

# Digifieds: Evaluating Suitable Interaction Techniques for Shared Public Notice Areas

Florian Alt<sup>1</sup>, Dominik Bial<sup>1</sup>, Thomas Kubitzka<sup>1</sup>, Alireza Sahami Shirazi<sup>2</sup>,  
Markus Ortel<sup>1</sup>, Björn Zurmaar<sup>1</sup>, Firas Zaidan<sup>1</sup>, Tim Lewen<sup>1</sup>, Albrecht Schmidt<sup>2</sup>

<sup>1</sup> Paluno – The Ruhr Institute of Software Technology, University of Duisburg-Essen  
Schützenbahn 70, 45117 Essen, Germany  
{florian.alt, dominik.bial, thomas.kubitzka, markus.ortel}@uni-due.de  
{bjoern.zurmaar, firas.zaidan, tim.lewen}@stud.uni-due.de

<sup>2</sup> VIS, University of Stuttgart  
Pfaffenwaldring 5a, 70569 Stuttgart, Germany  
{alireza.sahami, albrecht.schmidt}@vis.uni-stuttgart.de

**Abstract.** Public notice areas are nowadays being widely used in stores, restaurants, cafes and public institutions by customers and visitors to sell or advertise products and upcoming events. Although web platforms such as Craigslist or eBay offer similar services, traditional notice areas are highly popular as using pen and paper poses only a minimal barrier to share content. With public displays proliferating the public space and with means to network these displays, novel opportunities arise as to how information can be managed and shared. In an initial step we systematically assessed factors inhibiting or promoting the shared use of public display space and derived design implications for providing a digital version of such public notice areas [2]. In this poster we report on the implementation of such a digital shared notice area, called *Digifieds*. With an initial lab study we aimed at understanding suitable means of interaction when it comes to creating, posting, and taking away content.

## 1 Introduction

As prices for large screen display hardware decrease, public and semi-public spaces are being more and more augmented with large screen displays. Though they are in most cases not networked yet, we envision that in the future many display owners will share their display space hence allowing visitors and customers to publish content. Traditional forms of shared public display spaces include so-called public notice areas (or PNAs), as can be found in stores, restaurants/bars, university buildings, or public institutions. They contain different types of content, e.g., classifieds, events, announcements, and advertisements. As such displays become digital we envision that they can be made more visible and attractive to passers-by: (1) Digital content can be augmented with pictures, videos, animations, or services such as Google Maps. (2) Networking capabilities enable an easier (even remote) distribution. (3) Easy means can be provided for taking away information (e.g., content or telephone number) by allowing to send classifieds via email or transferring them to the mobile phone.

Based on the results of an observational study in 29 locations and in-depth interviews with stakeholders, we derived design recommendations for creating a digital version of public notice areas. As a contribution of this paper we present a technical realization of *Digifieds* (“digital classifieds”), a digital shared notice area, and report on findings from an initial lab study with 20 participants. We evaluate the suitability of different interaction techniques for posting and taking away content from PNAs.

## 2 Related Work

Many projects looked at technical requirements for networking displays, mostly in offices (e.g., [1,4]) but also in public spaces (e.g., [8]). Novel interaction techniques have been studied both with regard to user behavior (e.g., [3,7]) and interface technologies (e.g., [5]). Although technical and architectural suggestions could be drawn from these studies, our work focuses on understanding design implications from *existing practices* of posting on and *latent motivations* of offering and maintaining PNAs.

Studies on the impact of digital notice boards have been conducted in several settings. Of particular interest is Huang’s [6] finding that people spend less time learning about system capabilities when it is not supporting current practice. Further, the users’ will to use novel system needs to be considered [7]. This emphasizes the necessity of embedding existing routines in novel systems to support their use.

## 3 Digifieds

In an observational study prior to this work [2] we aimed at understanding how to create digital PNAs supporting the needs of different stakeholders (display providers, content providers, and viewers). We found that different types of PNAs exist (e.g., scaffolded or unscaffolded displays), which consider the interplay between the space they are deployed in, the involved stakeholders, and the envisioned content. PNAs also differ in how they support posting content (e.g., free posting vs. approved content), in their flexibility with regard to content creation (e.g., pre-printed cards, scaffolds), and how they are being managed (e.g., expiration dates, cleanup procedures).

PNA providers are typically interested in attracting people and to subsequently reach potential customers. At the same time, customers usually stop by to read or leave posts while they are on-the-go, hence having only very little time. As a consequence, interaction with a PNA should be simple and quick. In this work we focus on comparing different interaction techniques, based on the following requirements:

- *Design for specific use of board*: PNAs should carefully consider the context in which they are deployed (e.g., content to be displayed, dealing with abuse, etc.)
- *Design for flexibility of input*: means have to be provided to keep posting on the display as simple as possible while at the same time creating attractive content (e.g., images, videos, different colors, etc.).
- *Support take-away of information*: digital PNAs should provide means for easily taking away information (e.g., phone numbers, information about an event).

To evaluate suitable means for creating, posting, and taking away content we implemented *Digifieds*, a PNA environment, which incorporates public displays and supports means to create content directly on the touch screen, using a mobile application, or a web interface. In this way we support creating content in different situations, e.g., ad hoc at the display, on-the-go with the mobile phone, or at home using a PC.



**Figure 1: Interaction with PNAs (a) Creating a Digified directly at the display, (b) Taking away information using QR codes, (c) Adding / Taking away Digifieds using touch interaction.**

## 4 User Study

To evaluate different interaction techniques, we setup the *Digifieds* system in our lab, using a 50'' public display, and asked 20 participants (10 males, avg. age 26.8 years) to generate, post, and take-away content from our PNA. We equipped the participants with mobile phones that we had installed our app on and presented them the following scenarios, which feature different interaction techniques (see also Figure 1):

- *Display*: New posts are created using the virtual onscreen keyboard. For taking away a post it can be sent to one's email address.
- *Phone Touch*: Our Android app allows creating content on-the-go. As the user approaches a display, he can simply add the content to a specific location on the display by touching it with his mobile phone. Similarly he can take away any classified by touching it.
- *QR codes*: New classified are created on the mobile phone, which then generates a QR code on its display to be scanned at the display's QR scanner. Classifieds could be taken away by scanning its QR code with the phone's camera.
- *Paper*: A PC is used to generate and print out a new classified in the form of a QR code. The code can then be scanned with the QR scanner at the display. Taking away a selected classified is done by instant printing.

For each scenario the participants had to solve a task (e.g., selling his bike/phone, renting his apartment, or giving private lessons). After each scenario participants had to complete an SUS (System Usability Scale) and at the end we conducted an in-depth interview. The study was recorded with multiple web cams for a post-hoc analysis.

Quantitative results based on the SUS and the participants' personal ranking indicate, that creating posts directly on the display and taking them away via email is the most preferred interaction technique (SUS: 86.6). Surprisingly, users preferred the mobile phone based interaction techniques (phone touch and QR codes) compared to the paper-based technique. This is also reflected by qualitative feedback from the interviews were many users stated that both features are "cool". However, from a usability perspective, the paper-based technique (SUS: 82,08) outperforms the mobile techniques (Phone Touch: 70,01, QR code: 73.45). This indicates that direct touch is the most promising interaction technique - probably as it is similarly quick and simple as traditional PNAs. Mobile phone based techniques seem to have high uptake among the younger generation. Qualitative feedback included numerous suggestions as to how the application could be enhanced (e.g., posting and displaying content from home, adding search and filter functionality, and adding further functionality).

## 5 Conclusion and Future Work

In this paper we have presented *Digifieds*, a digital public notice area. A user study with 20 participants strongly indicates that direct touch is the most promising form to input content – however, phone-based techniques receive similar uptake among young people. We are currently analyzing the study data in-depth and enhancing the application based on the feedback we received. *Digifieds* is a finalist of this year's UbiChallenge (<http://www.ubioulu.fi/en/UBI-challenge>) and will be deployed during summer 2011 in Oulu, Finland.

**Acknowledgement.** The research leading to these results has received funding from the European Union Seventh Framework Programme (FP7/2007-2013) under grant agreement no. 244011.

## References

1. Agamanolis, S.: Designing displays for human connectedness. In *Public and Situated Displays Social and Interactional Aspects of Shared Display Technologies*, Kluwer Academic.
2. Alt, F., Memarovic, M., Elhart, I., Bial, D., Schmidt, A., Langheinrich, M., Harboe, G., Huang, E., Scipioni, M. P.: Designing Shared Public Display Networks – Implications from Today's Paper-Based Notice Areas. In *Proc. Pervasive 11*
3. Brignull, H., Rogers, Y.: Enticing people to interact with large public displays in public spaces. In *Proceedings of INTERACT'03*, ACM, Zurich, Switzerland, pp. 17–24 (2003)
4. Churchill, E. F., Nelsen, L., Denoue, L., Helfman, J., Murphy, P.: Sharing multimedia content with interactive public displays: a case study. In *Proc. DIS'04*
5. Greenberg, S., Boyle, M., Laberge, J.: PDAs and shared public displays: Making personal information public, and public information personal. In *Pers. and Ubiqu. Computing*
6. Huang E. M., Koster, A., Borchers, J.: Overcoming assumptions and uncovering practices: When does the public really look at public displays?. In *Pervasive Computing '08*,
7. Michelis, D., Müller, J. 2010. The Audience Funnel. *Int. J. of Human-Computer Interaction*
8. Storz, O. Friday, A. Davies, N., Finney, J., Sas, C., Sheridan, J.: Public Ubiquitous Computing Systems: Lessons from the e-Campus Display Deployments. In *IEEE Per. Comp.*