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# 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 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<sup>1</sup>. 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<sup>2</sup> 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 involving citizens in the innovation process.

#### *Collecting Tacit Knowledge*

One of our partner organisations, Community Action: MK (CAMK) commissioned a bespoke app to help 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 detailing community priorities have been collected of which 841

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<sup>1</sup><http://goo.gl/2zugxH>

<sup>2</sup> <http://www.mksmart.org>

are related to Smart City concerns, particularly transport (353), energy (294) and water (194).

Collecting this information is important because it provides an insight into the concerns citizens have which are not always the same as the concerns expressed by city officials. It also provides an insight into how to best engage citizens with the sustainability challenges the city faces.

#### *Our MK*

Moving beyond the collection of citizen concerns, we have also set up an initiative, Our MK, which encourages citizens to produce their own solutions to the problems they identify. Based around a website<sup>3</sup> to crowd-source citizens' ideas about sustainability issues in their community, we deviate from previous crowdsourcing approaches (e.g. [2]) by refining citizen's ideas into viable projects that have both a strong plan of action and a team of volunteers to carry them out. This is done through a joint process of discussion. Projects are assessed on their potential for generating an impact on a sustainability concern, their use of technology and their potential for continuing beyond the end of MK:Smart. The best projects are given funding and support from MK:Smart to then turn the idea into a reality. Since the launch of the initiative in July 2015 over 6,000 people have visited the site, or attended one of the accompanying workshops, contributing 68 distinct ideas.

The aim of Our MK was to support citizen innovation and promote citizen-led sustainability projects, each of which has distinct goals related to sustainability.

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<sup>3</sup> <https://www.ourmk.org>

## **Barriers to Citizen Innovation**

We believe that HCI approaches to creating sustainability have got to focus, at least in part, on facilitating citizen innovation. In doing so we promote an understanding of the sustainability challenges, harness the creativity of the citizenry and ensure that solutions are more likely to have support from citizens. Through the Our MK initiative, and the MK:Smart project in general, we have experienced a number of barriers to fostering citizen innovation which are applicable across different cities. By identifying 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.

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.

The Our MK initiative has used Community Mobilisers as facilitators to engage with the community. Such a method is useful for scaling up as it removes the burden of large-scale recruitment from a few researchers and distributes it across a large number of people. In terms of diversity, such an approach certainly helped us to reach parts of the population not normally reached by traditional recruitment techniques.

Discussing the selection of recruitment techniques is not typically prioritized within the HCI academic community as it is normally considered to be a practical concern. While piecemeal solutions exist to recruiting large numbers of participants (often necessary in the context of sustainability) we strongly believe that the establishment of best principles around the recruitment of participants would benefit the SHCI movement.

### *Nature of engagement*

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

Such a split is limiting in the context of citizen-innovation, particularly in the context of sustainability, where it is necessary to engage with a large number of participants (in order to harness their creativity) whilst having an in-depth relationship with participants (in order to develop their ideas into viable projects). We do not have a proposed solution as to what a large-scale,

intensive design method would look like, simply that it is worth considering the benefits it would bring. What we are interested in is whether it is possible to establish design patterns and practices which help inform researchers about how to balance 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 larger numbers of people than any single organisation.

However, involving multiple stakeholders necessitates a period of negotiation to ensure all partners are benefiting from the planned activities. Additionally, it takes a large amount of time 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 most useful when data is merged from previously separate sources. For example, to expand 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 still retaining the agreements we have listed above.

One potential solution is to establish design patterns as to how to manage the process of data-sharing and trial agreements in order to streamline this process of negotiation, increasing their likelihood and the ability to work with multiple stakeholders and datasets.

### **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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