Engaging in Island Life: Big Data, Micro Data, Domestic Analytics and Smart Islands

Abstract
This paper reports upon an engagement-based study that was carried out on the Isle of Tiree (the Inner Hebrides, Scotland). The purpose of the study was to examine the use of a tabletop projection system as a mechanism to allow some of the islands inhabitants to initially discuss their understanding of data, data needs and to further explicate the ways in which communities or researchers might use such systems to engage with communities in a participatory-civic manner.

Author Keywords
Projection; Touch; Civic Engagement; Design; Data; Participation

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

General Terms
Design; Human Factors
Introduction
We hear so much about Big Data and it’s usefulness. One only has to pick up an IT magazine to read a multitude of articles relating to the whys and wherefores of Big Data! But how do the public engage with the concept of Big Data? What and how might they use it? What are the most appropriate methods for engaging with the public in regard to this? Often we hear about smart cities [3] and the use of data in urban centres, but what about the people that live at the edge, away from the urban ‘centres’. How might they use IT-based tools and data for civic engagement? A majority of this work focuses upon our findings in order to highlight the research findings.

The Approach
Our approach was simple, but effective and was based upon our previous experiences of engaging and working with communities and groups in regard to design [1] [2]. We set up the tabletop projector (as described in the following section), and projected a map of the island using the Google maps aerial view. This meant that people were able to see where they lived and things in the landscape that related to their life. We also provided dry-wipe markers and post-it notes. The surface that we projected onto was akin to a whiteboard surface and this enabled both the participants to write and draw upon the surface. It was not only the participants that used the surface, but we also used the tools and surfaces provided to draw, elucidate and ask questions. In general terms the questions that we asked were about big data sets, what people understood them as being and what would be of use to the community. The sessions started with a semi-formal introduction and then were purposefully left open-ended in order to entice the participants to get involved in using and talking about themselves, and in order that the conversation and research might naturally evolve. Five participants who worked for a local community focused organisation took part in the sessions working together as a group.

The System and Set-up
The projection system that we used was an adapted version of the TESIS system: (Turn Every Surface into an Interactive Surface) [4]. The TESIS system is a system that converts any surface into an interactive surface. The system was initially developed to overcome the limitations of current interactive tabletops: the cost, lack of portability and ad-hoc use of flat surface displays. Usually a "projector and a depth-sensing camera are mounted, on a dedicated stand, above (or in front of) the surface", however, in this case we adapted the system by building a simple frame and ceiling mounting a standard projector and using a Microsoft Kinect as the sensing camera. This allowed us to project on a much larger surface, therefore allowing group use. The projector and Kinect is then connected to a Wi-Fi enabled Mac Mini. The depth-sensing algorithm of the TESIS system generates a model based on the touch surface that is to be used, it is then able to compute and calibrate the system accordingly. Figure 1 shows the set-up of the system. It must be emphasized that once the calibration of the system is finished that the system can be left running.

Reporting on the Sessions
We started the session (the authors) by briefly showing the system and generally discussing the concept of big data, by using examples that related to the map, offering the group the chance to vocalize their thoughts...
and to draw/write on the map if they so wished. Here we discuss some of the emergent themes.

Initially the group started to discuss and use the map to see where they were, where each other lived, (seen in Figure 2.) and where features on the island were based, but also acclimatizing themselves to the system and visualization. They focused the conversation around the building of a skate park (apparently high on the civic agenda), and the use of the system to plan the most appropriate place to site the park. Discussions also centred around the use of data relating to weather conditions to see if this might have an impact on the materials they might choose to use and if the structure could stand up against the high winds on the island.

**Smart Islands and Connected Communities** - As the debate continued the participants started to use the system to compare themselves against two other Islands: Mull and Coll. The main focus of the discussion centred on the aggregation of data in order to represent a truer picture of island life. There was a general feeling that such systems if used in real-time, remotely could also enable and support inter-island collaboration and that it might also be able to support activities relating to the diaspora of the island. Inter-island communication is important, because although the islands are close together they are difficult to travel to, being only serviced by ferries and light aircraft. The participants use the dry-markers to show the difficulties of traveling around the island and show the lack of 3G as seen in Figure 3.

**Social knowledge and Micro Data** – As we carried on the session we asked about data relating to health and if and how it might be useful. The group said that they often used data/figures relating to the health of the island in order to write bids and apply for funding for community projects. When asked where and how they got the data from, they said that they only had to call or visit the local surgery to access such information, they had expert at hand who could provide them with the small amounts of data they needed. In many respects this is not normally the case, particularly for larger towns and cities, but in the context of smaller communities it is important to understand the social dynamics of the setting in which one is working. We carried on asking about the nature of community. On the island fuel (petrol/diesel) is very expensive when compared to the mainland, so this formed the foundation for an obvious line of questioning. We asked if as a community the island would come together to examine fuel prices and then bulk buy as a group? It was explained to us that although the data might be interesting to use to show the expense of living on the island, that there was a family on the island who are an important part of the community and buying fuel independently would put them out of business, so this wouldn’t be something that they would do - community is important.

** Appropriately Targetted Data** – As we carried on referring back to the interface and each other the group would occasionally split and discuss sub-issues in two groups, coming back to the table to talk about the main concern. As we discussed the difficulties of engaging with large data sets the group thought that it might be a good idea for the organizations that expected them to find information to have mined data so that they could appropriately target them in the first place. By this the group meant that if they were able to provide data about the community then, organisations such as
funders should then be able to appropriately target them with, for example, funding bids that related to their needs. The use and provision of data was not only in one direction.

Ad-hoc use and evolving use
After using the system in the day we were asked if it would be possible for the community to use the system one night for the launch of the Tiree Heritage app. For this purpose we turned off the sensing algorithm and instead connected a wireless mouse and keyboard. In this situation people gathered around the table and map-based information acted as a catalyst for conversation relating to the Island and evaluating the app.

Conclusions
We hope that the initial work that we have presented here is of use to the Ubicomp community and beyond. Our research showed us the value of using touch surface technologies in order to engage people in civic debate. It also helped us to understand the different ways that people understand, could engage and provide data. Being able to understand the in-situ social context of the community that researcher work with is of the utmost importance as this can often inform the appropriate design and development of the system that we are choosing to build. Ignoring this could be at the detriment of the research project.

We would like to further develop the system to enable inter-island discussions and also further develop our portable small-scale projection systems to enable people to engage with data on a more domestic level. Another area for further investigation would be the use of new off-the-shelf Ubicomp technologies, such as the Leap Motion system (www.leapmotion.com). This may let us develop the interactional possibilities of the touch surface, but more importantly it might let us understand the peripheral interaction around the table and feed the responses of an affective nature back to the system, in order to encourage and support debate in such a context.

At this time the research is still in progress and we plan to go back to Tiree later in the year with our newer system in order that we might get more input into our design and perhaps leave a functioning prototype with the community in order that we might understand its long-term use in as a tool to support civic participation.

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References