Tiny Data: Situated data analysis to support community decision making

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Abstract
Locally relevant data is important in order to support local decision making processes. Previous research has focused on collaborative capture of such data, rather than facilitating collaborative analysis. In this position paper, we put forward the argument that introducing tools for analysis into shared community spaces can facilitate this type of community analysis for groups with a co-located component, such as community growing groups (e.g. urban community farms). We propose to use participatory design with a community growing group in combination with exploratory experimental probes in shared urban spaces to examine this area.

Author Keywords
community data analysis, situated interfaces, sensor network user interfaces

Introduction
There are a number of recently developed tools for facilitating non-hierarchical decision making and bottom-up democracy such as Liquid Feedback [1] and Loom.io [2]. However, in order to make informed plans and decisions as a community, community members need access to information. Low cost networked sensors are increasingly being used to collaboratively gather ('crowdsense') local data, however participants struggle to
interpret the data [5] or to use it to inform action [3].

Traditional tools for analysing data are aimed at trained individuals and do not actively support collaboration, and citizen science and crowdsourcing research is focused on facilitating and incentivising the collaborative collection of data rather than on analysis and interpretation [16].

We argue that embedding analysis tools into the environment itself may help foster collaborative analysis of data in shared spaces, being visible to all community members and supporting situated learning through peripheral participation [9]; facilitating communications and learning in the shared space, rather than detracting from it.

Our research is focused on community agriculture, where a physical shared space is central to the community. Local groups use a variety of tools (digital and non-digital) to support understanding in a complex environment and already monitor a number of ‘natural sensors’ or ‘biomarkers’ [11]; thus they represent an interesting test bed for situated collaborative analysis, an existing ‘sensor’ enabled shared space.

**Activating environments for situated analysis**

So how can such tools be embedded into shared community spaces?

Approaches to analysis and display of local data often focus on using screen-based devices such as phones or computers that people already have. Mobile devices are particularly compelling as they are available both for contextual access in the environment and access later in other contexts such as the home or office. Although this use of the hardware in people’s pocket lowers barriers to entry [4], such interfaces do not facilitate collaborative explorations and analysis. Moreover, these “powerful representational reality spaces” can disrupt the users cognitive-affective relationship with the physical space they are in [6]; this is especially problematic for communities where presence in the environment is part of the appeal (such as community growing groups [14]).

Dedicated screen-based displays are also commonly installed in public environments [15], however digital displays of this type lack suitable affordances for informing or engaging people in public settings [10, 15], often resulting in being ignored and unused [10].

A number of alternatives to urban display and interaction have been explored, including networks of interactive light nodes [15], chalk street-art [10] and wall crawling robots [12]. These three examples augment existing aspects of the environment, using surfaces as substrates for display and interaction. Rather than attaching a window into an abstract representational space, they add data and interactivity to the environment itself. Similar modular, responsive artefacts could be used to facilitate collaborative analysis in an appropriate and engaging manner. There has been little research done into the design of sensor network user interfaces (SNUIs) where the sensors themselves are part of the interface [13], making this an exciting area to explore.

Our initial research with 5 community growing groups in and around London suggests that augmenting existing management artefacts (such as those in Figure 1) and building on the culture of material reuse and tool archetypes offers a path to embedding analysis tools in the environment; these principles may also be applicable to other communities using a shared space.
Next Steps
We will investigate this space with a combination of participatory design of situated data analysis tools with a local community agroforestry group, coupled with experiments in other urban spaces to examine more general questions around collaborative analysis behaviour. Exploratory prototypes will be deployed in both streams of research as they are particularly suited to investigating the properties of systems which do not exist and are outside of a community’s normal practice and experience [8, 7].

In the case of the agroforestry group, we will use exploratory prototypes and associated activities to help community members learn about the opportunities and limitations of sensor technology in context and enable what Di Salvo et al. [7] describe as “speculative, but informed” co-design. The prototypes will consist of devices which sense and display information in situ, (both tool-like and parasitic on existing infrastructure such as markers) which augment natural biomarkers [11], and an overview interaction area in the shed (where tools are kept and volunteers sign in) for further analysis.

Conclusion
Collaborative community data capture and analysis represents an opportunity for design in alternative systems, but also represents a fascinating new area of human cognition augmentation; we propose combining local participatory research with exploratory experimental probes to further explore this space on a practical and theoretical level.

References


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