Creating sustainability through Smart City Projects

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Abstract

Smart Cities are a key mechanism for facilitating
sustainability – be that in the use of resources (e.g.
energy, water), the running of city infrastructure (e.g.
transport) or in terms of social policy (e.g. politics).
Using our experience of a Smart City project,
MK:Smart, we describe what role citizen-led innovation
could have in promoting long-term sustainable change.
Beyond this we detail some of the barriers to success
we have identified in the hope that design patterns
might help us address these challenges.

Author Keywords

Smart Cities; Sustainability; Citizen innovation.

ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g.,
HCI): Miscellaneous.

Introduction

Ever increasing numbers of people are living in urban
areas. 66% of the world's population is projected to be
living in an urban area by 2050 [1]. This shift in the
size and location of population centres increases the
need to manage resources sustainably; of developing
an understanding of how our energy, water, transport
and environment needs to be managed over the long
term as resources become ever more scarce.

One approach to addressing this challenge is through the creation of Smart Cities. While definitions of Smart Cities vary (see [1]) they tend to coalesce around the key ideas of supporting infrastructure through the use of data and the importance of deploying processes that respond to that data.

Milton Keynes is a good example of our shift in living patterns. One of the fastest growing cities in the UK, its population is expected to grow from around 250,000 today to over 300,000 by 2026[1]. Such growth creates a huge pressure on local infrastructure, particularly transport, energy and water. Each of these resources are already operating close to full capacity with no clear plan as to how to gracefully manage an increase in demand. The MK:Smart[2] project is developing technological solutions aimed at addressing these 3 key issues. In addition to traditional top-down, researcher led activities to address these issues, MK:Smart has a strong focus on citizen innovation.

Collecting Tacit Knowledge
One of our partner organisations, Community Action: MK (CAMK) commissioned a bespoke app to gather citizens concerns. As part of their role, CAMK's 10 Community Mobilisers go out into the community and engage with citizens through a range of one to one conversations and group discussions. Mobilisers have expertise in engaging citizens and eliciting their issues and concerns, which are now recorded through the app prior to being actioned and followed-up. Since starting to use the app, over 16,000 dialogues on community concerns have been collected of which 841 are related

to Smart City concerns, particularly transport (42%), energy (35%) and water (23%).

This process of engagement has highlighted a number of issues related to communicating with citizens around sustainability. The first is that the extent of each citizen's background knowledge is variable. Much of the initial communication occurs in a very short time-frame and it is difficult to engage people in such a way that their interest and commitment is maintained.

Additionally, citizens tend to focus on the things that they experience day-to-day. Transport was the easiest topic to engage people on as citizens interact with this on a daily basis. Engaging citizens on energy and water use is more challenging as the priority for many was on the cost to the consumer - people largely reduce their use because it saves them money rather than because of the environmental impact. This was particularly the case with water-usage as many citizens view water as an infinite resource and as it is cheaper than energy many people struggled to think of ways to improve their use of this resource.

Ideas to Practice
Collecting information about citizens' experiences is valuable as are the ideas citizens have about changes they could make in their local community. However where we deviate from previous crowdsourcing approaches (e.g. [2]) is that through the Our MK initiative[3] these ideas are then refined into viable projects that have both a strong plan of action and a team of volunteers to carry them out. The best projects will be given funding and support to make their idea a

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[1]http://goo.gl/2zugxH

[2] http://www.mksmart.org

[3] https://ourmk.org

reality. Since the launch of the initiative in July 2015 over 4,000 people have visited the site posting 68 distinct ideas. What excites us about the Our MK initiative is that long-term change can be facilitated by providing relatively small amounts of money to citizens who are committed to actioning their ideas.

Barriers to Citizen Innovation

We believe that HCI approaches to creating sustainability have got to focus, at least in part, on facilitating citizen innovation. Through the Our MK initiative, and the MK:Smart project in general, we have experienced a number of barriers which we believe are applicable to other contexts. These challenges are hope is that by listing these barriers we can explore the potential for establishing design patterns to overcome them.

Recruiting diverse participants

The first barrier we faced was recruiting citizens which is difficult, requires an ongoing effort and is expensive when trying to reach a large number of citizens. We have found that to engage people it is necessary to have a clear narrative to tell which explains how participants might benefit and that convinces them they want to take part. In our experience this is best handled face to face rather than through online channels. This is clearly a challenge when attempting to engage at scale.

One of the most successful techniques we have used is to showcase current successes. For example, award winners from Our MK have been the best ambassadors for spreading information about the scheme.

Even if large numbers of participants are recruited, there are concerns around ensuring that a sufficiently diverse set of people are recruited. As others have argued, who participates in research projects is a political matter which can privilege certain groups who can easily contribute and have pre-existing competencies and values making participation more straightforward [3]. Each of these diverse people bring their own concerns and values into the design process and establishing factors important to the success of a collaborative design process (such as trust, ownership of ideas, control of decision making) become harder to negotiate.

As we have previously described, the Our MK initiative uses Community Mobilisers to engage with the community. Rather than try to directly reach people, this process is mediated through facilitators. Such a method is useful for scaling up as it removes the burden of large-scale recruitment from a few researchers and makes it more democratic. In terms of diversity, such an approach certain helped us to reach parts of the population not normally reached by traditional recruitment techniques.

Nature of engagement

In the design methods we have available there is already a balance between the number of participants and the technique used. Interviewing 600 people is exceptional and rarely done while it would a fairly standard number of participants in a survey.

Such a split is clearly present in the current techniques where crowdsourcing goes for large numbers with small engagement whilst PD involves small numbers but relatively intensely. We do not have a proposed

solution as to what a large-scale, relatively intensive method would look like, simply that it is worth considering the benefits it would bring. To a certain extent, such a method could exist simply be augmenting traditional techniques (PD, interviews, Living Labs) with the resources necessary to scale them up. What we are interested in is whether it is possible to establish design patterns to assist with balancing the nature of engagement with large-scale participation.

Streamlined processes for collaboration
One of the biggest barriers we have faced is when working with external stakeholders. This is nominally a strength – each organisation has a different user base and relationship with the public which can be drawn upon to engage with large numbers of people than any single organisation.

However, involving multiple stakeholders comes with two substantial barriers. The first is simply that different organisations have different interests. This necessitates a period of negotiation to ensure all partners are benefiting from the planned activities. Of more concern is the amount of time that it takes to make formal agreements amongst the stakeholders. Data-sharing agreements, Open Data agreements, confidentiality agreements, managing the multi-ownership of the resulting data – all of these are processes that have to be negotiated from scratch for every single trial.

Big data is just starting to be explored as a resource for design and is more powerful when the data is merged from previously separate sources. For example, as a supplement to the energy trial, we attempted to draw in data from the local water company. While both companies were project partners there was no easy way of effectively combining datasets on an individual in a meaningful way that could lead to new systems whilst till retaining the agreements we have listed above.

Conclusion
We believe that HCI approaches to creating sustainability have got to focus, at least in part, on facilitating citizen innovation. Through the Our MK initiative we have demonstrated how citizen innovation can contribute to issues of sustainability. In doing so we have experienced a number of barriers which we believe are applicable to other contexts. By listing these barriers we can explore the potential for establishing design patterns to overcome them.

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