

Media sharing in an open network of place-based displays

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Abstract: In this study, we aim to uncover emerging media practices for open place-based displays and understand how people appropriate the opportunities created by this new medium. Based on usage data from 43 displays, we study the role played by different publication paradigms, more specifically subscription of pre-defined content channels, integration of arbitrary content sources from social media and direct media creation. The results suggest that these different publication paradigms can all play an important role in an open model for public displays and that they complement each other in a very flexible way. This seems to confirm that openness can represent an important step towards more effective and more relevant uses of large screen displays.

Key Words: public displays; urban screens; open displays; media.

Introduction

Large screen displays are an increasingly ubiquitous element in urban spaces and they could be playing an important role as a city interface for social interaction in public places. However, existing display systems are still far from reaching their potential as an open communication medium. They are operated as part of multiple isolated display networks, where they serve as mere distribution points for centrally created content. Perhaps because of the obvious associations with broadcast television, people have developed high expectations in regard to the quality of the media shown by those displays. The prevailing mind-set is that content creation for the public displays is a professional activity that should only be performed by people with the necessary expertise. This institutional perspective of display content has had major consequences on their usage scenarios and the perception they generate as a communication medium. In particular, it led to more formal communication practices, which do not normally leave much space for spontaneous creativity and situatedness. Müller et al. (Müller et al., 2009) report on how this more formal content may impact audience expectations regarding what is presented on digital public displays, i.e. mostly boring advertisements and trivial content, and how this correlates with the effect of display-blindness.

For some years, there has been a growing call for more open and expressive uses of public displays. The Urban Screens movement promoted worldwide initiatives to address the use of urban displays as a way to contribute to a lively urban society. Their promoters advocated a stronger binding of the screens to their communal context to promote local identity and engagement, civic and cultural expression, community building, multiculturalism and public engagement. Foth et al. (Foth et al., 2016) argue that displays should be key touch points between “the city” and its civic body, the citizens. In particular, they argue that public displays, as urban interfaces, have unique capabilities for meaningful civic engagement. They can reach a

diversity of citizens and they can break away from the echo chambers and filter bubbles created by the automatic content selection algorithms that control most of our digital activity. Davies et al. (Davies, Langheinrich, Jose, Schmidt, & José, 2012) also call for a move away from a world of closed display networks to scenarios in which large-scale networks of pervasive public displays are open to applications and content from many sources. They argue that an open model for public displays should promote the same levels of rapid innovation that we have previously witnessed with mobile devices. When mobile platforms moved from a model where their functionality was locked down by network operators to a model where anyone was able to create and distribute new mobile applications, innovation quickly exploded and a whole new ecosystem emerged around mobile devices.

What these various views represent is a broader trend towards the transformation of public digital displays into a richer medium for user-generated content and a locative channel for self-expression and creativity. A key enabler for this evolution is the ability to allow any third-parties to generate and publish content to be consumed by displays in the network. Multiple entities anywhere in a global network should become co-creators of value by developing new applications and content for themselves or for the community. Another key enabler is place-based displays that are able to reflect the physical and social setting in which they are inscribed, while being part of an open model. We are especially interested in this type of display because they can challenge most of the assumptions that have been behind the narrowcast model. Instead of being a distribution point for content pushed from a central control point, a place-based display is managed by a local display owner, who will take independent decisions on which content to create or pull for presentation on that display.

In this alternative paradigm, multiple autonomous screens, operated by many independent entities, could integrate the screen infrastructure of the city. Each screen owner will have its own display concept to serve his own specific goals, but at the same time, part of that display time can be used for shared applications and content from multiple third-parties, and particularly from the city institutions. For the city as whole, this infrastructure will represent a new channel where to advertise local events, promote civic engagement, or increase neighbourhood awareness. Municipalities often try to promote their own display network, but they quickly realise that the business case is challenging and scaling the infrastructure to a city wide scale involves costs that are not affordable. With an open display network, they could have access to such an infrastructure without actually having to own their own displays.

Even though there is wide recognition for the huge potential embedded in this vision, there is still little evidence that place-based displays can actually sustain the emergence of more informal, social and creative uses of public displays. In this work, we study emerging media practices around early instances of place-based displays. The research methodology is based on the analysis of an anonymised dataset that includes the media creation activities of 43 displays in the Displr platform. Displr is a platform for public displays that empowers display owners to easily create and manage their own display. Display owners can publish their own content, but also repurpose existing content by integrating relevant external sources, such as Facebook, Instagram or Dropbox folders. Displr in general, and this dataset in particular, provide an interesting context for our research goals:

- The display are all operational displays, which are in daily use at the respective venues to serve specific communication goals. They were not deployed for research purposes and our research did not include any content creation or even any contact with the venues involved.
- The owners of those displays had full control and freedom regarding the usage of their displays. There was not any type of conceptual design driving display owners towards any

particular usage of their display. Display owners could publish their own content as well as integrate multiple types of external sources.

- These displays were autonomously operated by many independent entities without any specific connection between them. The geographic dispersion is very high and most display owners are not even aware of the existence of other similar displays. Therefore, what each of them has decided to do is very much the result of an independent decision.

For these reasons, we believe this to be a representative sample of how people may appropriate the freedom and locativeness of place-based displays and the extent to which this might affect media publication practices. The results show the complementarity between the various publication paradigms and highlight the importance of external content.

Related Work

The concept of situated displays has been explored before as displays that can convey a shared sense of place by transmitting the identity and purpose of a space, inviting people to action, setting behaviour expectations or supporting navigation within contextual boundaries. As summarized by O'Hara et al. (O'Hara, Perry, Churchill, Russell, & O'Hara, 2003): "...they inform us about places, amenities, and events of interest and reflect the activities of others [...]. They act as important cultural reference points in the construction of shared meanings, beliefs, desires and the memories of groups and communities". Dourish (Dourish, 2001) explores how embodiment, described as a physical presence in the world and a social embedding in a web of practices, can play a key role in the design of interactive systems. McCullough (McCullough, 2004) also considers that the definition of place is closely related with people's particular appropriations of a space and therefore the "identity of a place" is what makes it unique or recognizable. Concrete instantiations of the concept have been explored from many different perspectives (Taylor, Rouncefield, Cheverst, & Izadi, 2008), with particular incidence in work environments as a means to disseminate information or provide awareness about group activities (Greenberg & Rounding, 2001)(McCarthy, Costa, & Liongosari, 2001). Studies in third-places have shown how a sense of community and place attachment can be promoted by displaying media associated with the profiles of people present in a café (Farnham et al., 2009). The Funsquare application (Memarovic, Elhart, & Langheinrich, 2011) presents trivia information in a way that reflects the current context around the display.

Traditional public notice areas have been studied as a design inspiration for the emergence of new practices around digital displays (Alt, Memarovic, Elhart, Bial, & Schmidt, 2011). Their work uncovers some of the practices behind the operation of these non-digital boards and discusses their role in the design of future generations of globally networked public displays. Publication practices for digital displays have also been studied in a long-term analysis of the e-campus deployment at Lancaster University (Storz et al., 2006). Their findings highlight the importance of flexible publication tools that people may easily appropriate to support very diverse content publication practices. On a complimentary study to the work reported in this article (Coutinho, José, & Silva, 2016), the authors have also studied media creation practices for situated displays. The findings suggest that, in place-based displays publication practices tend to be less formal and much more situated than what is now common in most display networks. These results seem to confirm the expectation that future display network may evolve towards becoming a medium that is open to new forms of self-expression, appropriation and Human connectedness.

Results

The 43 locations used in this specific study were mostly schools, but there was also 1 library and 4 different locations at one University. The study covers a period of 10 months. However, since displays were being deployed throughout this period, the time range associated with each of them varies between those 10 months and just a few weeks. The study data includes the channels subscribed by each display, the external sources that were explicitly added and the messages created.

Channel subscription

Displr explicitly separates content providers and display owners. Content providers can produce content to be consumed at any display in the network. They organise and publish their content through channels that they fully control. A display owner, on the other hand, can control the content on the respective displays by means of channel subscriptions. They can subscribe or unsubscribe to channels at any time. This is a loosely controlled system in which there is no central point of control.

Channel owners are free to produce their own channels and display owners are free to decide which channels to subscribe to. The platform was initially seeded with 227 channels. These were already created and offered to display owners as content recommendations that they could easily add to their displays through a simple subscribe button. These channels were linked to third-party media sources and organised in 9 categories: News; Academy; Culture; Sports; Entertainment; Famous; Football and Institutions.

Regarding channel subscriptions, we were mainly interested in understanding overall preferences and the extent to which some channels could become more popular and be used at many different displays. We observed 270 channel subscriptions (6,3 per display) referring to 85 unique channels. Since there were 227 channels, 142 were never subscribed by any of the displays. We also observed that 38 of those channels were subscribed only once, and hence there were at least 5 displays that had no unique channel whatsoever. The histogram in Figure 1 shows the distribution of the number of subscriptions per channel.

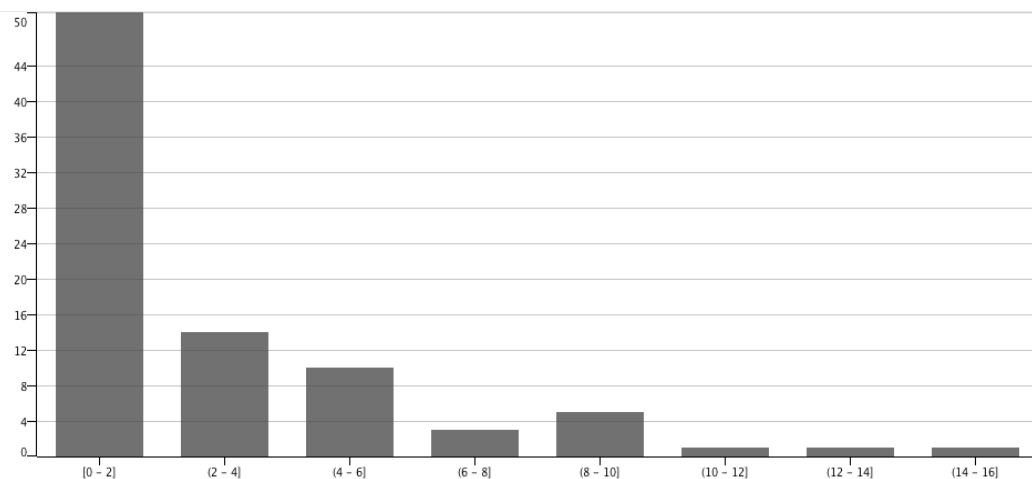


Figure 1: Histogram of the number of subscriptions per channel

There are 21 channels subscribed by 10% or more of the available displays, with the most popular one being used in 15 displays (34%). The ratio between unique channels and channel subscriptions is 0.3, which suggests a considerable level of overlap between subscriptions made

by the different displays. These results may have been biased towards a more common usage of some channels because when displays are created, they are created with a default set of seed subscriptions. Even though display owners are free to change them, many of them ended up staying, either for inertia or simply because they were actually appreciated. Regarding the nature of the content, each channel is classified with a category and we can thus analyse the content preferences expressed by those channel subscriptions. The categories with more subscriptions were News (75), Culture (51) and Entertainment (46).

Explicit integration of external media sources

Displr also supports the explicit integration of external content sources, such as Facebook, Instagram or Dropbox folders. This is a simple process for repurposing existing content as display media. It can be used to integrate content from the display owner or from any arbitrary sources. Unlike channels, which represent a simple and convenient approach to select pre-arranged content, external sources represent a fully open model for integrating external content into the displays. They need to be explicitly added by a display owner who needs to input the respective URL or source ID.

In our study, display owners integrated external content sources into their displays 178 times. Even though there were no limitations to the number of sources, 90% of the displays integrated 6 external sources or less. There was a total of 140 unique sources being used and their usage across multiple displays is represented in Table 1.

Table 1: Distribution of the number of places in which each unique source was used

Number of places where it was used	Number of unique sources
1	123
2	12
3	3
4	1
5	1
6	1
7	1

If we estimate the same ratio as before (unique sources/sources integrated), we obtain a ratio of 0.78, which represents a striking difference to the ratio obtained with channels (0.3). In particular, 123 out of 141 were unique to a single display, which is a good indication of situatedness. Unlike channels, sources were not seeded and they had to be added explicitly from the respective URL.

Regarding the nature of the sources, Facebook (52) was the most popular one, with display owners explicitly adding 52 unique sources to their displays. The other external sources were YouTube (33), RSS (26), Facebook Albums (21), Twitter (19), Instagram (17) and Dropbox (10).

Media creation

Finally, display owners can also create their own display media in the form of messages (text with selected background image). Regarding display messages created by display owners, we counted 524 messages that were created during this study. In this case, all those messages are unique and used at only one display. This represents an average of 12,1 messages per display with the 2 most active ones producing more than 100 messages during this period. When we consider the average time that each display has been active during the study (which we estimate as being 3 months), this corresponds roughly to 1 message per week per display. On average, each message was active for 11 days. More details about media practices with displays messages can be found in (Coutinho et al., 2016).

Conclusions

This paper reported on the emerging media practices in an open display platform. Based on usage data from a long-term system that is in daily operation at 43 locations in Portugal, we have studied how the owners of those displays have made use of 3 different publication paradigms. The results suggest that these different publication paradigms can all play an important role in an open model for public displays and complement each other to offer a very flexible set of publication models.

While there is clear use of locally sourced content created through the use of messages, we have also seen that external sources can play a key role in keeping the displays running with continuously updated content. The content that was explicitly created by the display owners was just a small portion of what those displays have shown. Without this content from third-parties, they would have to either incur in a significant content creation effort or risk having a display that would quickly be perceived by users as non-relevant. These results seem to confirm the value that open approaches can bring to richer uses of public displays.

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