

HCI for City Farms: Design Challenges and Opportunities

Peter Lyle, Jaz Hee-jeong Choi, and Marcus Foth

Urban Informatics Research Lab, Queensland University of Technology,
130 Victoria Park Road, Kelvin Grove, Queensland, Australia
{p.lyle,h.choi,m.foth}@qut.edu.au

Abstract. Urban agriculture plays an important role in many facets of food security, health and sustainability. The city farm is one such manifestation of urban agriculture: it functions as a location centric social hub that supplies food, education, and opportunities for strengthening the diverse sociocultural fabrics of the local community. This paper presents the case of Northey Street City Farm in Brisbane, Australia as an opportunity space for design. The paper identifies four areas that present key challenges and opportunities for HCI design that support social sustainability of the city farm: A preference for face-to-face contact leads to inconsistencies in shared knowledge; a dependence on volunteers and very limited resources necessitates easily accessible interventions; other local urban agricultural activity needing greater visibility; and the vulnerability of the physical location to natural phenomenon, in this instance flooding, present a design challenge and a need to consider disaster management.

Keywords: Urban Agriculture, City Farm, Design, Sustainability, Urban Informatics.

1 Introduction

Over half the worlds population now resides in urban spaces, and this is an increasing trend. Urban agriculture is the use of urban and peri-urban spaces for the cultivation and production of food, fuel and livestock [1]. Urban agriculture contributes to the ability of cities to provide food to its inhabitants, and offers many positive benefits to society, in the areas of sustainability and health e.g. [2-5]. This domain has been identified as a space that could benefit from new types of HCI technology design [6], however the limited number of studies mean there is opportunity for exploring urban agriculture from different methodological approaches, including exploring the field as an ‘opportunity space’ [7].

This research presents the findings of a case study of the Northey Street City Farm in the city of Brisbane in Australia. A city farm is a term often used interchangeably with community garden, and is a form of urban agriculture that has a specific location

and involves a productive farm or garden, run by the local community¹. Fieldwork was undertaken onsite over six months in late 2011, and was followed by interviews in early 2012 to gain an understanding of the way the farm operates. Participant observation and semi-structured interviews generate data with which to reveal the challenges and opportunities to communication and resource management at the farm. This research forms part of a larger study exploring design opportunities and challenges within different manifestations of urban agriculture within Brisbane.

This approach attempts to provide a clearer picture for HCI designers who wish to engage with city farms. We identify four key outputs as a result of this research that relate to design. The opportunities and challenges described apply to the environments urban agriculture is practiced, far away from the ‘standard office environment’, as well as the more common limitations and problems that are experienced, designing for volunteer dependant organisations.

2 Prior Work

Urban agriculture as a subfield of sustainable HCI has previously been reviewed previously [8, 9], and the limited studies that explore links between urban agriculture and technology indicate opportunities for innovation to create greater community engagement [2, 6]. Urban agriculture was also a partial focus of a CHI workshop that explored design considerations for small scale agriculture and fisheries, focusing on economic and social sustainability [10].

Locally grown food generates fewer food miles than large scale rural agriculture where food must travel 1500-2500 miles before it is consumed [2], although this oft-quoted figure has been disputed, and the real value may be much higher [11]. Producing food locally in urban environments is important because it helps alleviate pressure on centralised rural food production to meet the food demands of cities [3]. Urban agriculture promotes public health, both with the availability of local fresh produce – an alternate to refined and processed foods, which contributes to obesity [4] – and provides physical exercise by engaging in the practice [5].

As a key related work Odom [2] explored urban agriculture in a similar setting to the focus of this work within Australia. Odom [2] by contrast, took the approach of ethnographic fieldwork over several months with two sites – a ground level garden, and a rooftop garden. A continuation of this is Odom [12], which also investigated different opportunities for design.

Agriculture and technology is also researched as part of ICT4D, although this is not specific to urban environments. Two examples of this in rural India [13, 14] explored methods of giving greater voice and connectivity to farmers.

3 Case Study: Northey Street City Farm

Northey Street City Farm (NSCF) is a non-profit community organisation and was Brisbane’s first community garden, located within two kilometres on the northern side

¹ Federation of City Farms and Community Gardens,
<http://www.farmgarden.org.uk/farms-gardens>

of the CBD. It was started by a group of friends in 1992 who lived in the local area and was supported by the local council. It has since grown to become a non-profit organisation, which employs nine part-time staff, has a separate management committee that gives the farm direction, and a large group of volunteers.

NSCF was chosen for this study as it models several positive aspects that city farms strive for: The location provides fertile land for productive farming; it boasts facilities for practical education through volunteer participation and organised events; and, it offers space to host a local farmers market. NSCF has an established reputation that includes appearances in newspapers and on Australian television².



Fig. 1. Northey Street City Farm map provided as part of a guidebook to new volunteers

NSCF is financially supported through the following means: community grants, a weekly farmers market, and a plant nursery. These support a diverse range of activities at the farm, which are performed by paid staff and a variety of volunteers. The farm itself is comprised of several functional areas that can be seen on the sitemap in Figure 1 above. There is a paid staff member who is responsible for the management of each area. These include: a nursery, which provides income for the continued operation of the farm; a backyard garden to provide an example of how a typical backyard environment can be utilised for food production; a market garden, where food is grown to be sold at a weekly market, and; a kitchen garden, where food is grown and then prepared in the onsite kitchen, to be consumed by the staff and volunteers who participate at the farm. There are other smaller areas without dedicated staff, such as

² <http://www.nscf.org.au/northey-street-city-farm-in-the-media/>
Accessed March 25, 2013

the composting, native plants, an orchard and a mobile chicken coup, and a new area dedicated to allotment gardens.

At the time this research was conducted, NSCF was undergoing a review process to reflect on the policies and positions of the organisation. The primary author attended one of many meeting of volunteers and staff that discussed the review to resolve potential shifts/redistributions of staff roles and responsibilities.

4 Methodology

The fieldwork for this study was carried out over the course of three months. It utilised ethnographically oriented methods of participant observation and semi-structured interviews to embed the researcher within the urban agriculture context of NSCF. The rationale for this approach is to give a deep understanding of the current operation and communication channels that NSCF utilise to continue functioning. The purpose was to understand the way interaction and communication occurred between people at the farm, and to gain an appreciation of what potential challenges and opportunities HCI designers must consider. The data was then analysed to derive themes from the data, and the key findings are presented in the Discussion section below.

4.1 Participant Observation

After completing a 1-hour farm tour (that is run weekly as a means of introducing the farm and encouraging new potential volunteer participation), the primary author then volunteered once a week for two months, working with different groups at the farm. Following this period, the author made the occasional visits on Tuesdays, and the weekend food market on Sundays. This culminated in a number of informal interactions and discussions with staff and volunteers at the site. Observational notes were recorded after the days of participation.

4.2 Semi-structured Interviews

Participants for semi-structured interviews (20-40 minutes each) were recruited using a process of snowball sampling. This began with a paid member of the administrative staff, who helped with recruitment suggestions which resulted in five participants overall (a mix of paid staff and volunteers). These five interviews provided sufficient to gain an understanding of the different roles in the farm planning, management and operation, and the nature of communication at the farm. These semi-structured interviews took place onsite at the farm over a period of two days, for the purposes of determining the participant's involvement in the farm, their connection with other members of the farm community, and their connection with other urban agriculture communities. Participants had been involved with NSCF for a period ranging from six months to five years. Two of the participants were current representatives on the Management Committee (in addition to their role as a volunteer and a member of administrative staff), which oversees the general direction of the farm.

5 Discussion

Analysis of the interview and observation data provided insight into four key areas that could shape potential interventions by HCI designers. These include: a preference for face-to-face communication as a means to share information, often leading to confusion and mixed messages; the dependence of NSCF on the volunteer workforce, and the general resource limitation that requires any intervention to be easily accessible in terms of resource requirement; an opportunity to make other local urban agriculture practice more visible and accessible, while respecting the limited time volunteers and staff have to invest in their gardening passions; and, the need to acknowledge and account for the physical location of the city farm, which is likely to be located on land unsuitable for other high-value uses (e.g. residential or industrial) and in the case of NSCF, is on a floodplain.

5.1 Face-to-Face and Inconsistency

Face-to-face is recognised as the prime means of communication at NSCF, as all participants indicated. Face-to-face communication means that information is not always communicated to everyone for whom it may impact, in addition to other issues similar to those identified by Nardi and Whittaker [15]. NSCF has different levels of communication that match the hierarchy; there is a management committee, paid staff, team leaders, and a wider circle of people that consists of both paid staff and key volunteers, and then all other volunteers. An example of where the complexities of different groups, have led to inconsistencies is the management of the farm's online presence. The promotions manager indicated that she was confused as to whether she should be involved in reviewing content before it is made public via the website or Facebook page, as some staff members went directly to the web manager, and other areas of the farm setup their own Facebook pages that were managed independently. The number of other Facebook pages that the interview participants were aware of also differed.

Developing technology that can alleviate communication breakdowns, while respecting the preference for face-to-face interaction presents a unique challenge for HCI designers. This could come in the form of a prototype that enables recording of face-to-face transactions, possibly as audio recordings or automated transcriptions. Issues of cataloguing would then need to be considered, given resource limitations described in the next challenge.

5.2 Resource Limitations

NSCF is reliant on volunteers to continue operating, despite support from successful grant applications, the nursery, educational operations, the weekly market and annual membership costs. This is unsurprising given that the rise of urban land prices is often a factor in 'pushing' agriculture to the fringe and rural areas. Paid staff are expected to perform volunteer duties in addition to their paid hour allocation. While the space at NSCF is effectively utilised, there is insufficient land for it to operate as a viable

commercial farm. Notwithstanding this, the primary focus at NSCF is education and community building, allowing people to learn and participate through volunteering.

In order for the farm to continue its operation by paying staff, and procuring tools and materials, the farm understandably depends on incoming funds. A lack of surplus money and resources, and a demand to acquire the ability to continue operation means that resource allocation must be performed carefully and efficiently, as there is minimal margin of error. This is a common problem for both starting an urban agriculture project, as well as its continuation [16]. HCI designers should consider the overhead of any technologies, as organisations that depend on volunteers such as NSCF are unlikely to consider any investment in new systems. Utilising a participatory design approach may not succeed if the designers themselves are unable to see beyond what is simply said by participants, a problem identified by Bertelsen et al. [17]. Taking stock of existing infrastructure, or providing offsite infrastructure as part of any collaboration with a city farm, would have a greater chance of success.

5.3 The Bigger Picture of Local Urban Agriculture

All those interviewed expressed interest in other urban agriculture activities outside of NSCF, however only one interviewee indicated they had any time to actually participate. The reasons provided were related to the individual's preference to dedicate all of the volunteering time to a single initiative to encourage and engage with community based urban agriculture. Community based urban agriculture is distinct from that undertaken by individuals in their backyards, which is not necessarily dependent on interaction with others.

This limitation of time is not dissimilar to the Resource Limitation point discussed above, however the focus is on the individuals commitment. While participants did not think themselves able to invest time into multiple projects, they were all interested in knowing about other city farm, community gardens and similar community efforts to champion urban agriculture in the local area, providing an opportunity for technology to make this visible. An example might be to provide a geo-mapping experience that can show presents nearby city farms as a map overlay. Sharing expertise and knowledge between different urban agriculture projects, may provide a way to alleviate obstacles for newer initiatives, a problem identified by Kaufman and Bailkey [16].

5.4 Physical Environment

Urban agriculture tends to be forced out of urban spaces as populations increase, as the relative value of the land increases with higher population densities [18], so it is unsurprising that in order to be located so close to the CBD, it is located on flood plain.

Prior to the participant observation, at the end of January 2011 the farm suffered from flooding, causing damage to the farm that meant it was not operational for nearly four weeks. One participant in particular detailed the difficulty experienced keeping the farm operational during this time, and had to setup a remote working environment from her home. A similar problem occurred in January of 2013, with the

farm once again flooded. After the floods email communication in addition to the regular farm newsletter was circulated to give an explanation of planned clean-up days, and advised of what facilities or utilities had been damaged (and included requests for donations or replacements). The limitations of the physical environment is consistent with Kaufmann and Bailkey's [16] experience that noted the physical setting of urban agriculture projects is subject to a number of issues and constraints, relating to the land (and possible soil contamination), as well as socially driven physical problems of security and vandalism.

As such the ability to manage and mobilise the community in times of natural disasters provides an opportunity for HCI designers to take advantage of mobile technology and telecommuting. This also highlights the importance of proper documentation and backup management of farm resources, perhaps taking advantage of cloud technologies such as Dropbox.

6 Conclusion

The role of city farms in the broader context of urban agriculture is important as it provides a central physical space for like minded people learn and participate in the process of growing food. HCI designers should consider the positive benefits from a thriving urban agriculture community such as the case of Northey Street City Farm, and take stock of the challenges and opportunities outlined in this paper in order to better share information internally, alleviate resource strains, make visible the bigger picture of local urban agriculture, and prepare for the physical limitations of the environment.

The findings of this paper coincide with that of Odom [12] and Kaufman and Bailkey [16], with regard to the potential value that could be added by improving the visibility of urban agriculture projects, not just to those not engaged, but also to those embedded within existing practice. As part of the larger project of which this study is a part, the future direction is to test the generalizability of the above findings with other manifestations of community (or other non-commercial) urban agricultural practice, such as that of grassroots movements (e.g. "guerrilla gardening", or the permablitz movement), and communities of practice who support each others back or front yard gardening endeavours.

Acknowledgements. This research study is supported under the Australian Research Council's Linkage Projects funding scheme (project number LP100100232).

References

1. Smit, J., Ratta, A., Bernstein, J.: Urban agriculture: an opportunity for environmentally sustainable development in sub-Saharan Africa. Environmentally Sustainable Division, Africa Technical Dept (AFTES), World Bank (1996)

2. Odom, W.: "Mate, we don't need a chip to tell us the soil's dry": opportunities for designing interactive systems to support urban food production. In: *Proceedings of the 8th ACM Conference on Designing Interactive Systems*, pp. 232–235. ACM, Aarhus (2010)
3. Brown, K.H., Jameton, A.L.: Public Health Implications of Urban Agriculture. *Journal of Public Health Policy* 21, 20–39 (2000)
4. Chopra, M., Galbraith, S., Darnton-Hill, I.: A global response to a global problem: The epidemic of overnutrition. *Bulletin of the World Health Organization* 80, 952 (2002)
5. Howe, J., Wheeler, P.: Urban food growing: The experience of two UK cities. *Sustainable Development* 7, 13–24 (1999)
6. Blevis, E., Morse, S.C.: SUSTAINABLY OURS Food, Dude. *Interactions* 16, 58–62 (2009)
7. Hornecker, E., Halloran, J., Fitzpatrick, G., Weal, M., Millard, D., Michaelides, D., Cruickshank, D., De Roure, D.: UbiComp in opportunity spaces: challenges for participatory design, pp. 47–56. ACM (Year)
8. DiSalvo, C., Sengers, P., Brynjarsdóttir, H.: Mapping the landscape of sustainable HCI. In: *Proceedings of the 28th International Conference on Human Factors in Computing Systems*, pp. 1975–1984. ACM, Atlanta (2010)
9. DiSalvo, C., Sengers, P., Brynjarsdóttir, H.: Navigating the terrain of sustainable HCI. *Interactions* 17, 22–25 (2010)
10. Hirsch, T., Sengers, P., Blevis, E., Beckwith, R., Parikh, T.: Making food, producing sustainability. In: *Proceedings of the 28th International Conference Extended Abstracts on Human Factors in Computing Systems*, pp. 3147–3150. ACM, Atlanta (2010)
11. Schnell, S.M.: Food miles, local eating, and community supported agriculture: putting local food in its place. *Agric. Hum. Values*, 1–14 (2013)
12. Odom, W.: "You don't have to be a gardener to do urban agriculture": Understanding opportunities for designing interactive technologies to support urban food production. In: Choi, J.H.-J., Foth, M., Hearn, G.N. (eds.) *Eat Cook Grow: Mixing Human-Computer Interactions with Human-Food Interactions*. MIT Press, Cambridge (2013)
13. Rege, R.: Designing interactive information access technologies for small scale rural indian farmers. In: *Proceedings of the 27th International Conference Extended Abstracts on Human Factors in Computing Systems*, pp. 3359–3364. ACM, Boston (2009)
14. Patel, N., Chittamuru, D., Jain, A., Dave, P., Parikh, T.S.: Avaaj Otalo: a field study of an interactive voice forum for small farmers in rural India. In: *Proceedings of the 28th International Conference on Human Factors in Computing Systems*, pp. 733–742. ACM, Atlanta (2010)
15. Nardi, B.A., Whittaker, S.: The place of face-to-face communication in distributed work. *Distributed Work*, 83–110 (2002)
16. Kaufman, J., Bailkey, M.: The Lincoln Institute of Land Policy: Farming inside cities: entrepreneurial urban agriculture in the United States. Lincoln Institute of Land Policy (2000)
17. Bertelsen, O.W., Zander, P.-O.: Obstacles to design in volunteer based organisations. In: *Research Symposium*, p. 93 (Year)
18. Nugent, R.: The impact of urban agriculture on the household and local economies. *Growing Cities, Growing Food. Urban Agriculture on the Policy Agenda*, 67–98 (2000)