

Towards new advertising models for situated displays

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Abstract.

Advertising is often a key element in the business case for public display networks. However, the respective advertising models do not yet provide effective solutions to the key issues of campaign targeting and impact measurement that are now so common in web advertising. In this paper, we specifically discuss some of the directions and principles that may emerge in advertising models for public displays. We make this analysis combining some of the lessons from other media, but also considering the specificities and potential evolution of public displays as an advertising medium.

1 Introduction

In 25 years from now, digital media in its many forms has become increasingly ubiquitous and woven into the fabric of everyday life. The advertising models have also changed dramatically in a co-evolution process in which new advances in digital media enable new advertising models and new advertising models provide new business cases for digital media. Advertising models are now mature, they are more considerate for people, not only as targets of a message, but also as an integral part of the advertising process. People are also more aware of the models and of how to assume a more proactive role in the process. They can easily balance between “surprise me” types of adverts and “inform me better about things that I am interested”. This increased engagement is itself a source of value for the process, part of which is also shared with the people that are the targets of the adverts. This is a path that has just recently begun for the web, currently the most active medium for new advertising models, and one which we can only anticipate for other digital media.

Public digital displays are increasingly common in all sorts of public places, such as shopping centres, cafeterias, gas stations or streets. They have a very strong potential as marketing tools and advertising media, as they are close to shopping decision points, they can leverage on situations of strong attention availability, e.g. queues, and they can reinforce messages from other media. Therefore, advertising is often a key part of the respective business case, which revolves around the revenue obtained from selling screen real estate and time to advertisers. Still, the evolution of this market has been somewhat restrained by the limitations of the respective advertising models, which do not yet provide effective solutions to the key issues of campaign targeting and impact

measurement. The prevailing model is characterised by selling essentially undifferentiated screen real estate, with only some basic targeting being done in terms of geographical regions or the nature of the networks in which the adverts are negotiated. Also, the closed nature of displays networks means that only large networks can have the necessary scale to be of any interest to advertisers. These limitations have been critical obstacles preventing a stronger evolution of this market. Meanwhile, web marketing has been generating solid advertising models that are enabling that medium to become increasingly central in marketing strategies. The evolution of web advertising provides an inspiring model for other digital media, but it also means that marketers will have increased expectations regarding the advertising models for public displays.

The idea that public displays needs more effective advertising models has been widely acknowledged by the digital signage industry, which has been making an effort to overcome those obstacles through more advanced audience metering techniques. Also, a large number of patents have been filled in recent years on targeted advertising for public displays, including by major companies such as Google, Microsoft, IBM, NEC or HP. However, any major breakthrough is only likely to happen in the context of a significant evolution of the medium itself, and there are two emerging trends that are most likely to play a central role in re-shaping the concept of public display and providing the ground for significant evolution in advertising models.

The first trend is the move towards situated displays [1] that are interactive and able to sense and react to the social environment around them. Currently, public displays offer very little in ways of interacting with and responding to the people around them. They are distribution points for centrally controlled content with very little support for adaptive behaviour. A situated display should go far beyond this traditional view of public displays as little more than local TV channels. A situated display should invite us to action, induce behaviour and provide an important background for the interpretation of place, its associated practices and culture. This may happen implicitly, as a response to the presence of people, or explicitly as the result of any interactions the display may support. Regardless of the specific features or interaction modalities of any particular concept of situated display, the ultimate consequence is the generation of multiple activity traces that may help to characterise the place where the display is located or the people that visit that place.

The second trend is the emergence of pervasive display networks in which advertising models may take advantage of the network effects enabled by open network models. This is a key step towards an open, networked, and automated advertising market in which any campaign could potentially be matched with any advertising opportunity to maximise value generation. Both these trends are central in opening up new opportunities for advertising models that are able to meet the full potential of the medium.

In this position paper, we discuss those opportunities and how they can be explored for targeting and impact assessment in situated displays. This is based on our own research on situated displays in which we have been exploring multiple sensing and interaction modalities as the basis for adaptive content. We will start by comparing existing models for other media and then we analyse some of the key properties that should be part of the new advertising models for situated displays.

2 Advertising Models

Advertising is a key element of the promotion mix of companies and covers a wide range of communication tools in order to inform and persuade. As in any other form of communication, advertising effectiveness depends on understanding the communication process (encoding, decoding and feedback) and elements (sender, receiver and media). Furthermore, developing an advertising process requires 4 major steps, namely: setting advertising objectives; budget; message; and media [2], with the evaluation of advertising effectiveness being fundamental for planning and control. The goal of any advertising model is thus to reach specific audiences and assess their response. Targeting adverts to specific audiences is essential because it allows campaigns to be executed in a much more cost-effective way. If an advert is only shown to those people for which it might be more relevant, it is much more likely to produce sales. Additionally, marketers also need to establish the value of advertising opportunities and assess the impact of the campaigns in order to optimise the message or the media being used.

Advertising models have evolved very significantly in recent years, especially with the new possibilities emerging from the web. However, audiences and the impact of campaigns can be expressed very differently depending on the supporting media, and thus multiple advertising models have emerged that address the specificities of each media. In this section, we analyse some of the most relevant models and what we can get from them that can be also applied to situated displays.

Television. Television is a media with solid and well established advertising models that have sustained and driven that industry for many years. Audience measurement is a high-profile activity strongly associated with the prestige of the TV shows. The measurement unit is the number of exposures by time unit, with the data being gathered through phone surveys, diaries or even dedicated audience metering devices that detect and communicate which channels are being watched. Advertisers want their adverts to be seen by as many people as possible, but they also want to optimise the process by focusing more on their main target groups. Therefore, audience data is complemented with demographic data about viewers, enabling audiences to be determined, not only as a global number, but also according to multiple demographic parameters such as gender, economic class, age and residential area [3]. As a result, the valuation of adverts also considers the type of viewers. As certain segments may be more valued than others, a larger audience does not necessarily correspond to a higher price. Impact assessment, albeit limited, is typically achieved through surveys on brand recall.

Static Displays. Static displays differ from the other media being analysed in that they are an example of a static medium. In static media it does not really matter when people are watching because the message always remains the same. Therefore, audience metering is mainly centred on determining venue traffic. Detailed data about traffic in specific areas can be obtained through people counters, small sensors that can count the number of people that walk through doors or some type of virtual gate, for example in a corridor. Even though this is not effective in determining how many persons are actually paying any attention to the display, it is still effective enough to establish a reasonable valuation model for this medium. More elaborate techniques may also consider display visibility and demographic data about visitors [4].

Web. The emergence of the web raised many challenges, but also immense opportunities for advertising. What clearly distinguishes the web from other media in this analysis is its inherently interactive nature, and the consequent ability to obtain rich information about user context and behaviour. As a user visits particular web sites or places search queries for particular keywords, these actions can be used to infer interest in particular topics and select appropriate adverts or sponsored links. These characteristics were first explored by Google AdWords and Google AdSense to address two fundamental issues that had previously undermined web advertising: The ability to establish a valuation for adverts and the ability to assess the impact of the selected adverts. The first issue involves determining which ads may be closer to the interests of the potential audience in order to target advertisements. Multiple alternatives have emerged that consider the geographic location, the context of the page being visited or some knowledge about user behaviour. The second issue involves assessing impact by determining which ads have actually managed to lead people into the desired action. In the web this is mostly achieved by measuring Click-Through Rates (CRT).

Social web networks have extended even further the immense possibilities of web advertising by enabling campaigns targeted at very refined user profiles. Campaigns are mainly centred on the demographics of users, which may include elements such as geography, age, job, company size or gender. In some cases, additional elements such as the history of social actions are also supported and the models are quickly evolving.

Despite being a relatively new medium, the web has now become a thriving environment for the emergence of new and sophisticated advertising models with implications that must also be considered in other digital media. The first is that exposure is no longer seen as the single or even the main element in determining the valuation of adverts. The focus has shifted from merely determining who receives the message towards measuring how many people were interested or even how many people actually bought something. This immediate feedback means that it is now possible to try many different strategies and evaluate on-line which ones are more effective. As a consequence, valuation models have also evolved from the traditional Pay per Impression, based on exposure, to models based on the achieved impact, such as the Pay per click (PPC) in which payment is determined by the number of clicks generated by the advert. The valuation of the clicks is typically determined by a bidding system, which enables media planning, i.e. determining where the advertisements are to be run, to be done automatically in order to optimise the value generated by the system to all the parties involved. The allocation algorithms allow adverts to be placed at the opportunities that maximize the generation of clicks and subject to the limitation of capital available for the campaign.

Another major characteristic of web advertising is that it can benefit both large traffic web sites as well as the small blog page. The PPC model and the automated media planning system have created the ground for open and automated campaigns in which any web site can benefit from advertising revenue and any campaign can reach any web site. A web site does not need to attract a high volume of traffic to be considered a relevant advertising medium. Through affiliate programs, even the smallest of sites can offer advertising opportunities and generate advertising revenue, as long as it performs well in attracting some niche segment.

Public Display networks. Like the web, public digital displays are also a digital media, but unlike the web, current market solutions do not provide the level of interactivity that could enable some of properties of web advertising to be explored for this media. While the revenue generated from advertising in these networks has been steadily increasing and the medium has been gaining the interest of marketers, there is still the perception that the respective advertising model needs to evolve in significant ways before public displays could be seen as a first class advertising medium.

Targeting in public displays can be partially achieved by negotiating advertising space for the campaign with the appropriate set of networks. Each public display network will have its own displays in particular locations, typically similar places, and therefore is able to reach viewers within the segments that characterise the frequency of those places. Also, some networks may be thematic, e.g. university campuses, and thus implicitly target specific segments. Additionally, there may also be some geographic segmentation, which can be inherent from the scope of the network or managed administratively in the case of larger networks.

The existence of multiple networks makes these negotiation processes very hard as they need to be conducted on a case-by-case basis and without any standard mechanisms to express advertising needs or opportunities. This problem is being addressed with the emergence of advertising aggregators, such as SeeSaw, BookingDOOH, Vukunet, Argo Digital Solution or AdCentricity, that can collect information on the advertising opportunities of multiple networks and provide a media planning service for matching advertisers with advertising opportunities across multiple networks. This is an important step towards enabling small networks to have access to the advertising market. In principle, the potential value offered by a single display as an advertising medium should not be dependent on whether that display is part of a large network or just a single display owned by a coffee shop. What makes the difference is that only with scale it can become viable to negotiate advertising contracts. These aggregators may facilitate this process and reduce the problem of scale, opening the path for solutions similar to the affiliate programs on the web.

Regarding audience measurement, public digital displays share some properties with static displays, namely the importance of venue traffic in characterising the potential audience. However, they also differ in that they are not always displaying the same content, and therefore audience metering techniques should consider, not only the aggregated traffic, but also the variations of that traffic through time. Furthermore, they can change what to display based on any criteria, including the varying population around the display. This opens the possibility for dynamic targeting, in which the targeting process is sensitive to the circumstances of what is happening at any particular time around the display.

The need to audit the potential impact of advertisements in public displays has led to a broad range of audience metering techniques that are able to determine how many people are near the display, how near or even inferring some type of characteristics about them. Several computer vision audience metering techniques for public displays are now in the market [5] [6]. They assume the existence of a video camera in the display, typically placed on the top and facing the audience. The images captured by the camera are analysed to detect faces and in some cases additional characteristics

about the viewers. These products can deliver reports about the number, attention span, gender and age of the viewers of a particular display, providing a dynamic description of people flow. Some of them include an adaptation process in which the advertisements can be selected based on the characteristics of the current audience. For privacy reasons, the techniques used do not normally involve any image recording. The images are processed and only the demographic information extracted from the image analysis is recorded. Also the process does not normally involve the identification of specific users. This is a limitation arising mainly from the potentially very large set of visitors, and may be overcome for smaller sets of regular visitors. However, the identification of individuals through image recognition raises considerably privacy issues, even if no images are ever recorded, and it is unclear to what extent it may be viable to use these techniques to associate the presence of the same person on different occasions.

The broad range of potential techniques and information models for audience metering in public displays has led the Out-of-Home Video Advertising Bureau (OVAB) to produce a guidelines document that describes the Average Unit Audience as “*the number and type of people exposed to the media vehicle with an opportunity to see a unit of time equal to the typical advertising unit*” [7]. These guidelines have a clear focus on what is normally called the Opportunity to See (OTS) and on three qualifying characteristics associated with that opportunity: Presence, Notice and Dwell time.

2.1 Analysis

Advertising models for public digital displays are far from being consolidated and the next years are likely to witness considerable change. Web advertising is clearly going to set the standard and the expectations of marketers regarding digital media advertising. We may compare the current situation of public displays as being similar to the web before the emergence of Google AdSense, when there was no reliable impact measurement and only large web sites had the necessary scale to have any relevance to serve as advertising media. This means that the search for effective targeting and audience measurement techniques is going to continue, and the same applies for increasingly open and efficient media planning mechanisms. However, there are inherent limitations to what can realistically be achieved with the current properties of the medium. While vision-based audience metering techniques are gaining considerable attention and entering mainstream, they may be lacking the ability to keep up with the evolution of the medium itself. They can be reasonably effective at measurement audiences, but they assume passive observers, in which the objective is to measure how many people have devoted any attention to adverts. The evolution towards more effective advertising models for public display is thus more likely to occur as part of the evolution of the medium itself towards pervasive networks of situated displays.

3 Situated Displays as an advertising medium

As the public display landscape evolves in terms of technology, scale and openness it will open many new opportunities for advertising models that explore the properties of that new medium. In particular, the ability to sense and support the interactions of people makes situated displays a whole new concept and a totally different medium when it comes to advertising. An interactive medium can provide many other opportunities for people to engage with public displays, to say something about themselves, implicitly or explicitly, and in the end drive the targeting process much more effectively and provide the ground for impact assessment. Appropriate advertising models are likely to borrow some of the concepts that have evolved in the web advertising market, but they will also have to address the many specific challenges associated with this medium.

In this section we discuss some of those challenges and specificities. We try to avoid very specific assumptions about particular technological characteristics of situated displays, but we do make two general assumptions. The first is that situated displays will enable a strong association between public displays and mobile technologies. This association creates new powerful ways to reach people, as they are personal, always on and permanently carried devices. They also enable many new forms of presence management and interaction, providing additional data for audience measurement based on the number, duration and nature of the interactions. Unlike simple audience metering techniques, the use of mobile technologies can give people a much more active role in the interaction process and enable much more effective forms of engagement and personalisation. Finally, they may also enable built-in fidelity programs, discount codes, vouchers or payment mechanisms that help to close the loop by facilitating sales and impact measurement. The second assumption is that public display networks will evolve towards increasingly open models in which multiple independent parties will be able to create automated collaboration models for content management and advertising. This will enable very small networks, or even single displays, to act as part of a larger virtual network in which their advertising opportunities can be matched and allocated to globally available adverts injected by advertising aggregators.

In the end, the solution may combine multiple advertising models, serving a variety of social, commercial and technical situations in which pervasive display advertisements may be used. While it is still early to envision what such models will be like, we can start to enumerate some of the properties we may want to consider: **Proximity-based.** Situated displays are part of a physical environment and therefore, even if they integrate an open and virtual network of display nodes, they have a connection with a specific location in space that is an integral part of what the display is. This means that not only geographic location, the type of venue, or the demographics of visitors should be considered, but also that there are other physical and social proximity elements that may be considered when establishing the valuation of adverts. For example, two places sharing a significant percentage of visitors may be targeted in an integrated way enabling the mutual exchange of adverts or providing the ground for Life Pattern Marketing approaches [8] in which the same message is reinforced by being present, even if slightly adapted, in the multiple locations that a

person may visit throughout the day. Also, nearby displays may act collectively to provide a consistent and strongly situated user experience, such as dynamic guidance services [9] that suggest directions to nearby businesses.

Place making. While web browsing is essentially an individual activity, public displays are part of a social and physical setting in which adverts are seen in a shared environment. An effective advertising model must acknowledge the role of public displays as place-making elements and give the people responsible for the place increased control over the nature of the adverts displayed. If those adverts are not aligned with the place values, practices or commercial strategies, their public presentation may become a source of embarrassment.

Presence and self-exposure. Recognising individual presences, and not just interaction, should also be an integral part of the adaptation process. While interaction may be rich and sophisticated, there will normally be many more people present than those who may be actively involved with the display at any given moment. A model for targeted advertising will be much more effective if it also supports some adaptation when there is no one interacting. Detecting presences, characterising those presences and being able to recognise the same entity across sessions are increasingly sophisticated levels of presence management that may depend on the underlying technologies. Additionally, controlled self-exposure in which a person is saying something about herself in order to influence the display is a complementary mechanism that may be crucial in leading people to express their preferences. In our research, we have explored the use of Bluetooth scanning and Bluetooth naming to support all these dimensions [10].

Generic Interaction traces. Situated displays are expected to support multiple forms of interaction. While these interactions may not be as rich as click-through patterns on the web, they are still a major step forward when compared with the idea that displays are just to be seen by passive observers. However, situated displays are likely to support multiple interaction modalities, from mobile technologies to touch-sensitive surfaces. A generic model for the digital traces generated from interaction events is needed in order to abstract away from these specificities and focus on modelling interests, regardless of how they are expressed. This will enable targeting processes to be applied across multiple display technologies with very diverse interaction modalities. In our research, we have been identifying the traces generated from multiple interaction modalities and they can be used for adaptation purposes [11].

Enhanced engagement. An effective model should also seek new forms of user engagement that promote audience characterisation through enhanced interaction and shared control of the display content. This may involve specific types of games, quizzes or polls, specifically designed to promote engagement in public displays, content pull or content push opportunities in which increased engagement is rewarded with increased influence of the display, or sponsored content in which adverts are associated with user-pull content.

Integration with adaptation processes: In situated displays, adaptation is not only for targeting adverts. Situated displays are expected to adapt their behaviour to the social context around them. This adaptive behaviour may include targeted advertising, but it should also extend to other generic forms of adaptation. Adaptive content will make the display more valuable to people, which will be more willing to express their

preferences to influence displayed content rather than displayed adverts. A global solution should combine these multiple dimensions of adaptation and avoid interferences between them.

Crowd targeting: Public display will typically have multiple simultaneous users and the adaptation process must consider the best strategy for dealing with the potentially varied interests expressed by those people. This generates a trade-off between the selection of adverts based on a profile combining the multiple interests of the multiple persons present and the selection based the use of each individual profile, one at the time [12]. The first is a balanced approach, but faces the risk of not really matching anyones' specific interests. The second can be very targeted for each individual, but it raises additional privacy issues and may conflict with the idea of public displays as place-making tools.

Actionables: Content on public displays is often some type of actionable, a message intended to cause people to act [13]. Reaction to actionables provides the most promising path for automated impact assessment. Actionables may take many forms depending on the interactive features available and the advertised services. Examples may include content download, coupons or discount codes for being redeemed at sale points. The challenge is to automate their detection in a way that enables them to become an integral part of the valuation model and ultimately lead to something similar to the pay-per-click concept.

Automated allocation: Automated allocation across multiple networks will be the culminating point of a full fledged advertising model and the last barrier towards a global and open market for advertising in public displays. Automating the full cycle requires a valuation model that automatically matches advertising opportunities, characterised by particular situations around specific displays, with potential advertising campaigns that aim to reach particular audiences at particular situations. Some models have been proposed for making this allocation [14][15], but the quickly evolving properties of the medium is continually generating new potential allocation attributes and thus the definition of an effective valuation model remains on-going work.

4 Conclusions

Advertising model for public displays are still very limited, especially when compared with the rich and sophisticated web advertising models that are now already part of the mainstream advertising industry. Situated displays and the emergence of open display networks are two trends that will necessarily re-shape the medium and will also open entirely new possibilities for advertising models in public display. Developing those models will have to consider the successful models from other media, but above all will have to consider the specificities of the new medium. We have discuss some of the properties that may become part of new advertising models for public display and expect to contribute for the discussion on how those models may evolve and be instantiated into specific public display technologies.

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