CommunityMirrors – Large Interactive Screens as Natural User Interfaces for Cooperation Systems

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Abstract
In this paper we describe one of the problems (multi)touch computing is currently facing in many organizations because of its rapid growth: a lack of reasonable deployment scenarios and missing integration into the social context. After specifying the main challenges appearing in this field of interest we will give a short overview of our socio-technical approach to support interactive information supply and peripherally awareness support with socially integrated ubiquitous "CommunityMirrors" as (semi-)public Natural User Interfaces for Cooperation Systems.

Keywords
Touchscreen, Socio-technical System, Natural User Interface, NUI, Design, Interaction Style, Touch Computing, CommunityMirrors, Cooperation Systems

ACM Classification Keywords
H5.2. Information Interfaces and Presentation: User Interfaces

Introduction
Although touchscreen technology has a long history, dating back to the 1960s, it has not received

considerable and widespread attention until the past few years [8]. Amongst other things this shift can be put down to the triumphal procession of multitouch, which has been quite effective in advertising. Notwithstanding multitouch systems are currently rather used as gadgets than being deployed for helpful business application scenarios. Based on the multitouch hype and the steadily falling prices of LCD hardware [7] many companies have meanwhile acquired large, partly interactive screens. These are typically installed at various (semi-)public places like lobbies, coffee corners or conference rooms within companies. However, in most of the cases the devices are either turned off or at least don't show content that is conducive for the benefit of the organization. This is mainly caused by missing usage concepts. Despite the necessary investments, which are in fact sunk costs, the potential of using these (touch)screens for real business objectives so remains unexploited [2].

Prospects and Challenges

Most organizations started developing touchscreen applications for their newly bought hardware in order to redeem it. Now they are facing acceptance problems, because they majorly stuck to their traditional programming paradigms of well-known desktop applications with only one user in front of each screen. But as learned e.g. from the field of mobile touchscreen development, technical IT usage scenarios needn't necessarily to be transferable to touch-based systems [1]. With growing display sizes there is not only a simplification of certain user interaction possibilities [9], but also a more important social component of the socio-technical systems, as users in front of the screens are not only interacting with the system itself, but also with each other. This relevant design facet of inter-human-interaction is currently often neglected. Thus, one of the most important challenges in the field of Natural User Interfaces (NUI) for the adoption for day-to-day business purposes is to identify possible deployment scenarios within organizations, for which the use of NUI actually makes sense. This step is especially important, because we still haven't reached a completely ubiquitous computing era, where computers and IT systems perfectly "disappear" like in Mark Weiser's well known vision [15]. Instead desktop systems as shown in figure 1 are still normal workspaces for daily business work. In addition to that there are certain tasks, like e.g. keyboard based text input, for which we need innovative replacements before (especially vertically mounted) NUI can be a real alternative to desktop systems.

figure 1. Classical desktop computer based office workspaces.

With (social) integration being the general goal, that leads to the fact that NUI – at least for the moment – can only be an amendment of already existing technology. In a second step after the identification of systems that are capable of being used as data sources and that can be integrated, it is then necessary to not only implement a touchscreen application, but to rather develop a socio-technical system around the screen. This system has to guarantee sufficient user attraction to motivate the utilization of the interface. As gesture controlled interfaces get more and more common, user

attraction and meaningful integration into the social context is of particular importance to keep the interaction alive in the long run, after the first technology-driven rush has ebbed away.

Conceptual Approach

Against this background we tried to identify IT systems

- for which an amendment with additional ubiquitous NUI makes sense,
- which can be used to support inter-human-interaction and
- which can be integrated parts of a reasonable socio-technical total system.

As we described in[5], [10] or [11] Social Software and Innovation Management Systems currently seem to have the highest potential for bridging this gap. As application scenario we suggest using large touchscreens to extend the boundaries of these Cooperation Systems with omni-present interactive information displays at various (semi-)public places. This is schematically shown in figure 2.

figure 2. Vision of CommunityMirrors as socially integrated Natural User Interfaces for cooperation systems.

Such places can be lobbies, beside the elevator or at coffee corners, where people usually come together open minded and away from their desktops. There they can see, touch and experience the typically "hidden" content and find information by chance without having to look for it explicitly, which generates a kind of serendipity effect [12]. By providing joyfully usable and peripherally recognizable displays for existing systems as lightweight "mirrors" without additional databases, we are seeking

- to enhance the awareness of community members about each other,
- to increase the visibility of the contained information and
- to generate appreciation for the information contributors in order to motivate them for more participation.

In contrast to desktop systems, which have a lack of assistance for interpersonal "human" communication between people sitting separately in front of their PCs as shown in figure 1, this approach supports "natural" communication while using the NUI and thereby generates better social integration.

Prototypes and Evaluation

In order to be able to evaluate the usefulness and the impacts of social interaction we built our so-called "CommunityMirror Framework" (CMF), a modular toolset for building CommunityMirror applications, which is based on consolidated findings of early large screen prototypes (e.g. [4]). The modularity of the framework allows quick customization to the special needs of a given context. Existing platforms can be very easily enhanced through the intentional absence of additional databases. Based on the CMF we conducted several field-tests in different settings as depicted in

figure 3 in order to find out for which tasks / applications our approach fits best (Task-Technology Fit, Technology Acceptance, see e.g. [3]).

figure 3. Social interaction in some of the recent field-tests.

Social Integration Model

Based on observations and qualitative feedback we tried to develop a first social integration model for NUI in organizational contexts, which is shown in figure 4. The theory of the interaction zones is mainly based on [13] and [14] and was adapted to the given context. Beside an active zone of direct interaction we identified three other interesting cyclic areas:

- the communication zone, in which users actively monitor other people and partly talk to them while they are interaction with the system,
- the notification zone without direct involvement, in which users' attention can quickly be caught by certain attractors on the screen and
- the ambient zone, which mainly supports the submission of peripherally recognizable awareness information.

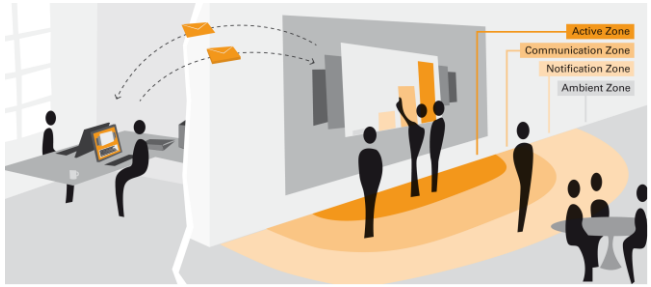

figure 4. Interaction zones of the social integration model.

Further Research Interests

Besides the extension to other deployment scenarios, usability evaluations and the development of generic touchscreen components that are usable both for vertically and for horizontally mounted NUI we are currently interested in

- the improvement of our social integration model by extension with (private) mobile touch devices like Pocket PCs or iPhones,
- the identification of users in the different interaction zones through RFID, Bluetooth and Fingerprint sensors for personalization purposes
- the extension of our field-tests to combinations of vertically and horizontally mounted NUI

To discuss these aspects we would be very glad to join the Natural User Interfaces workshop at Chi 2010.

Further Information

Additional information can be found on our project website http://www.communitymirrors.net. Furthermore we produced a short commented video showing the early concept of CommunityMirros. The video was published in [3] and can be found on http://www.youtube.com/watch?v=WryIVsDWzNI.

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