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EXECUTIVE SUMMARY

“Innovation in Design, Construction & Operation of Buildings for People” (IDCOP) July 2004 – February 2009, was a multi-institutional research programme funded under the Engineering and Physical Sciences Research Council (EPSRC) Sustainable Urban Environment (SUE) programme. The research aim was to investigate how to achieve a more sustainable urban environment which would benefit people, the inhabitants and users of these environments, creating a higher quality of life. The research focused on the existing UK building stock and developed new technologies and processes for maintenance and refurbishment of existing buildings.

This study is focused on the impact of one activity within the IDCOP project which has expanded beyond the project into the on-going development of the Sustainable Built Environment Tool (SuBET) tool by Matt Kitson of Hilson Moran and two of the researchers, Professor Derek Clements-Croome (University of Reading) and Dr Husam Al Waer (now a lecturer at the University of Dundee). Hilson Moran is a multi-disciplinary engineering consultancy for the built environment. The tool has gone from theory to practice because of their shared interest in urban sustainability. There was a clear gap in the industry, a need for masterplanning to address sustainability and carbon mitigation issues. SuBET is a sustainable masterplanning tool which will be used to guide the future design of exemplar planning and development schemes.

1 INTRODUCTION

SuBET, “a unique sustainable masterplanning tool” grew out of a framework developed to assess the sustainability objectives of intelligent buildings during the IDCOP project and research on the sustainability of retail centres. The resulting research was jointly developed beyond IDCOP into a sustainability assessment tool by the academics involved and a practitioner from Hilson Moran. Hilson Moran is a multi-disciplinary engineering consultancy for the built environment with offices in the UK, Europe and the Middle East.

The “Innovation in Design, Construction & Operation of Buildings for People” (IDCOP) project ran from July 2004 to February 2009 and was a multi-institutional research programme funded under the Engineering and Physical Sciences Research Council (EPSRC) Sustainable Urban Environment (SUE) programme involving the Universities of Southampton, Reading and Greenwich. This research investigated how to achieve a more sustainable urban environment which would benefit people, the inhabitants and users of these environments, creating a higher quality of life. The research focused on the existing UK building stock and developed new technologies and processes for maintenance and refurbishment of existing buildings, although many of the ideas are also applicable to new building stock. Dr. Husam Al Waer joined the project at the University of Reading in the final year of its funding, replacing Dr. George Chen. Al Waer was able to contribute a significant amount to the project by feeding in elements of his doctoral research on sustainability assessments of retail outlets, resulting in publication of a paper by Al Waer and Clements-Croome on the assessment of sustainable intelligent buildings (Al Waer, 2010).

Upon the completion of the project Clements-Croome and Al Waer invited Kitson of Hilson Moran to critically review the various frameworks developed for the built environment, sustainable intelligent buildings and shopping centres. A series of workshops were run at Hilson Moran providing information on the outcomes of the ongoing projects at that time. At this point Matt Kitson, driven by his interest in sustainability in masterplanning, saw the potential of taking the work further. Strong, ongoing relationships have been formed between the three collaborators, as the tool development process took place over several years. Various knowledge exchange stages include initial engagement and translation processes (Gravani, 2008) have resulted in both *instrumental* and *conceptual* use of the initial research (Nutley et al, 2007). There was a clear gap in the industry: a need for masterplanning to address sustainability and carbon mitigation issues. The tool has gone from theory to practice because of the shared interest of Kitson, Al Waer and Clements-Croome in urban sustainability. Development and fine-tuning of the indicators and metrics has occurred as the tool has matured and it is now being applied to planning and development schemes throughout the world.

2 SUCCESS STORY - THE SUBET TOOL

The SuBET tool can uncover missed opportunities in a masterplan. It assesses the sustainability of a development masterplan at an early stage and can then be reapplied throughout the design cycle. To quote from the Hilson Moran (2010) description of the SuBET tool:

“This powerful tool incorporates over 70 indicators of a scheme’s environmental, social, cultural and economic impacts. Its focus ranges from the micro scale (water, energy and so on), to the meso scale (such as land use, site selection and planning considerations) and broadens out to consider issues on the macro scale (such as greenhouse gas emissions from all energy used for the built environment, transport and infrastructure, together with wider urban and regional planning issues), right up to the global scale to tackle the impact on sustainability at national and international levels.”

The assessment framework developed by Clements-Croome and Chen at the University of Reading was applicable to individual intelligent buildings. Al Waer’s assessment framework developed during his PhD research focussed on the sustainability, or otherwise, of retail outlets and shopping centres. Kitson perceived that masterplanning needed to address sustainability and carbon mitigation and that these requirements could not be met by building design alone. In fact, all the protagonists were aware that there was a big gap in the market, there was a need for a framework for sustainable masterplanning. There were hardly any methodologies around the world that addressed this issue, which includes urban regeneration and economic, social and cultural aspects of city design.

It was a marriage of Hilson Moran’s own research and interests, and that of the two academics. They have since worked together over the last three years developing the methodology that they have now called SuBET, Figure 1, along with Andrea Vosgueritchian of Hilson Moran, who has become an important part of the on-going practical development. Kitson and Vosgueritchian worked together over this period to form the basic structure of the tool and develop the practical measurable descriptors for each indicator.

The tool is in its third version and there will be further iterations as it is applied to the real world. It is not unusual for research to take years to reach maturity; Mansfield (1991) collected data that showed that the mean time between the academic research findings and the first commercial introduction of a product or process was seven years. More than a hundred initial indicators have been reduced down to eighty (Version 2), and made quantifiable and objective whilst respecting subjective values. Prioritisation of the indicators is achieved by bringing stakeholders on board and it is informed by the local climate, socio-economic conditions etc. so that it is not in any way location or site specific. The tool has evolved dramatically and is now robust in its ability to deliver an assessment. This development was enabled by the people involved, a transfer of conceptual knowledge within the team, far beyond the instrumental use of the initial frameworks of the IDCOP programme and of Al Waer’s Ph.D research (Nutley et al, 2007).



Figure 1: Husam Al Waer, Derek Clements-Croome and Matt Kitson (left to right) working together on the SuBET tool.

2.1 Case Studies

Hilson Moran has offices in Europe and the Middle East and apply their technical skill and specialist knowledge to a wide range of projects. As a first benchmarking activity Hilson Moran used SuBET on a major masterplan in Milan and subsequently on the King Abdullah City for Atomic and Renewable Energy in Riyadh, Saudi Arabia. The tool aims to address the long term sustainability of developments by covering several focus areas such as energy, mobility, placemaking, cost and economics, as shown in Figure 2. Within each of these areas there are several indicators against which the development is assessed.

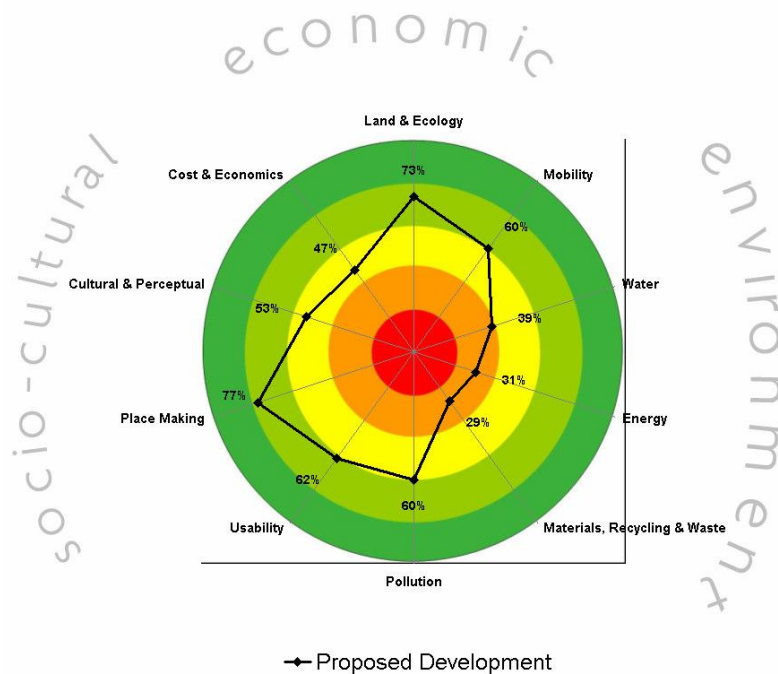


Figure 2: Example spider map of SuBET assessment of a development.

Version 2 was recently applied to the Greenwich Peninsular development, adjacent to the Millennium Dome. The objective is to achieve a comprehensive masterplanned solution that provides a fitting setting for the Dome, fully integrating the east and west

sides of the peninsular with a development consisting of residential, commercial and retail spaces. It is a previously contaminated, brownfield site that requires remediation. Figure 3 shows a schematic view of the site. The design includes shared open spaces and dedicated cycle lanes and brown and green roofs will be used to improve the ecology of the area.



Figure 3: Greenwich Peninsular Development

Amongst other recommendations the SuBET assessment suggested that further attention could be paid to reducing the amount of construction waste sent to landfill and addressing light pollution.

However sustainable a masterplan may at first appear the use of SuBET can uncover missed opportunities early in the design process and it may be reapplied effectively as the design process develops. Some projects initially included only very modest commitments to improve energy use, re-use materials, generate local jobs and provide measures to improve social cohesion. SuBET enables a holistic assessment of a new development's sustainability.

3 DISSEMINATION PROCESS

3.1 Pathways – Personal connections and alignment of interests

The IDCOP (2010) project had in-built dissemination routes. Arup, design and engineering consultants in the built environment, were included from the project start as Research Partners, and there were also cooperating industrial partners such as Sustainable Homes and the Housing Corporation. However the researchers and academics involved in IDCOP were keen to further develop their urban sustainability ideas and raised their visibility through conversations with practitioners and the distribution of reports and papers. Kitson of Hilson Moran had an existing interest in the sustainability of urban environments and his contact with Clements-Croome went back over several years. Kitson had many colleagues when he first started work who had attended Clement-Croome's course at the University of Bath which encompassed a different way of thinking about architecture and engineering in relation to the built environment. At Reading University Clements-Croome has since developed a MSc in Intelligent Buildings, an IGDS course funded for 5 years by EPSRC, and has built up a lecturing team of some 100 professionals from industry to enable students to have contact with existing case studies and to think creatively about change and the future.

Kitson is one of these lecturers and it was after such a lecture that he mentioned to Clements-Croome his interest in sustainable masterplanning. This led Clements-Croome to inform him about the work they had been doing on IDCOP and to ask him to critically review the final report for EPSRC, and the various developed protocols and frameworks developed for the built environment by Clements-Croome and Al Waer. These personal connections and the alignment of interests led to formal engagement and on-going relationships between the three protagonists. It is an example of the premise that impersonal marketing methods like advertising and media stories may spread *information* about new innovations, but it is conversations that cause them to be *adopted* (Enabling Change, 2009). Kitson now lectures at both Reading and Dundee Universities and by giving up his time in this way maintains contact with the research undertaken by Ph.D students and research teams at these Universities.

3.2 Drivers

It was clear to all the protagonists that there was a big gap in the market, “*a need for a framework for how masterplanning gets done*” (Kitson, 2010). This is a big issue for every city around the world: cities require refurbishment and regeneration, populations are growing, power requirements are increasing and planning is required so that people want to work and live in these cities. The need for sustainable masterplanning is also driven by legislative requirements for low carbon and energy efficient developments from the EU and the UK Government. Kitson, Clements-Croome and Al Waer had independently looked at the sustainability appraisal methods around the world and had found them to be insufficient. A strong driver was the protagonists’ personal belief in the need to address sustainability in the urban environment.

3.3 Barriers

As a life-long academic this contact with practitioners was a novel (and very rewarding) experience for Al Waer, “*It was a huge challenge to explain sustainability and my sustainability indicators to them and to deliver a talk in front of the practitioners*” (Al Waer, 2010a). Kitson felt that it was an education process for the academics and there was a need to bring them all around the table with the stakeholders (Kitson, 2010). A process of “translation” took place. Al Waer (2010a) feels that sometimes there is a gap in the skills of academics, that communication between practitioners and academic researchers can initially be poor, there is no common language. Gravani (2008) found that practitioners found it hard to comprehend theoretical knowledge presented in terms of words and propositions, and consequently detached themselves from the content. The practitioner wants “*something that cuts straight to the bone*”, that is easy to digest for the client (Al Waer, 2010a).

The indicators had to be explained and altered, the measures needed to be objective, whilst still respecting the subjective view. This was part of the on-going development carried out under the auspices of Hilson Moran. There were a lot of things that worked and a lot of things that didn’t work, a huge amount of effort was required on everybody’s part to bring what was a very academic piece of work to something that fitted Hilson Moran’s requirements and could be a commercial tool that the market would understand and use (Kitson, 2010). It needed the ‘real life’ experience of the practitioner and an awareness of the practical issues out there in the world to marry the

two types of thinking together. This linkage and exchange of knowledge underpins knowledge brokerage (Ward, 2009).

4 IMPACT AND LESSONS LEARNED

The impact of the SuBET tool lies in changing the behaviour of the developer, architect and planner and raising their awareness of sustainability across social, cultural, economic and environmental areas as demonstrated in the Case Studies. Urban regeneration and masterplanning is going to be an area of growth for the next few years, so Al Waer, Clements-Croome and Kitson are all expecting SuBET to be applied increasingly in the market.

There has been added value beyond the development and impact of the tool itself. Kitson found that it was a lot more complicated than he had thought it would be, but the shared personal knowledge and experience from other projects has been invaluable. Ongoing knowledge exchange relationships have been built up between the three protagonists. Kitson regularly lectures at both Dundee and Reading Universities passing on practitioner applied knowledge. Through taking time out of his schedule in this way Kitson gains value from learning about fledgling ideas and research within the department research teams. Kitson's opinion is that this is one of the best ways for him and his organisation to find out about the research being carried out within the universities. He stated that it is not easy to discover what work is going on within universities and that they never publish in the practitioner-oriented publications that he reads. He is aware that there are a couple of other consultancies now going down the same route, partnering with other universities. This is an example of contacts developed with individual researchers in their field and used by practitioners to keep up to date with the latest findings (Percy-Smith et al 2002). Knowledge brokering is all about building relationships and networks that share research and ideas and often then stimulate new work in the future (Sheate, 2010).

5 CONCLUSIONS

The engagement between IDCOP and Hilson Moran can be seen as a good example of the demand-pull model of knowledge exchange. This model describes the situation where end-users shape research ideas through their own demands and involvement (Landry, et al., 2001, Weiss, 1979). In fact according to Wonglimpiyarat (2010) the use of the push model to manage innovations results in a poor rate of innovation diffusion and a demand-pull policy is essential to generate value from research funding. It is clearly the case that brokering knowledge means far more than simply *transferring* knowledge; it also means *transforming* knowledge (Meyer 2010).

Sustainable urban regeneration and masterplanning is going to be an area of growth over the next few years, and the SuBET tool is likely to be applied many more times to assess the sustainability of future developments.

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