

Digital Black Boards

On Public Screens Developing into the
Communication Medium of the Future
by Florian Alt | Institute for Visualization
and Interactive Systems

Sinking costs for hardware and the development of technologies for use outdoors, have caused an increasing coverage of the public space with large-scale screens. Unlike traditional outdoor media like billboards, screens have the advantage that content can be changed quickly, cheaply and possibly automatically. Furthermore, they allow the integration of novel kinds of media, like video, that offer passers-by and users more interesting content.

In Germany, such big screens usually either are not at all or are only partially connected and only accessible by the owner, who in most cases is a major outdoor advertiser such as JC Decaux or Ströer. Due to the sinking costs, it is likely that in the future more retailers will employ these screens, which can also be connected via the internet.

The result will be an urban infrastructure which can be used not only for outdoor advertising but also to disseminate content fed in by visitors, inhabitants or adjacent shops. The technical challenge herein lies in providing pertinent middleware that supports the exchange and programming of content on any screen, even over long distances, as well as the implementation of user interfaces to facilitate the interaction with those screens. In addition, it is imperative to understand which mechanisms need to be provided in order to meet the expectations of all parties involved (screen providers, authors of content, observers) regarding the usage of the screens. So long as there continues to be a lack of control mechanisms, the screen owners will only reluctantly allow access to the screens and let others decide upon the shown content.

Within the framework of the EU research project *PD-Net*⁶, experts at the University Duisburg-Essen (Germany) and the University Lugano (Switzerland) are researching the question of how a global network of screens can be developed that goes beyond the capacities of currently isolated commercial screens. The aim is to create an open platform for the development and display of user-generated content.

The following article provides insights into a current project that explores the potentials of public screens as the com-

munication medium of the future.

The point of departure is digital notice boards, which can be considered the predecessors of public big screens. An ethnographic study researched practices of the management and control of contents as well as the motivation of all participants. Based on these results the research team at the University Duisburg-Essen developed a digital notice board which is currently embedded in an open screen-network in Finland, publicly accessible and continuously under evaluation.

Traditional Digital Notice Boards

Digital notice boards or pin-boards are a widely spread communication medium, that make it possible for everyone to publish information in the public space. Such digital notice boards are to be found in numerous places such as supermarkets, bakeries, cafes and bars but also at universities, schools and in public and religious institutions. They provide indications on how they should be designed in the digital world in order to enable their simple and successful use. This includes information on the motivation of individual actors (Why do the owners allow the dissemination of information? What is the users' motivation to share content in the public space? What makes them pay attention to such content?). A further question is can predominant mechanisms that facilitate the creation, transport and removal of content and control of access be adapted?

For a study, executed in Germany and Switzerland, digital notice boards in 29 locations were observed for 4 weeks and a series of interviews with owners or managers conducted. Through daily observation and capturing of images, the researchers made important findings on the reasons for the ongoing popularity of digital notice boards even in times of the internet and platforms like Ebay. The decision to opt for a notice board in supermarket chains is often made at the manager level. Displays here serve to increase customer satisfaction. Public institutions, however, offer boards to convey information to their citizens or target groups. Providers of content are on the one hand providers of classifieds, on the other third-party suppliers for advertising purposes. The readers of such content are either searching for an explicit piece of information or notice them accidentally, particularly in highly frequented places (eg. the entry-hall of a supermarket) which present waiting situations.

Since these contents are often left unremoved, several strategies have been introduced to overcome the problem. Some board operators ask the content provider to define an

expiry time after which the post will be removed from the panel. Sometimes content is pre-selected and published and older content removed by the operator. A method employed especially for big and confusing boards is the regular cleaning and removal of all content.

One of the most important characteristics of digital notice boards is the fact that adverts reach a local target group (community). This makes it easier to find buyers for bulky objects like furniture or bikes that can easily be picked up, avoiding complicated delivery via mail. Consequently, the majority of content on these digital notice boards is nearly entirely of a local nature – only seldom does one find content without local reference.

Another reason for the popularity of digital notice boards is their simple mode of use which demands almost no requirements from the user. With the help of paper and pencil, everybody can contribute and publish or take information like telephone numbers via a tear-off slip. At the same time, one is free in terms of its design. It is possible to have simply designed content like pre-printed cards as well as semi-professional content (for example home-made notifications) or professional contents such as concert-flyers.

Consequently, the following recommendations have been derived for the design of digital applications for digital notice boards:

- Support of different kinds of content: depending on the context of a screen, it is important to consider which content is requested and how it can be conveyed through its design. Whereas it is important for passers-by to create content fast and simply, one also has to support people who spend lots of time developing striking content. One possibility would be to support the uploading of images or videos and to enable the development of content with different fonts, font sizes and background colours.
- Support of different interaction techniques: one reason for the big success of digital notice boards is the easy usability. To guarantee this for the digital versions too, it is necessary to make the design, publishing and transmission of such information as easy as possible.
- Management of content: since older contents are often not removed, relevant posts get lost easily. Hence what is needed is a method to remove old information (automatically) and allow the operator to delete posts that

don't comply with their requirements.

- Local character of digital notice boards: The contents of digital notice boards have a strong local reference. Therefore it makes sense to not spread the information widely in ones network but to offer options regarding where it is to appear. Only thus can one reach their target group. Interviews, for example, have shown that event notifications and local classifieds are the most popular content.

Digifieds

Based on those results, scientists and students at the University Duisburg-Essen have developed and programmed a digital notice board. *Digifieds*⁸ (derived from Digital Classifieds) is a web-based application that can be implemented on various screens. The application runs in a web-browser in full-screen mode and automatically adapts to the screens' size and resolution. Furthermore an Android application for smartphones is also offered. Users can choose if they want to create a classified either with the virtual screen keyboard or their smartphone. The information-exchange between smartphone and screen is then facilitated via QR Codes or the manual entry of a 4 digit code. This allows one to create and transmit classifieds to the screen on the move. Users can also take the classified with them by sending it via the virtual keyboard to their email address or transmitting it via the QR code to their mobile phone.

Currently, *Digifieds* runs in an inner-city display network (Ubiquitous Oulu) in Oulu, North Finland where it has been available for the citizens since July 2011. *Ubiquitous Oulu* is a joint project of the city and the University Oulu additionally supported by external project partners like Nokia. Thanks to this, Oulu is imbued with an architecture that was unique until today and allows researchers to implement and evaluate their own applications.

A team of on-site researchers is tasked with evaluating the application through observation, interviews and questionnaires in order to amplify its functionality. Preliminary results of the study show that the citizens consider the capability of the boards to spread information about local events and classifieds as their main strength. The younger generations especially are very open to the application and dispose of internet-enabled smartphones which make possible the use of the mobile application. One advantage with this is the wireless coverage of the entire inner city. One faces various challenges, however. Content

on outdoor screens is nearly impossible to read in the daylight and often hidden by parked bikes. Furthermore, when commercial content is shown, the interactive quality of the screen disappears for users. A potential solution that is currently being tested on-site is integrated cameras which can track a person approaching. In this case, the content of the display can be adapted accordingly and motivate an interaction.

Conclusion

Even though the screen network has existed for several years, many inhabitants still do not know about their interactive applications. Instead they often ignore the screens, not expecting any interesting content. Services like *Digifieds*, however, offer a chance to make passers-by aware of the possibilities of interactive displays and to prove that these not only convey static content but also allow and facilitate communication (e.g. with another person). At the same time, the phenomenon of display blindness caused by the use of displays almost solely for commercial use can hence be counteracted and the vision of screens as communication medium of the future be strengthened.

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Florian Alt is a researcher in the Human-Computer Interaction Group at the University of Stuttgart (Germany). The main focus of his research is on context-sensitive advertising, implicit and explicit interaction with public displays and on exploring pervasive displays as a future communication medium. Florian is an organiser of the international workshop series and co-editor of the Springer book on Pervasive Advertising (2011). Prior to joining the University of Stuttgart he worked in the Pervasive Computing and User Interface Engineering Group at the University of Duisburg-Essen (Germany), as a web developer for Pinnacle Systems, Inc. in Mountain View (US), and as an IT specialist for Schreiner MediPharm LP in New York (US).



Digifieds, Oulo, Finland 2011 (c) University Duisburg-Essen



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References

- Florian Alt, Nemanja Memarovic, Ivan Elhart, Dominik Bial, Albrecht Schmidt, Marc Langheinrich, Gunnar Harboe, Elaine Huang, Marcello P. Scipioni: Designing Shared Public Display Networks – Implications from Today's Paper-Based Notice Areas. In: Proceedings of the Ninth International Conference on Pervasive Computing, San Francisco, US 2011.
- Florian Alt, Dominik Bial, Thomas Kubitzka, Alireza Sahami Shirazi, Markus Ortel, Björn Zurmaar, Firas Zaidan, Tim Lewen, Albrecht Schmidt: Digifieds: Evaluating Suitable Interaction Techniques for Shared Public Notice Areas. In: Adjunct Proceedings of the 9th International Conference on Pervasive Computing. Springer, San Francisco, US 2011
- Müller, Jörg & Wilmsmann, Dennis & Exeler, Juliane & Buzbeck, Markus & Schmidt, Albrecht & Jay, Tim & Krüger, Antonio (2009) : Display Blindness: The effect of Expectations on Attention towards Digital Signage. Proceedings of Pervasive 2009, Nara, 2009.

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The Institute for Visualization and Interactive Systems (VIS) and the newly founded group for Human Computer Interaction at the University of Stuttgart are internationally renowned for research in the areas of visualisation, interactive 3D computer graphics, and HCI. The institute is currently involved in a number of national and international projects carried out in collaboration with partners from academia, public research institutions and industry. The focus of the R&D-work of VIS is on human computer interaction, context-aware computing, simulation, usable security, mobile systems, computer graphics, and visualisation.