Who’s There? Experience-Driven Design of Urban Interaction Using a Tangible User Interface

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ABSTRACT
During recent years public displays relying on new types of display technologies have made their way to the city scene. In this paper, we present a concept that combines tangible interfaces with such ubiquitous urban interaction. We set out to create a tangible connection between different cities and employed an experience-driven design process towards our concept called ‘Who’s There?’. We evaluated the concept by using a cardboard prototype with a group of fifteen users in a busy market square, where it generated considerable engagement and discussion with members of the public.

Categories and Subject Descriptors
H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous

General Terms
Design, Experimentation, Human Factors.

Keywords
Experience-driven design, Tangible user interfaces, Public displays, Connected cities.

1. INTRODUCTION
During recent years public displays have become ubiquitous in the wild, especially in the city scene. New types of display technologies have, e.g., enabled displays to spread into different urban facades [1]. The use of interactive public displays in urban surroundings has been studied over a long period of time [2]. These studies have revealed that users are likely to interact with public displays in groups. However, Ojala et al. [2] suggest finding means to motivate users to interact with the display. This was the main motivation for our study: to design an attractive ubiquitous user-interface connecting people between different cities. We decided to combine interactive public screens and tangible user interfaces (TUIs) into a new way of physically interacting with people in distant cities. We investigated how this combination attracts users to interact with the interface. TUIs have become the next wave of making information processing more concrete for the user, following in the footsteps of graphical user interfaces. With TUIs, the user interacts with digital information through physical objects. The metaDESK system allowed the user to interact with digital information through graspable physical objects [3]. Terrenghi et al. introduced a Learning Cube, which is a TUI for learning [4]. In their study, children considered the tangible appliance as a toy rather than a learning instrument. This, in turn, motivated them to learn. In our ‘Who’s There?’ concept (Figure 1), multiple ropes act as the tangible physical part of the user interface.

The idea is that people in different cities can interact with each other by pulling ropes coming out from a display positioned on a world map. When a user in city X pulls the rope belonging to city Y, the user in city Y is able to witness how the rope belonging to city X is drawing back into the map. A similar interaction paradigm was used for the user interface in the Canopy Climb rope interface [5]. This concept physically coupled a rope to a scroll mouse. By pulling ropes, users could move a projected interface. Here, we describe our concept as well as the experience-driven design process leading to it.

Figure 1. Prototype for urban interaction between cities.

2. URBAN INTERACTION DESIGN
The design process consisted of four different steps: 1) Exploring the context; 2) Using PLEX cards [6] with different brainstorming methods; 3) Constructing the cardboard prototype; and 4) Production of the video prototype (cf. Figure 1). Exploring the context consisted of field observations and interviews. We explored the public market square in a Finnish city during the summer holiday season and interviewed people. The passers-by were asked the following questions: (i) How often do you come here and why? (ii) How do you feel about using technology? (iii) What do you think about being connected to other cities whilst you are here (e.g. for the purpose of sports, communication, arts)?

After gathering qualitative information about the context and possible users, we selected three PLEX cards (see Figure 2) (fellowship, submission and competition) and used a number of formal brainstorming methods for creating the concept idea: Six thinking hats, playful scenario construction, random words, and picture collage. We came up with the idea of a ‘tug-of-war’ between cities. However, to avoid the potentially negative energy of competing and losing, we decided to modify the idea towards distributed interaction with a rope pulling metaphor.

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MUM ‘13, Dec 02-05 2013, Luleå, Sweden
ACM 978-1-4503-2648-3/13/12
http://dx.doi.org/10.1145/2541831.2541878
connecting cities across the globe. The prototype realizes a key design decision to focus purely on haptic feedback from the to-and-fro of the (digitally) connected physical ropes to provide a coherent user-experience. This notion of a single-purpose installation, with strong focus on user-experience, follows the appliance idea and contrasts with multi-purpose devices such as smartphones. We speculate that collaborative installations in public-spaces have specific demands placed upon them related to simplicity, ease of use and comprehension. We propose a single-purpose installation employing realistic physical feedback and an easily comprehensible visual design incorporating a map of the world. The production of the video, along with the development of the lo-fi prototype, provided a concrete ‘physical’ goal for the team that supported the group members in orientating themselves toward the project. In this way, they became boundary objects [8] that support communication across team members who have different disciplinary backgrounds and come from different work cultures.

The video prototype has shown to be effective in communicating our ideas in a vivid form for connecting cities using tangible interaction. It has provoked follow-up exploratory work in designing and implementation of the communications middleware and subsequent ideas of developing engineered prototypes. We are considering making an experimental installation in a public space between multiple cities. Furthermore, an open source hardware kit could enable a single person or e.g., an office to join the network.

5. REFERENCES


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1 http://youtu.be/RzW9PJEplhw last accessed on Nov 06 2013