Urban Interfaces

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Abstract
In this paper we briefly describe our approach to designing public interactions and we provide an overview of prototypes we have developed using mobile phones and public displays.

Keywords
Mobile phones, public displays, interaction design

ACM Classification Keywords
H.5 Information interfaces & presentation: H.5.2 User Interfaces and H.5.3 Group & Organization Interfaces

Introduction
The Suburban Communities Program within the Australasian CRC for Interaction Design (ACID) researches ICTs for place-based communities. The Program is developing *Future Ethnography* to combine social context approaches, particularly ethnography, with participatory design, and applying it to mobile-, embedded-, and WWW-based experiences.

In the next section we provide a brief overview of our design approach, followed by an overview of prototypes we have built using embedded devices, mobile phones and public displays.

Future Ethnography
In this section we provide an overview of our design approach: *Future Ethnography*.

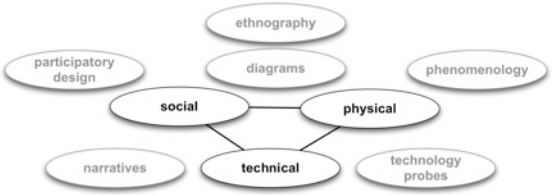

Figure 1: *Future Ethnography* approach

Our focus is embodied interaction [6], at the intersection of social computing on one hand, and physical computing on the other.

Our approach to the social is informed by participatory design [19], and our approach to the physical is informed by phenomenology [13]. We attempt to bridge these approaches through the use of ethnography, particularly observation-based fieldwork and embedded reflection, and through the use of diagram-based representations.

Our process is iterative, cycling between *understanding* and *synthesising* [16]. We express designs as narratives [3], including scenarios, stories or story-boards, and also as technology probes [9], validating our understandings and evaluating technical feasibility.

In the next section we outline prototypes we have developed for mobile phones and public displays.

Prototypes

Technical

Our early prototypes emphasised the technical aspect as we explored the possibilities for what Schön calls "reflective conversation with materials" [18].

The *RiccartonMall* prototype explored the use of a public display for engaging with members of a place-based community. The prototype is a shopping information application, displaying information about the shopping centre where it was installed, including: history, transport, weather, images and games. The display included a touch-screen and the content was stored locally and was not user-modifiable. The emphasis was on contextually relevant content and services, and evaluating interactive technologies.

Figure 2: *RiccartonMall* prototype in use

The *VillageGuidebook* prototype explored the use of Bluetooth wireless communication between mobile and embedded devices in a place-based community. The prototype implemented a researcher-devised scenario for residents of the Kelvin Grove Urban Village [10], accessing multimedia content at significant points within the Village.

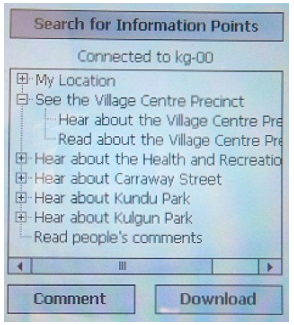

Figure 3: *VillageGuidebook* interface

For the *MultimediaGuidebook* prototype we developed *BTsocket*, a cross-platform Python API for consistent access to common Bluetooth operations under Mac OSX and Nokia's pys60 platform for mobile phones [15]. The API enabled us to re-implement the *VillageGuidebook* in a faster and more efficient manner compared to the earlier prototype. *BTsocket* has since evolved into the open-source *LightBlue* API [12].

Our current *infopoint* prototype is an adaptation of the *VillageGuidebook* prototype to a public information context: the Fishing Boat Harbour in Fremantle. The prototype consists of embedded devices that 'push' location-specific multimedia content to nearby mobile phones, exploiting the use of the mobiles as 'third screens' [7]. The prototype uses *LightBlue* to support Bluetooth features (OBEX) that avoid the need for users to install client software [4, 17]. Trials revealed major variations in Bluetooth interfaces between mobile phone makes and models, and wide variations in familiarity with Bluetooth-based interaction (with a strong generational bias). The prototype has highlighted issues related to long-term real-world deployments, dealing with an average of 600 distinct phones each day.

Social

Our approach to the social aspect of phone-based interaction with public displays draws on participatory design, emphasising long-term engagement with a place-based community.

nnub is a digital notice-board extending a community WWW site into a shop and café that is a community hub opposite a primary school in Moggill, an outer suburb of Brisbane. *nnub* content is submitted via a categorised weblog and displayed via Macromedia Flash. The display is a large-format touch-screen and there are plans to add an associated thermal printer to support 'tearing off' of content items, analogous to physical notices.

Figure 4: *nnub* prototype with test posts

The *nnub* prototype is the latest stage in a four-year engagement with the Moggill community by researchers living in and near the suburb. The prototype was developed through reflection on this deep local experience, and we evaluate and evolve it through iterative observation and development. There is no phone-specific interaction within *nnub* (other than mobile WWW) but the capabilities of *infopoint* and *iwall* for close and distant interaction respectively are under consideration, as is integration of mobile social software developed within a related student project.

Physical

Our approach to the physical aspect of phone-based interaction with public displays draws on phenomenology, using ethnographic observation to

explore somatic experience and the material environment.

As with the *RiccartonMall* and *MultimediaGuidebook* prototypes, initial *iwall* prototypes in Sydney and Brisbane explored technical feasibility, as well as investigating spatial configurations and contexts. Four prototypes explored options for projected and screen-based displays, using full-screen WWW browsers embedding Flash- and AJAX-based content, presenting content such as video from an embedded camera, local weather, news feeds, public transport times, local directories and user-generated content. Phone-based interaction included WWW, SMS and MMS, and Bluetooth, as well as some experiments with direct input via a motion-flow library using phone cameras, and via the Bluetooth HID profile, emulating keyboard and pointing devices.

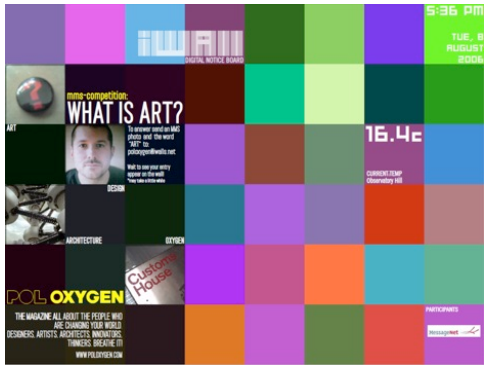

Figure 5: Sydney Esquisse *iwall*

The latest *iwall* prototype has been developed for Kelvin Grove Urban Village (KGUV) [10], an inner-suburban, master-planned, infill development. KGUV combines expansions of nearby campuses of Queensland University of Technology and Kelvin Grove State College (a combined primary and secondary school) with medium-rise residential and commercial development. The KGUV population is diverse and dynamic:

- University and College students and staff
- Short- and long-term workers, such as construction and retail workers respectively
- KGUV residents, drawn from various socio-economic backgrounds due to the deliberately heterogeneous housing mix
- Residents from surrounding areas

As with Moggill, our engagement with KGUV is long-term. Our *MultimediaGuidebook* prototype was developed for KGUV, and the headquarters for our research centre (ACID) is located in the Village.

We are developing the *iwall* for KGUV to explore self-moderation (similar to physical community notice-boards) and to continue our exploration of cafés as community hubs and 'third places' [14]. The prototype is also the basis for a phenomenological exploration of the interrelationship between body, screens and material environment.

Our initial design work illustrates the way we use sketching and diagrams as a key tool to record and express physical relationships. We began with an observation-based site survey to identify candidate locations for displays. Observations at various times of day identified furniture layouts, traffic flows, retail usage and population characteristics. The survey is presented as coloured, coded and annotated overlays on floor plans for each time period (week-day and week-end lunch-time and evening), providing a visual ethnography of the life of the Village.

Figure 6: KGUV site survey sample

We then conducted a contextual inquiry [8] in a particular café in the Village. The core of the inquiry was a series of open-ended, in-situ interviews, combined with observation and post-inquiry reflection and summarisation. The site survey and inquiry were used to develop scenarios [3] describing content and interactions for the prototype. The scenarios emphasise issues identified in the interviews, such as posting of content about the café (for example, "best waitress in Brisbane") and reflections on current events ranging from personal (for example, seeking accommodation) to political (for example, "in the time it took to have your coffee, two soldiers have died in IRAQ") issues. Supporting self-moderation is also a focus, reflecting a key concern of custodians and hosts of third places.

The prototype display is implemented in Apple's Quartz Composer visual programming environment (also used in the *iStuff Mobile* prototyping framework [1]). The aesthetic of the display draws on the café design, earlier *iwall* prototypes and *wiffiti* [20], an SMS-based graffiti board installed in cafés and bars in U.S. cities.

Figure 7: Kelvin Grove Urban Village *IWALL* prototype

The prototype supports SMS- and Bluetooth-based interaction to provide multiple connectivity options. Our evaluation of the latest iteration of the *iwall* will emphasise the gestures, experiences and somatic involvement of participants as they interact with a public screen in a shared social space.

Discussion

In summary, we have built various prototypes using mobile phones and public displays over the past four years. The prototypes have involved a wide variety of screen- and phone-based technologies. Our approach to design and evaluation combines technical, social and physical perspectives, with an emphasis on ethnographic and visual techniques, as well as narrative representations and technology probes.

In addition to future work already described, we are adding displays to the *nnub* and *iwall* prototypes as a basis for exploring remote management and interaction issues related to dispersed public displays (see, for example, [11]).

As this work has evolved we have moved away from custom phone-based clients (such as the

WalkingGuidebook prototype) to prototypes that involve typical phones using standard services such as SMS and Bluetooth. Our aim is to lower the barriers to entry for long-term deployments "in the moment" and "on the street", providing a basis for understanding issues of embodiment and appropriation through "dwelling with technology" [2].

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