focus. As an Energy Officer at South Tyneside explained:

“it’s awful that we’re in a position where we’re not really offering anything at the moment; the first time I’ve been in this position since starting work here, in 16 years.”

Critically, the perceptions of failure actually reduced the opportunity to learn from what could have been a fruitful experience, and therefore recalibrate energy efficiency retrofit work accordingly in future towards something which stakeholders could agree would ‘work’. The Delivery Partners were looking to limit damage to their reputations and company finances. BCC and the ANEC authorities moved on immediately to other priorities rather than ‘throwing good money after bad’, by allocating resources to explore and understand what had gone wrong, and what could be done in future. BCC and the BES Delivery Partner had indeed lost money during BES; it cost BCC over £1million to procure and set up, while the Delivery partner spent £30million. The projects were not discussed and reflected upon, partly because the experience had been so ‘painful’ and demoralising. The findings here chime with Heiskanen et al.(2015) who argued that the projects they studied that had failed led to a sense of disillusionment, and a sense that time had been wasted. Despite the contention in the literature that failure is necessary and productive for learning (Karvonen and van Heur, 2014, Laakso, et al., 2017, Naor, et al., 2015), the findings show the risks attached to failure, and hence potentially a fear of failure.

4.5. Lost opportunities for Learning because of other factors

Local authorities across England are facing cuts in their funding from central government, which is perhaps precluding further projects. When discussing how BES was not talked about any more, the PM highlighted that this was

“primarily because not because of its success or its failure, but primarily because of where the organisation has changed over the last . two years, or where its priorities are,. . it’s got massive budget pressures and ..., [the] priority is Children’s Services and Adult Services... So things of this nature [i.e. BES] they see as nice to haves.”

Some council officers working on BES moved to other parts of the authority, and now have no opportunity to make use of any of the learning they gained from the project:

“It’s a part of the problem within the Authority, ... if you then move to a different part of the Authority, that becomes your life, and your world, and you don’t really look back, ... nobody ever published anything and said this is what we achieved” (BCC employee).

In the North East, the situation is similar: *“Funding’s just,. . it’s never been so dire”* (ANEC energy officer), making further experimentation less likely. Many of the local authorities are dealing with this lack of funding by adding more ‘roles’ to their staff’s responsibilities;

“I’m being pulled into other stuff, and so the fuel poverty is falling down on my agenda a bit” (South Tyneside Energy Officer)

The situation of the interviewee from Darlington was yet more challenging; he was now dealing with both private sector housing and licencing of entertainment venues and events. Furthermore, the Association of North East Councils has dissolved. This has hap-

pened in the light of potential devolution deals in the UK, but is another external factor which further compounds the loss of learning.

Again, the findings presented here demonstrate how the dynamic nature of the real world context of these projects provided further barriers to learning. There was a lack of stability in the resources available for the projects, and even in the governance structures that pushed for them to happen (such as with ANEC). As such, there was a lack of stability in the conditions required to 'protect' the experiments. This lack of stability, the changing priorities for local authorities and hence their staff given the cuts to local government funding, and the consequent breaking up of project delivery teams, prevented staff from reflecting on them and learning from them, even if they had wanted to. The dynamism of 'real world' contexts and the importance of this for learning is certainly highlighted in the literature (e.g. Sengers et al. 2016), however the findings here illustrate the potential negative consequences of this dynamism.

5. Discussion – Learning from experiments and why failure matters

To reiterate, individual transition experiments are often described according to a generative logic (Ansell and Bartenberger, 2016); whereby an experiment is taking action to achieve a purpose and evaluating whether that purpose has been achieved, and then refining and recalibrating the action taken. Following this logic, the success of such an experiment is evaluated in terms of whether it meets the expectations of the involved stakeholders about what the action taken or innovation is to achieve, usually after a process of recalibration and reiteration. It is acknowledged that these case studies are limited by the fact that of the multiple stakeholders involved, only staff involved in the projects were interviewed. Nevertheless, both case studies presented here demonstrate failed experiments as they were perceived to be failures by some or all of their stakeholders, and crucially, a process of iterative learning to recalibrate the action so that 'it works' did not therefore take place. At the national level, the Green Deal policy was seen to be a failure (Rosenow and Eyre, 2016), and was ended by the UK Government in 2015. This undermined the protection for the two local experiments. It contributed to financial losses and to difficult relationships between the local authorities and their Delivery Partners. At the local level, these projects (particularly BES) became politically untenable as funding cuts made failure more risky and therefore less tolerable. As such both projects missed out on significant lessons that could have been learned. Following Geels (2005), as originally conceived, these projects would have been excellent opportunities to learn about retrofitting multiple energy efficiency technologies on hard to treat homes, of different user expectations about responsibility for energy retrofit, and about how local companies could be supported to deliver these. There would have been opportunities to learn about how to regulate such a complex system of energy retrofit, with multiple products, and installers and assessment companies, and how to best organise the delivery of this complexity. And yet because of the failure of these projects, they lost almost entirely the *opportunity* to learn about all of this. Indeed, the perception of failure made stakeholders potentially unwilling to discuss their projects and draw out painful lessons, as the refusal of some participants to be interviewed tentatively suggests.

Transition scholars argue that the primary function of experiments is higher order, deep and collective learning in order to drive a wider transition (Laakso et al., 2017, Seyfang et al., 2014, van den Bosch, 2010; Raven et al., 2008). They argue that even failure can provide opportunities for learning, as what does not work is as important to know as what does (Lammers and Diestelmeier, 2017; Heldeweg, 2017). However, the cases presented here show that the failure of an innovation is *not* always taken as a useful learning experience, particularly by those stakeholders delivering a project. Both cases cite the 'painful' experience of the project as a factor in not wanting to talk about the projects, when such conversations could have helped explore lessons learned. Also, as BES began scaling back long before ending and terminated early, there was no opportunity to share learning more widely with other local authorities as planned, thereby aggregating learning across similar experiments in different contexts (Raven et al., 2008). The BES Delivery Partner moved away from domestic retrofit altogether, also losing the opportunity to learn. The data presented here suggest that ultimately, in practice, failure can be embarrassing, demoralising, and substantively (and financially) damaging. The case studies support Heiskanen et al. (2015) in demonstrating that experiments must have intrinsic value, or concrete benefits for their stakeholders. The case studies suggest that cities driving urban experiments may well be sensitive to issues about the credibility of their projects and the need to show that they are spending public funds appropriately. In the UK context of local government austerity, in particular, local experiments run by cities may be particularly driven to see 'concrete achievements' arising from their experiments.

This research also demonstrates how the tension that can exist between the ability to learn about innovation in protected spaces and the aspiration that experiments take place in the 'real world' (Sengers et al., 2019, Luederitz, et al. 2017) can contribute to failure. The case studies presented here demonstrate that the real world nature of experiments can actually *undermine* the protection of them. In some contexts, (for example, the particularly centralised UK governance system, see Wilson and Game, 2006), policy which can provide protective niches for experiments may only be providing that protection partly by accident. For instance, the UK Government didn't envisage that their Green Deal legislation would be used by local authorities for area-based schemes; it was meant to set up a relationship between a single householder and a Green Deal Provider. Also that 'protective' policy may only be in place for a while – as was the case here. In the UK, national government cuts to local government spending also reduce the autonomy to experiment at city level; leading to a reduction in resources for experiments and the *stable* provision of those resources, and increasing power imbalances between stakeholders (as was the case between WUN and their delivery partner). These are the 'real world' conditions under which these two cases struggled under unreliable protection. The importance of supportive policy and legal frameworks at international and national levels has indeed been highlighted in the literature (Hickmann, 2017; Young and

Brans, 2017; Sengers and Raven, 2015). Therefore the lessons drawn from these case studies about the damaging consequences for experiments of this dynamic, real world protection are applicable beyond the English context.

As such, this paper argues that experimentation can lead to learning and scaling up, as detailed in the transition literature, *but only under certain conditions*. It is proposed that these conditions include success, concrete benefits for project participants themselves, and stability in experimental conditions over time, including adequate funding. Each of these will be taken in turn.

Firstly, this research suggests that some level of success is required which allows learning to be transferred. These projects failed, and learning was not transferred. Indeed the appetite to experiment at all was reduced as a result. This builds on previous work by Collins et al. (2017) which shows the converse – they present two successful projects which led to further, more ambitious projects on the back of “narratives of success”. Successful projects provide proof of concept or inspiring real life examples and provide more generic lessons that can be aggregated at other sites (van den Bosch, 2010; Raven et al., 2008). Successful projects can be inspiring, encouraging other experiments to be set up *in order that* learning from previous projects can be applied or built upon (Collins et al., 2017). Perhaps some narrative of success is therefore a minimum condition for learning from experiments in practice.

Secondly, experiments must have tangible benefits for project participants if they are to learn from them. This relates closely to the above point on success – success here *means* benefits for project participants. Rosenow and Eyre (2016) have pointed out a host of useful lessons for transition scholars and designers of policy that can be gleaned from the failure of the Green Deal; not least the need for more attractive finance and less complexity overall. However this learning was of no immediate benefit to the local authorities and Delivery Partners involved in the two cases. As previously stated, this builds on Heiskanen et al.’s work, which showed that concrete benefits were necessary for project participants in order for them to continue to argue for investment in carbon neutral projects. Heiskanen et al. (2015) showed that failure, and hence the lack of actual and immediate benefits for project participants, is demoralising and leads to disillusionment, which can be a barrier to learning.

Finally, this research suggests that stability in conditions over time, and adequate funding are also important conditions for learning. This has been highlighted by other authors; van den Heiligenberg et al. (2017) describe adequate funding as a necessary success factor in their survey of experiments, and Brown et al. (2003) highlight the importance of the extended duration of experiments in their study of sustainable mobility systems. The present research demonstrates that without these conditions, experiments are at risk of failure and of their learning being lost as a result. Furthermore, a proper evaluation of projects (such as that presented by Luedertiz et al., 2017) would take considerable time and resources if it were to be applied in experiments – and yet many projects that serve as experiments simply do not have the time and resources to commit to a systematic evaluation. Certainly BES and WUN were more interested in meeting their KPIs, rather than in evaluating the projects as a whole. Again, this provides a barrier to learning.

As transition scholars, we may ask if it *matters* if local projects or experiments fail and learning opportunities for project stakeholders lost as a result, if transition scholars can still learn from these experiments. Indeed there *are* many scholars and practising consultants drawing lessons from the experience of the Green Deal in general and these projects in particular (Sustainability West Midlands, 2015; Rosenow and Eyre, 2016). However if experiments are to respond to practice based (real world) challenges (Sengers et al., 2019), then practitioners as well as scholars must be involved. If cities are to provide important test beds for innovation, as scholars have argued for (e.g. Bulkeley and Castán-Broto, 2013), then the cities’ municipal staff, local businesses, citizens and other stakeholders must all be involved in learning from experiments, and applying this learning in future experiments (Luedertiz et al., 2017), rather than being unwilling to do so because of negative past experiences. A failure to learn from experiments because they are too demoralising to reflect upon can therefore ‘stall’ the trajectory of a transition in a local area. Given the increasing urgency of action to mitigate climate change, this is something society cannot afford.

6. Conclusions

Although not originally set up as self-conscious transition experiments, BES and WUN still can be conceived of as niche experiments according to the description by Caniglia et al. (2017), and can be understood according to a generative logic (Ansell and Bartenberger, 2016). They are therefore useful to transition scholars in understanding potential consequences of failure in experiments; an area which has not received enough attention in the literature (Heiskanen et al., 2015). This research responds to several tensions within this literature; the tension between failure of experiments and the (in)ability to learn from them, and the tension (and potential conflict) between protection for niches and the real world nature of experiments and how this can contribute to failure. The cases presented demonstrate that in practice, the perceived failure of experiments can reduce the opportunities for learning by those involved in delivering them, and can even reduce the appetite for experimentation. In practice, failure can be demoralising, embarrassing, and substantively damaging, which can reduce stakeholders’ willingness to reflect upon experiments, and learn from them.

It is therefore suggested that experimentation can lead to learning and scaling up only under certain conditions. It is argued that these conditions include: a minimum level of success; success interpreted as some concrete benefits for those actually delivering the projects; and the contextual factors of stability in experimental conditions over time along with adequate resources. It is suggested that in certain contexts where funding for local government is scarce, and where policy and law making are highly centralised (such as in the UK), such conditions are hard to achieve. However these conditions are doubly necessary to learn from experiments, and win support for future experiments, that can aggregate learning and drive transition trajectories towards sustainable outcomes.

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