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1. INTRODUCTION

Urban Futures is a research project that is part of the second wave of Sustainable Urban Environment (SUE) initiatives funded by the Engineering and Physical Sciences Research Council (EPSRC.) It started in May 2008, and is scheduled to last for four years. One of its key aims is to test the effectiveness of sustainability measures in the future, against the backdrop of four different scenarios of how the future may look, socially and economically. The four future scenarios have now been developed, they are:

- Policy Reform
- Market Forces
- Fortress World
- New Sustainability Paradigm

The central premise is that the current sustainability measures, and traditional analyses thereof, may be of limited worth, because they fail to take into account the social, political and governmental context in which they will be applied. To overcome this, the project has developed these four archetypes based on potential global developments over the coming years and decades. For example, the *Fortress World* scenario imagines an authoritarian future where a powerful minority have established a web of interconnected enclaves that exclude a destitute minority.

The scenarios were based on research undertaken by the Global Scenario Group (GSG)(Global Scenario Group, 2010). Urban Future used four scenarios created by GSG and adapted them for use in British urban environments, in order that they could be reasonably used to test the performance of sustainability measures in terms of their impact on biodiversity, air quality, water wastage, and so on.

It should be stressed that the Urban Futures project is still at a fairly early stage. The nature of the project demands that both robust scenarios and accurate metrics for measuring their characteristics be devised, before testing of the proposed sustainability solutions can even begin in earnest. As a result, Urban Futures cannot be said to have delivered any of their intended outputs at this stage. Such is the nature of the task they are involved in. Nevertheless, their work can already be seen to have had an impact on how sustainability practitioners go about their work.

2. SUCCESS STORY

Despite the overall project still being at a fairly early stage, there has been interest in the use of the future scenarios models in sustainability testing from both private and public sector stakeholders of the Urban Futures project.

Private sector interest has come from CH2M HILL a global engineering and construction firm. They have a connection to Urban Futures through Peter Braithwaite, who is the European Head of Sustainability at CH2M HILL and a member of the steering committee for Urban Futures. Braithwaite's interest in the future scenarios has led to them becoming a central component in some of CH2M HILL's work.

Braithwaite has been leading a project called *International Cities*. It involves looking at existing cities, and considering how to make them more sustainable over the next thirty

to forty years. This is a major international project; Braithwaite identifies it as one of the “key future projects for CH2M HILL”(Braithwaite, 2010). Braithwaite has adapted the future scenarios, in collaboration with members of the Urban Futures team, so that they are now applicable to his organisation’s use. He now sees the future scenarios concept as “a core part of our project,” and points out that Urban Futures’ work has been “recognised and adopted by a major US organisation.” The upshot is that if the project develops as planned, then the future scenarios will be used as part of a major US-led programme identifying future solutions for cities worldwide. The project deals with existing cities, so GSG and Urban Futures’ work will be being applied to real world challenges.

In addition to this project, Braithwaite identifies Urban Futures’ work as having changed attitudes amongst those he works alongside at CH2M HILL. He sees the future scenarios as having a big impact, in that prior to his engagement with Urban Futures his colleagues, “had never thought of this idea of predicting the future socio-political situations in cities and how that would affect [sustainability] choices. So the future scenarios concept is now embedded in part of our framework.”

The changing of attitudes may not lead to an immediate tangible impact, but it can lead to profound changes in the medium to long term, and can legitimately be recognised as a form of utilisation of research. This form of knowledge transfer is commonly classified as *conceptual* research use. For Hasenfeld and Patti (1992) conceptual research use occurs when research is used, “to inform and enlighten the decision makers”(Hasenfeld and Patti, 1992). Similarly, Estabrooks recognises conceptual utilisation as having taken place when, “the research may change one’s thinking but not necessarily one’s particular action”(Estabrooks, 1999).

One can also see evidence of conceptual utilisation of the future scenarios in the Environment Agency’s involvement with Urban Futures. The Environment Agency (EA) is a project partner in Urban Futures, and Dr. Rob Kinnersley of the EA’s Evidence Directorate, sits on their steering committee. Although it is too early in the project for there to have been tangible changes in the EA’s working practices, he has identified changes in the way that some people there think about the idea of future-proofing.

As with the situation at CH2M HILL, the future scenarios scheme has raised awareness of a hitherto under-developed concept in future-proofing for sustainability, specifically the importance of social, political, and economic contexts in analysing the long-term prospects of sustainability measures. Of course the Environment Agency has long been aware of how changing circumstances can impact upon long term plans, but, according to Kinnersley this mode of thinking has applied mainly to climate change rather than social change. At present, Kinnersley feels that Urban Futures’ work has changed attitudes only in his immediate working circle, but it is an influence that he expects “to diffuse out from us to the other parts of the Evidence Directorate and from there to the rest of the business”.(Kinnersley, 2010)

Kinnersley expects that it will be some time until Urban Futures’ work has an overt impact on EA’s practices. His expectation is that there will be an observable change only when the final reports are delivered and distributed amongst the relevant departments. Nevertheless, his involvement in the project has been shaping the direction of the work and the applicability of the intended outputs.

This has involved directing the researchers to produce end-products that will be of practical use, without the need for “translation” into less academic, more accessible language. In his own words, he has been, “helping to ensure that the outputs are fit for purpose” One of the successes of this engagement, then, has been in steering the group so that it will be more able to produce outcomes that will be transferable, applicable and useful when they reach fruition. The engagement between Urban Futures and EA can be seen as a good example of the demand-pull model of knowledge exchange. This is a model that has been prominent in knowledge exchange literature for around 30 years, and describes the situation where end-users shape research ideas through their own demands and involvement (Landry, et al., 2001, Weiss, 1979).

3. DISSEMINATION AND ENGAGEMENT PLANS

The interest shown in the future scenarios themselves, as opposed to the future-tested sustainability solutions, was largely unexpected, and thus not a planned part of Urban Futures dissemination strategy. That’s not to say that the success of the models was fortuitous in any sense, on the contrary, this dissemination was a direct, albeit unintended, result of the steering and engagement plans put in place by Urban Futures. Their early engagement efforts involved a programme of workshops, steering committee meetings, expert panels, and other events designed to keep stakeholders involved, but also to generate suggestions for ongoing research. As discussed in section 4, below, these engagements would be central to the models’ utilisation as research outputs.

4. DISSEMINATION PROCESS

4.1) Pathways

There have been three areas that have been central to the utilisation of the future scenarios by both CH2M HILL and the Environment Agency. These are personal connections, institutionalised collaboration, and the alignment of interests.

4.1.1) *Personal Connections*

For the Environment Agency, personal connections come in the form of Rob Kinnersley’s professional contacts. The key contact in this case has been Rob Mackenzie, a researcher on the Urban Futures project. Mackenzie and Kinnersley have known each other professionally for a number of years, a relationship built on their shared specialisation in atmospheric pollution. As a result, Mackenzie was aware of Kinnersley’s professional interests and his potential value to the Urban Futures project, and was in a position to approach him about contributing to the steering committee. Kinnersley has also had links with the University of Birmingham in the past as a lecturer, and at present as an honorary senior visiting research fellow.

The key connections in the CH2M HILL story are Peter Braithwaite’s longstanding relationships with the EPSRC and the University of Birmingham. Braithwaite is the individual who has brought the future scenarios concept from Urban Futures to CH2M HILL, in his roles as steering committee member and European Head of Sustainability respectively. That he was present to hear about Urban Futures’ work, and recognise its applicability to his permanent workplace is a result of his personal history.

His earliest link to the SUE programme goes back approximately ten years, to the inception of the programme. At that time he was employed by consultants ARUP, who were well known for taking an interest in academic research. EPSRC was aware of this, and asked Braithwaite to be part of the initial scoping discussions into SUE. From then on, his connection with SUE continued with a role in the PURC consortia, which took ARUP as a project partner.

He has had links with the University of Birmingham in the past, as a lecturer and honorary professor, and through this he became aware of the SUE Plus project *Birmingham Eastside*, headed up by Chris Rogers (*Birmingham Eastside, 2010*). He took on a role as an advisor to the project, and developed a close working relationship with Professor Rogers. When Rogers went about setting up the Urban Futures project, he was thus aware of the potential value of Braithwaite's input, and he asked him to join the steering committee. This happened despite the fact that neither Braithwaite nor his new employer CH2M HILL were official partners on the project. Rather it was the personal connections of the protagonists that enabled Braithwaite's involvement, indicating the importance to knowledge transfer of developing and maintaining personal contacts.

4.1.2) Institutionalised Collaboration

These personal connections, however, might well have been meaningless without the institutionalised collaboration encouraged by the SUE consortia, and Urban Futures in particular. Peter Braithwaite's personal connections were made relevant by the original SUE scoping study, which piqued his interest in industry-academia collaboration. He became aware of the future scenarios concept during an Urban Futures workshop. Clearly, the personal connections are useful, but they may not have yielded knowledge transfer if they were not supported by formal events organised by researchers.

For the Environment Agency, one of the key mechanisms for institutional collaborations has been their use of 'embedded science experts'. The Lancaster Environment Centre (LEC) is one of a number of places where the EA have based members of their staff, with the purpose of working alongside the resident scientists and communicate findings back to the Agency. LEC is partly subsidised by Lancaster University, which is a partner in the Urban Futures enterprise, so EA's presence there provided a channel of communication between the Agency and the nascent project.

The Environment Agency does not leave the formation and maintenance of vital external relationships to chance. Rather, they employ formal measures to ensure that they remain connected to academic research, such as the embedding of experts in research institutes. In addition to Rob Kinnersley and Rob Mackenzie's connection, these measures help maintain a relationship between public and academic bodies that allows them to understand where interests overlap and where cooperation can be mutually beneficial.

4.1.3) Alignment of Interest

The third plank that has facilitated knowledge transfer is the alignment of interests. A matter of weeks before the Urban Futures workshop, Professor Braithwaite had been asked by CH2M HILL to lead a project looking at the planning sustainability in existing

cities over the next few decades. He was subsequently taken aback when the Urban Futures workshop featured the kinds of models that would fit in perfectly with his new project. Braithwaite describes the co-incidence that Urban Futures brought up their future scenarios at the same time as CH2M HILL were looking at future proofing cities as “totally bizarre”(Braithwaite, 2010).

The Environment Agency’s involvement came about through a completely different process; they were actively looking for projects that would help with the future-proofing of their own work. The connections with Rob Mackenzie and the LEC allowed the shared interests to come to light, and both sides were therefore well positioned to take advantage of this alignment.

There may have been an element of serendipity here, but these convergences would have been meaningless without the meetings and workshops put together by the consortia. Just as Pasteur claimed that chance favours the prepared mind in matters of observation, perhaps chance favours the prepared researcher in matters of knowledge exchange.

Alignment of interests has clearly been important. In the CH2M HILL case it has been largely coincidental, but the Environment Agency story shows that this need not necessarily be the case. These episodes suggest that it can be worthwhile for researchers to be aware of what is happening in industrial and governmental circles, so that they can position themselves to take advantage of any potential alignments.

4.2) Barriers

The rigidity of a project’s research direction can prove to be a barrier to dissemination in some instances. The external utilisation of the future scenarios was not expected by Urban Futures. Feedback from CH2M HILL and the Environment Agency has encouraged them to consider the scenarios as outputs in themselves, and to think about ways to communicate the scenarios, in addition to the project’s intended outputs. However, this does not mean that the research direction has shifted towards tweaking the future scenarios and promoting them outside academia. The team, naturally, have continued to focus on their original goal, that is, to develop the scenarios and to use them to evaluate the resilience of today’s sustainability solutions. As Rachel Lombardi emphasises, this is the “deliverable” that their research grant specifies, so they are bound to work towards it.(Lombardi, 2010)

Urban Futures are funded by EPSRC through a grant - they are not contracted to perform certain tasks and have a degree of flexibility in how they go about fulfilling the specifications of the grant. This has allowed Urban Futures research fellows to devote more of their time to dealing with CH2M HILL’s use of the scenarios than she had initially expected. Nevertheless, Urban Futures does remain accountable to its grant-giving body and in theory this could constrain the group if they wished to pursue a dramatically different research direction.

5. CONCLUSION

The Urban Futures project never intended for their future scenarios to be research outputs as such. For their researchers, the scenarios were the means to an end; a

necessary device in the project to allow for the pressure-testing of sustainability measures' usefulness in the future. Nevertheless, the scenarios have had an unexpected influence upon sustainability practitioners in both the public and private sectors. They have made an instrumental impact in that they have been adapted and applied by CH2M HILL, and have made a conceptual impact at the Environment Agency, in that they are changing attitudes towards how governments should make plans for the future.

These impacts were unexpected, but they were not fortuitous. They have been made possible by the formal and informal structures in place. These include EA's desire to stay close to the academic community, Peter Braithwaite's longstanding professional connections with various SUE consortia, CH2M HILL's eagerness for Braithwaite to remain involved with SUE, the workshops and conferences arranged by Urban Futures that kept partners informed of the research direction, and the commitment of EPSRC to bringing academia and industry together in the SUE projects.

The clear conclusion from this is that outputs may be unplanned and unexpected, but they are still likely to rely on conventional dissemination tools. Workshops, conferences, steering groups, secondments, and individual interactions have all been significant in the knowledge transfer process here. This process did not have the specific goal of promoting the future scenarios as a research output; nonetheless, the more abstract goal of ensuring that the group's research would have real world implications is on its way to fulfilment. This highlights the importance to knowledge transfer of formal and informal interaction, even if the end-results of such interaction are not immediately apparent.

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