

going, technology-driven R&D projects, that we need to seriously address the fact that we are located in, and taking action from within, the School of Engineering, at a technical university, which is explicitly profiled towards designing, developing, managing and understanding applied and emerging technologies.

Discussion

In the introduction, we posed the question “*How can experiments and studies be designed, and results shared, such that both network traffic measuring and evaluation of user experiences retain their own paradigmatic validity and relevance, while fruitfully informing service design?*” This article is a first step in articulating part of a multi- and interdisciplinary dialogue which we need to continue and get deeper into, in order to achieve what we are aiming for in the project *Mapping Service Quality* – a merging and reworking of methods and models for measuring and exploring QoS, QoE and for service research and design. It is obvious, to the reader as well as to us, that we are writing from two very different research perspectives, and that, as yet, we have not been able to develop and present a shared framework, other than the general framework of the project itself. Problematizing the measuring of t in the SLA term $\Pr\{RT \leq t\}$, and contextualizing it relative to situated use and user perceptions of QoE, is a challenging beginning. However, a large part of the potential quality of this project, as we see it, lies in the active involvement of the Mapping Service Provider and the Municipality (in this case the customer/users). Together, they provide a practice-based touchstone for our theory-building, which we need to develop methods to make good use of. This practice-based knowledge and experience, we believe, will become more visible as we get further in to the project.

Conclusion

As we are still in the initial stages of both the multi- and interdisciplinary project *Mapping Service Quality* and the multi- and interdisciplinary dialogue around QoS, QoE and the emerging (at least for us) concept of contextual engineering, we feel it is too early to draw any serious conclusions. Let it suffice that we have raised, and hopefully also provoked, one or two serious questions across disciplinary boundaries.

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Advertising in Ubiquitous Media Environments

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Abstract. This paper address advertising in ubiquitous media environments by empirically discussing challenges suggested in previous research. We have performed 15 interviews, 4 workshops and 3 brainstorming sessions with publishers and advertisers. Our findings agree with previous research but also point out several additional challenging issues. We conclude by suggesting that the publishers are well suited to take on the role as pervasive service providers and identify four specific challenges related to that role: 1) How to develop models to produce and make use of consumer information dynamically over time in a ubiquitous media environment?; 2) How to adjust advertising to consumer preferences, i.e. advertising on consumer terms?; 3) In what ways can advertising be integrated with services/content adjusted to context? and 4) How to create an arena for building relations between consumers and advertisers as well as between advertisers?

Keywords. Ubiquitous media environment, advertising, challenges.

Introduction

Advertising is the most important revenue stream for media houses along with circulation fees. The ongoing convergence of technology and media (Lyytinen & Yoo, 2002) and changed media use patterns have influenced publishing at media houses, resulting in a ubiquitous media environment for publishing (Åkesson & Ihlström, 2006). Most media houses today publish in multiple channels, existing in a multitude of infrastructural environments, such as print, online, telecom and broadcasting etc. Moreover, they publish news around the clock available

anywhere and anytime in public places, homes as well as in individual pockets. Indeed, this ubiquitous media environment creates opportunities for new and innovative ways to advertise.

The ongoing trend of digitalization is of vital strategic importance for the media houses since they lately have experienced decreased circulation and advertisement revenues for their printed editions (The Economist, August 26, 2006), thereby being forced to find complementing revenue sources. The online banner sales has taken off during the last years, mostly benefiting the larger media houses with banner sales from well known brands, while smaller regional or local media companies still struggle to find their way into this market. However, mobile news services have not taken off as expected, they still only attract a small audience (Åkesson & Ihlström, 2007), and without a mass audience it is hard to attract advertisers to the mobile media (Ihlström, 2005).

Now, the media houses are on the doorstep of yet another digital media mobile innovation, the e-newspaper, i.e. a newspaper service published on e-paper technology, which has the potential of becoming very interesting for both publishers and advertisers. The e-paper technology is reflecting, giving the same reader experience as paper, such as high contrast (with 170 dpi) and the possibility to read in sunlight. Further, it is light weighted, thin and non-sensitive. Moreover, the e-paper device is uniquely identifiable making it is easier to target individuals with advertising. These benefits provide new opportunities for publishing mobile news services that provide both a quality reading experience and have the possibility of target audiences. The e-newspaper holds the potential of combining the readability and overview from the printed newspaper with the possibilities of online media such as constant updates, interactivity and video (Ihlström *et al.*, 2004). It is even predicted that the e-newspaper may replace the printed edition in the long run (Ihlström, 2005). As stated above, media houses are dependent on two customers, i.e. readers and advertisers to cover their cost of production and distribution. The potential replacement of the printed newspaper with the e-newspaper would dramatically reduce production and distribution costs for the media houses, making it an interesting prospect for the industry. However, to make this a reality it is of utmost importance to attract the advertisers to this new channel.

In the European DigiNews project we have paid attention to the production, distribution and consumption of the future e-newspaper. We have studied the perspectives of different stakeholders, e.g. publishers, readers and advertisers. In this paper we focus on publishers and advertisers view of advertising in ubiquitous media environments in general and in the e-newspaper in particular. The aim of this paper is to add to existing literature on advertising in ubiquitous information environments by empirically discussing challenges for ubiquitous advertising.

Theoretical Background

Constant development and introduction of new mobile technology, converging IT and media as well as integrated global infrastructures are trends that has led to a ubiquitous information environment. Ubiquitous information environments is a term describing services offered in a multitude of devices delivered in integrated infrastructures in mass scale (Lyytinen & Yoo, 2002). This ongoing development influence the emergence of new channels for media content (Lyytinen & Yoo, 2002). In the media sector, this has lead to the publishers of today are organized as media-houses publishing in a multiple channels such as print, online, telecom and broadcasting, i.e. in an ubiquitous media environment (Åkesson & Ihlström, 2006). In this environment, advertising in mobile channels, such as the e-newspaper, is an important part of the business.

Mobile advertising or m-advertising has lately attracted researchers interest. For studying m-advertisement Salo and Tähtinen (2005) suggest a framework (see Figure 1) that describe influencing factors relating to mobil media and consumers goals in using a mobile devices. They state that advertising in mobile media should differ from traditional advertising since that is related to targeting groups. As mobile media is more personal, advertising in mobile media benefits from being targeted at individuals rather than on target groups, even though this might require permission in some countries. For the consumers to give permission, advertisements need to meet their requirements.

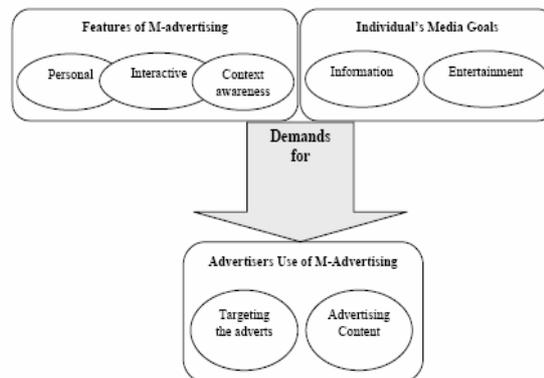


Figure 1. The factors influencing the success of m-advertising (Salo & Tähtinen, 2005, p. 4)

As can be seen in Figure 1, m-advertising is personal, interactive and context related fitting with the consumers individual media goals, thereby putting demands on advertiser decisions about advert targeting and content. To make use of the fact that mobile devices are highly personal, together with the possibilities of contextual adaptation and thereby targeted advertising content and interactivity, are expected to add value to advertisers. This means that the right individuals will be targeted, at the right time and place with matched advertising

content on which the targeted individual can react, creates a more intimate relation, closer to a personal meeting (Ranganathan & Campbell, 2004).

In a study aiming at determining the key influencing factors for m-advertisement value, content characteristics, frequency of exposure, and consumer characteristics (see Figure 2) were explored (Haghirian *et al.*, 2005).

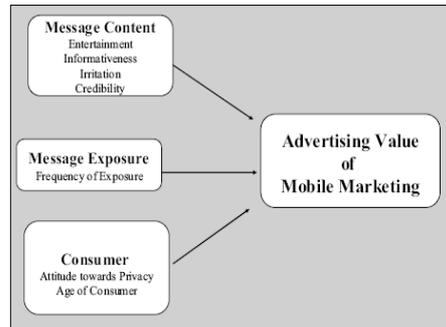


Figure 2. Advertising Value Model for Mobile Advertising (Haghirian *et al.*, 2005, p. 4)

The study showed that perceived value is strongly related to the content and frequency of the advertisement. The consumer profile, such as age, proved to be of less importance for how advertising value is perceived.

Another study, by Xu and Teo (2005) indicate that consumers have more expectations on entertainment value than on information value of mobile advertisement. Further, this study suggests that privacy issues are important for acceptance of mobile advertisement.

Two elements in m-advertising were identified by Komulainen *et al.* (2006), i.e. the mobile channel and the content of an ad, in a study addressing consumers as well as advertisers. Their findings are summarized in Figure 3 below.

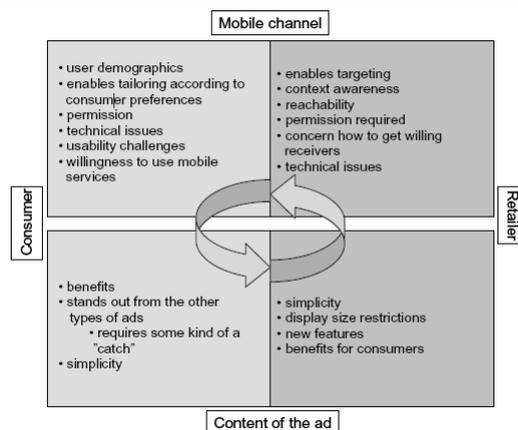


Figure 3. Relation between mobile media and ad content (Komulainen *et al.*, 2006, p. 6)

From the consumer perspective, the mobile channel offers tailoring possibilities of advertisement according to individual preferences. Consumer demographics, usability and technical issues, and willingness to use mobile services have influence on m-commerce.

Ranganathan and Campbell (2002) discuss the challenges in pervasive computing environments to be related to the intimacy with the consumers. In this paper we do not differ between the terms pervasive and ubiquitous environments. Advertising in such environments allow targeting of consumers, timing of delivery of ads in suitable ways. This offers new opportunity to advertising but it is also challenging to balance the interests of the consumers with the interests of the advertisers. Ranganathan and Campbell (2002) outline seven issues to address for advertising in pervasive environments:

- Reaching the right people with the right ads
- Delivering ads at the right time
- Delivering ads in the best way
- Serendipitous advertising
- Providing a means for users to follow up on the ad
- How should advertising revenue be collected in a pervasive environment?
- Privacy and Security

The first challenge is to match consumer needs with advertiser offerings and the second is about delivering ads at the consumer's convenience. The third regards how to deliver the ad given the decided target group and timing. The fourth challenge deals with how to catch the interest of people that did not know of for example a product. The fifth relates to the consumers possibility to react on an ad to get more information or to buy the product or service, but also to indicate that they do not wish to receive any more ads from that company. The sixth challenge is about what models that are suitable for collecting advertising revenue, for example by number of clicks in an interactive environment or number of times an ad is shown. Finally, the seventh challenge is about how to balance the need for personal information and privacy as well as security issues.

In their visioning Ranganathan and Campbell (2002) suggest solutions that may overcome these challenges. They discuss how a pervasive service provider, i.e. a service provider reaching a variety of locations (e.g. homes, offices, parks, cities) in a variety of ways (e.g. computers, billboards, TV, mobile phones), containing commerce, payment services, advertising services etc. In this paper we are arguing that newspaper publishers could take such a role in the future as they are intensely deploying their presence in ubiquitous media environments and new ways of providing services and doing business. In the following the suggested solutions to the seven challenges is described and compared to related literature.

For overcoming these challenges a middleware solution is discussed, with capability to transform different data formats to be suitable on the device it is going to be presented on. If this is supported, new types of ads can be developed making use of several interfaces and formats (e.g. sound, video, touch panels etc.).

The right people can be targeted by consumers indicating their preferences, requesting or prioritizing ads, which also have been pointed out by Salo and Tähtinen, (2005). This can also be done based on behavior, for example based on what people are buying. Detection of behavior such as staying late at the office, could render ads on late night food delivery. In short, this is about discovering consumer's intent. Tailoring ads is one way of getting closer to users (Komulainen *et al.*, 2006).

Based on context information, the best possible time and way to deliver an ad can be determined. Such context information may be based on location, time of day, the company of the consumer, the consumers schedule etc. Context awareness is an important part of m-advertising (Salo and Tähtinen, 2005; Komulainen *et al.*, 2006).

The best is to reach the consumer when free enough to follow up on the ad, still not too annoying for the consumer. It is important that there is a fit with the consumer's individual goals (Salo and Tähtinen, 2005).

In this environment, serendipitous ads could fit well with peripheral displays that people walk by or elevators etc. Adapting message content (Haghirian, *et al.*, 2005) and catching content of ads (Komulainen *et al.*, 2006) help create serendipitous ads in ubiquitous information environments.

There needs to be a good interface for consumers to follow up on an ad, e.g. to request for more information, for personal contact or even for buying the product at hand, independently of how or when they were reached by the ad. Interactivity is part of a successful m-advertising model (Salo and Tähtinen, 2005). This includes being able to react negatively on an ad.

The advertising model described is pushing ads to the consumer and therefore privacy is very critical issue. Information about how and when an individual was reached should not be revealed to the advertiser from the pervasive service provider. Further consumers should be able to decide if and how much advertising they are willing to receive. A service provider should collect consumers permissions (Salo and Tähtinen, 2005; Komulainen *et al.*, 2006). For example, a consumer or group of consumers may want to block ads on certain times or in certain situations.

In this kind of environment, advertisers could not be guaranteed time or space for their ads. Consequently, collecting revenues for ads is a bit tricky. The authors picture several criteria for advertising fees e.g. consumer request, guesses of interest, serendipity, kind of media and format. Consumer's willingness and when

and where they want to be reachable for advertising content can be other alternatives (Komulainen *et al.*, 2006).

These challenges and solutions in a pervasive information environment by Ranganathan and Campbell (2002) are related to concepts in the models described above. In Table 1, a summary of these relations is presented.

Challenges described by Ranganathan and Campbell (2002)	Suggested solutions by Ranganathan and Campbell (2002)	Related concepts from other studies
Reaching the right people with the right ads	Platform for transformation of formats Discover user intent (based on interest and behavior)	Targeting (Salo & Tähtinen, 2005) Tailoring (Komulainen <i>et al.</i> , 2006)
Delivering ads at the right time	When users are free enough to act on an ad (based on context information)	Fit with individual media goals (Salo & Tähtinen, 2005) Context awareness (Salo & Tähtinen, 2005; Komulainen <i>et al.</i> , 2006) Message exposure (Haghirian <i>et al.</i> , 2005)
Delivering ads in the right way	Where the user is going (based on context information)	Technical issues (Komulainen <i>et al.</i> , 2006) Context awareness (Salo & Tähtinen, 2005; Komulainen <i>et al.</i> , 2006)
Serendipitous advertising	In the users surrounding (large peripheral displays, sound in the elevator etc)	Message content (Haghirian <i>et al.</i> , 2005) Ad catch (Komulainen <i>et al.</i> , 2006)
Providing a means for users to follow up on the ad	With any device, any where at any time	Interactive (Salo & Tähtinen, 2005)
How should advertising revenue be collected in a pervasive environment?	Develop new criteria for advertising fees e.g. user request, guesses of interest, serendipity, kind of media and format	Reachability (Komulainen <i>et al.</i> , 2006) Willing receivers (Komulainen <i>et al.</i> , 2006)
Privacy and Security	User discretion User control	Personal (Salo & Tähtinen, 2005) Permission (Salo & Tähtinen, 2005; Komulainen <i>et al.</i> , 2006) Consumer attitudes (Haghirian <i>et al.</i> , 2005)

Table 1. Summary of challenges, suggested solutions and related concepts

In the following, we are empirically addressing these challenges with the views of publishers and advertisers.

Method

This research took place within the DigiNews project, a two-year collaborative research project, including several major technology firms, media houses and universities across Europe, which ended mid-year 2006. The overall goal of the project was to explore research and development issues for an electronic newspaper of the future. Our part of the project was to study the design of and business models for the e-newspaper and this paper focus on advertising which is one important aspect for building a successful business model.

This research can be classified as qualitative Information Systems research (Orlikowski & Baroudi, 1991) in that it is orientated towards people's assumptions, knowledge, and experience of newspaper media. In particular, the newspaper representatives and advertisers opinions of new ways of advertising were of interest.

Different types of data collection methods have been used (see Table 2). We have interviewed 13 newspaper representatives, performed 1 workshop with 7 publisher representatives and 3 brainstorming sessions with the projects Swedish steering group (consisting of representatives from the Swedish Newspaper Publishers' Association and eight Swedish newspaper managers). Furthermore, we have performed two interviews and three workshops with advertisers.

	Interviews	Workshops	Brainstorming sessions
Publishers	13	1	3
Advertisers	2	3	-

Table 2. Data collection activities

Interviews

All publisher respondents had key functions within each media house, e.g. editor-in-chiefs, managers, or designers. These interviews covered topics related to the scope of the project, such as organization, technology, business models, advertising, new services and design, however the reporting in this paper is limited to advertising issues for ubiquitous media environments in general and in the e-newspaper in particular. The advertisers selected for interviews were obtained by recommendations from other advertisers during the workshops described below, and the aim with these two interviews was to get a clearer view of advertising market, strategies, and their view of the e-newspaper potential.

These 13 interviews with publishers were about 60-90 minutes long and followed a semi-structured interview guide, aiming at consistency between the sites and interviewees. While allowing individual perspectives to emerge, the

interview guide provided a systematic way of delimiting topics discussed in the interview (Patton, 2002). The 2 interviews with advertisers were 1 and 3 hours long and were conducted as a conversation with only a few themes regarding advertising in digital media and in e-newspaper to cover in depth. All interviews were all recorded and later transcribed by a professional audio typist.

Workshops

The advertisers selected for the workshops represented three different segments of the industry, i.e. local retailers, national retailers and well-known brands. Each workshop focused one of the segments in order to get a rich picture of issues related to advertising in ubiquitous media environments in general and in the e-newspaper particular. The Swedish Newspaper Publishers' Association helped us to arrange the workshop with advertisers from well-known brands, while two of the participating newspapers helped arranging the other two workshops. All these workshops had four participants.

We started by presenting e-paper technology and initial prototypes of e-newspapers made within the project. Thereafter we discussed the situation for the segment present in relation to print and digital media as well as the competition at hand. Thereafter we had a discussion building on themes, such as digital advertising in general, added value with and demands on the e-paper, size, day-parting, contextual advertising, personalization, interactivity etc.

The workshop with newspaper representatives was performed last. 7 representatives from 6 media houses participated and the workshop lasted 2 hours. At this stage we have found the challenges from Ranganathan and Campbells (2002) research and during this workshop all these challenges were discussed.

The workshops lasted three hours and were led by one of the authors of this paper. At each workshop another member of the research group was present to take notes and to make sure that no important subject was overseen. The workshops were all recorded and later transcribed by a professional audio typist.

Brainstorming sessions

The brainstorming sessions with the projects Swedish steering group were all conducted at the premises of the Swedish Newspaper Publishers' Association and lasted between two to three hours. One of the authors acted as moderator during these sessions. These brainstorming sessions mainly focused on discussing viable business models in digital media with a specific focus on the e-newspaper. Advertising was one of the themes covered in all sessions. The second session

started with a summarization of the first and so on. All sessions was recorded and later transcribed by a professional audio typist.

Data analysis

The transcriptions from the interviews, workshops and brainstorming sessions were carefully corrected by the authors, and were then coded and sorted according to the seven challenges described by Ranganathan and Campbell (2002) with the use of a clustering technique (Miles & Huberman, 1994). One of the authors started the initial clustering by sorting out all available input from the transcriptions into the seven challenges. Thereafter all three individually analysed each challenge separately before taking a joint discussion in order to reach consensus about relevant issues regarding each challenge. In the following chapter we present our findings according to these challenges.

Findings

In this section we present the findings in relation to each of the seven challenges by Ranganathan and Campbell (2002). We start by presenting the general findings and continue with e-newspaper specific findings under each sub-heading.

Reaching the right people with the right ads

The most central aspect related to this challenge is consumer's interest. Reaching the right people with the right ads is about consumer analysis; it is about knowing who is interested of what, also including demographical and geographical aspects. Targeting is the term most used to describe what can be achieved in a ubiquitous media environment. Knowledge about consumers is the key for targeting. One part of this challenge is to get closer to peoples sphere of interest as illustrated by this quote:

"One exiting thing nowadays is to look at communities. It's like a view into a dollhouse. It's almost like buying rink publicity in an ice hockey game. We are trying to get inside the bubble of people, into their sphere of interest." (Advertiser)

Another central aspect discussed in relation to this challenge is advertising based on consumer behavior. The respondents give the search-based advertising as an example of a successful model. This model reaches people when they are searching for something on for example Google, reaching people with what they are interested in when they are looking for it, as illustrated in the following:

"That is why the search advertising is working very well, with Google ads. You hit the one who is searching. That is targeting on users own terms." (Publisher)

The publishers in this study discuss the search based model to be a critical challenge for them. The reason given is that this model requires large traffic volumes, larger than they have. Coordinating solutions within the industry an approach that the think may help, can be seen in this quote:

“The search model requires huge volumes. Not even Aftonbladet.se has volumes enough for this. Maybe this could be a possibility if we can coordinate our efforts between the newspapers. In the future we will see more behavioral advertising. What you do decides what ads you get.” (Publisher)

Situation-based advertising is another aspect of this challenge. The respondents discuss this to be an important model that can be further developed in ubiquitous media environments. Targeting on a situation, like when you are looking for a house to buy is a well working model. Everybody wanting to buy or sell a house is interested. The mass-market model is not selective enough since it also reaches people that are not interested and thereby get annoyed as illustrated with the following quote:

“The most irritating advertisements are those that are not targeted, i.e. mass marketing and spam. Of course, it’s not fun to receive ads from Via and Pampers if you aren’t interested.” (Advertiser)

The advertisers want to “*shoot with an air gun instead of a shut gun*” to avoid this irritation and thereby being rejected. The challenge for publishers is thereby to find sustainable models for selection in ubiquitous media environments.

Regarding the e-newspaper, the personalization possibilities due to the unique ID of the devices create an increased interest from the advertisers, e.g. to only reach all readers that live in a certain area, own their houses or have small children. This is of course dependent on the consumer’s willingness to share personal information and preferences.

Delivering ads at the right time

This challenge is all about timing. While the first challenge was about who is interested – this is about when they are interested. As expressed by one of the publishers:

“That is the Google model – when the user is there – when they are searching for something – and not when we think they want it. That is to say it is on the users conditions – that is really timing!”

Ads also need to be relevant to the consumer context. For example, if an information service with integrated ads is used, the ads need to be relevant to the content, e.g. in a service about food and cooking, ads can be about food, kitchen utilities, kitchens, dining furniture, but not about drilling machines.

Relevance is also about timing, not only time of day but also about holidays and vacation times, i.e. seasoning. One of the publishers has put together a special calendar for their advertisers to give their advertisers new ideas about timing. The

calendar shows everything from Christmas to Ramadan, mother's day to world peace day etc.

Time of day is of course also relevant, e.g. ads about lunch menus are not very interesting after 2 pm. The publishers find day-parting interesting but think that it is difficult to get the advertisers to see that:

"You could for example imagine that an ad would change its appearance during the day. That one customer has bought the space for the morning hours and another for the evening hours etc. Or that the same ad changes, a morning edition, afternoon and evening edition of the ad. For example a restaurant should be able to see the value in that. But no one has ever asked for something like that. On the web for example – we should be able to use "prime-time" like in the TV-model, in print it is the way it is". (Publisher)

The advertisers found it essential to reach the right reader at the right moment and in the right mood. One advertiser that represents cosmetics and perfumes argued the importance of reaching their target group, i.e. women in a particular age and with specific interests, at the right time and in the right mood, advertising in magazines:

"It's like a reward to your self when the children have gone to bed and are sleeping. The highlight of the day. Then you have a more emotional communication and an editorial environment that fits into cosmetics. It's a completely different environment for reading when you read the morning paper at breakfast or evening paper on the way home from work." (Advertiser)

Regarding the e-newspaper the publishers agree that contextual ads, e.g. Nike on the sports section should be supported as well as the classifieds. It should also be possible to have surround session like in the New York Times where you always have ads according to your profile following you throughout the whole e-newspaper.

Delivering ads in the best way

The publishers think that this is a problematic challenge, it is about the message and its impact provided by the media. They have just learned how to work with the web and are fumbling carefully with other channels. As one publisher said:

"We are very bad at using the strengths from each channel the best way and combine them for best effect. We should be able to use the fact that we have many channels as a huge advantage. But we do not do that today."

In the best of worlds, from a publisher view, one would start with the advertiser consumer needs and customize a solution that meet this need in the best way, using all possible channels. However, the publishers think that the average advertiser customer is not ready for this, illustrated by the following quotation:

“The small local advertisers want the same space and ad week after week. It is very difficult to communicate new or alternative ideas to them, especially ads in new channels let alone with multiple channels.” (Publisher)

Nonetheless, even though the publishers have packages they find it very difficult to customize, which requires resources that they do not have. There are several reasons for this, e.g.

a) finding someone who can coordinate and make sure the customer only get one invoice. If a customer wants a multi-channel ad campaign it is important that they only meet with one salesman and not different persons for each channel.

b) modifying advertising systems that are specialized for the printed newspaper. According to the publishers there is a huge challenge in integrating systems to make them work smoothly.

c) changing they way how people in the organization think. *“This is curial and we have experienced very good investments in systems failing because we did not manage to get people to rethink. If we cannot make people think in new ways system finesse will do no good.”* (Publisher)

The advertisers agree that it depends on the message one needs to send.

“There are no specific places but depends on the message we are about to send. We try to get a way from the product thinking and more and more go towards talking about customer benefit” (Advertiser)

Even though consumers may want to avoid ads, the multi-channel approach works in the favor of the advertisers. One of the advertisers expressed:

“Nobody can avoid advertising. Then we only say: how are we going to reach this customer in another way? The company will talk to the consumers anyway. We will have to find other ways. Shore, we can try to sort and control as a consumer, but Pampers will not give up on parents of small children just because they have rejected advertising.”

According to the advertisers advertisements can be divided into three headlines: exposure, relationship and transaction. Regards to the e-newspaper it is exposure that applies, according to the publishers:

“It is exposure that applies, and then the advertisement can tell where I can get more information.”

Another possibility with the e-newspaper is to allow the consumers to only buy specific newspaper parts, e.g. the sport section, and thereby bundling advertisement with this section. In addition, subscribing to ads of special interests was discussed as an opportunity with the e-newspaper because of the unique ID of the device.

Serendipitous advertising

The publishers think this is about a certain type of advertising, like the commercial model from TV or radio. The type of advertising that sinks

unconsciously into people's minds. The challenge is to balance so it does not annoy or irritate people, to interrupt without being disturbing. As one of the publishers said:

"The key is to interrupt in a way that catches curiosity."

This type of advertising is difficult to attach to a search or behavior based advertising model according to the publishers, as people do actively choose NOT to see ads and commercials.

"It is a delicate balance between advertising and disturbance, between surprise and irritate. If people are irritated they think SPAM – that does not work." (Publisher)

On the other hand, this type of advertisement has the potential to engage consumers:

"There is much of the commercial information that in some way engages us. In that there is aha experience, which makes us respond" (Advertiser)

Some ideas about the e-newspaper regarded this type of advertisement:

"Perhaps an advertisement can be a motion snippet between two articles? But not in the middle of an article, it should not disturb the reading experience." (Publisher)

Providing a means for users to follow up on the ad

The publishers regard feedback and interactivity as important and that they are getting better at that:

"Before, it used to be an ad in the printed newspaper and a phone number. Today, big advertisers have a branding ad in the newspaper and a reference to their own web site that may be very advanced and offers a lot more than we can help them with."

Chat sessions with experts, was given as an example of how to manage this challenges with smaller advertisers. It often attracts many people, not only those with questions, there were also many just viewing.

The publishers agreed that the mobile phone is very good for this purpose as it is much more direct. But they worried about the competition of the mobile operators:

"We have to consider how not to be by passed, how do we make sure that there is a value in going through us when advertising?"

The advertisers work hard to find ways of serendipitous advertising for attracting audience. As one of the advertisers expressed:

"The extension is to use our own website to create a relationship. Customer databases, conduct a dialog, find out more, etc, and then the initial contact is just a way to catch people." (Advertiser)

The e-newspaper creates a new arena for advertisements. For example, as suggested by publishers it would be possible to create a special "room" for the

advertiser. By clicking on an ad you arrive to the advertiser room where additional information could be published, e.g. a product catalogue. In this way the reader does not leave the e-newspaper as they might do if the click on a banner on the web. This is thought of as a new way of business:

“One could also commercialize electronic paper in the way that the advertiser could have more information space and pay us more for that. My vision is that one should be able to click on a piece of clothing and be able to see it in all available colors.” (Publisher)

According to the advertisers, the e-newspaper could provide a way of “legal lying”, i.e. presenting only a mobile phone in the ad, encouraging the reader to click on it, and when clicking the reader is presented with the legal details that usually are presented in a very small size. Games or other interactivity could also be used to attract readers, which is illustrated in the following quotation:

“The ads will change due to interactive possibilities, to get direct feedback. There will be more targeted advertisements. One will know so much more about ones subscribers.” (Advertiser)

How should advertising revenue be collected in a pervasive environment?

There must be different models for different channels according to the publishers. In paper size and placement decide the price. On the web there are a few different models like size and placement, number of clicks, period of time etc. In mobile channels they are still experimenting in a trial and error phase. They find it very challenging to stitch this together over multiple channels. It is of importance to measure how many that sees an ad, how many that is interested in an ad and how many that act on it, as this is valuable information:

“We really need to develop our methods for how to measure to produce targeting and tracing information. We really need to develop such techniques for the future. This is really a huge challenge and maybe the most important one because then we can communicate what we are selling to the advertisers.”

More direct targeting of individuals will probably increase the revenues:

“I think we will charge considerably a lot more from the advertisers. They can get more information into their advertisements and eventually even get in a motion picture. Then you can use customer databases and direct more and get more out of the advertisement for those who really want it. You can use all 18-year old in Mjölby, who shop at JC. They don't need to buy jeans advertisement to a 97-year old. They just pay for the effect. Today they shoot with a shot-gun” (Publicist)

However, this discussion has to be continued with the advertisers. This is illustrated with a quotation from one of the smaller advertisers:

"No, I have heard that about guarantees before. I don't want to know how many that has read my advertisement, I want to sell! The cash register is the best measurement."

Most advertisers and publishers agree on the importance of being able to show reach. By taking advantages of the unique ID of the e-paper device and by incorporating measurement possibilities in the e-paper device, both publishers and advertisers could benefit.

Privacy and Security

There are legislations concerning advertising which is different in different countries, but the media firms have this competence. According to the publishers privacy is much more important in the mobile channel since the devices are personal. With the printed paper a mass-audience is reached as well as online. The mobile phone is not a mass-medium, it is personal.

"You can compare it to your mailbox. It is personal and for example a SMS is sent to your individual number. But now browsing with the mobile is becoming a habit and then it is not as personal. In the browser you are in a public space." (Publisher)

Both advertisers and publishers agree that this issue needs to be addressed. Regarding the possibility of personalized ads in the e-newspaper the following quotations illustrate that it has to be on the terms of the user:

"Yes, if I have given my permission. But I don't want them to know that I'm in New York." (Advertiser – regarding offering of last minute tickets based on location)

"It's a little scary if you do not order that service by yourself. Shouldn't you be at work when the shop send a SMS when you passed by." (Publicist – regarding position based ads).

The publishers discuss that consumers may want to block advertising and consider if this should be allowed in the e-newspaper for a higher fee.

Discussion and Conclusion

The aim of this paper was to empirically discuss challenges for ubiquitous advertising. We have done that by applying the seven challenges discussed by Ranganathan and Campbell (2002) to the empirical material. We start by summarizing the findings for each challenge in Table 3. We continue by discussing what the introduction of the e-newspaper brings to advertising in ubiquitous media environment. Finally, we identify four specific challenges for the publishers acting as pervasive service providers.

Challenges	Main topics	Models
Reaching the right people with the right ads	Targeting - consumer analysis - who is interested in what	Demographic Geographic Behavioral (search) Situational
Delivering ads at the right time	Relevance - when the users want it Contextuality	Day-parting Seasoning
Delivering ads in the right way	Message Impact Contextuality	Bundling Customization
Serendipitous advertising	Balance	Interrupt but not disturb Push (scale from print to (commercials))
Providing a means for users to follow up on the ad	Feedback and interactivity	<i>Traditional</i> , such as SMS, URL, chat, phone number <i>New</i> , such as subscription, and direct sales
How should advertising revenue be collected in a pervasive environment?	Tracing	<i>Traditional</i> , such as size, place, click rate, period of time <i>New</i> , based on user behavior
Privacy and Security	Personal vs. Public sphere	Personalization on user terms Allowing blocking based on payment

Table 3. Empirical solution models for the suggested challenges

The main topics and possible models for advertising derived from the empirical material are summarized in Table 3. For the most part, the findings from the empirical activities correspond with the discussion of challenges and solutions by Ranganathan and Campbell (2002). However, in our findings there are some additional aspects that were emphasized. *First*, the challenge of analyzing consumer behavior and preferences was stressed as a prerequisite for targeted advertising. Both advertisers and publishers need to know more about the consumers and how make use of this information. *Second*, in addition to context information related to the individual consumer the empirical findings show that timing is also about cultural context. Day-parting and seasoning are two ways of adapting advertising to handle this. *Third*, the respondents underlined the importance of selecting channel or combinations of channels based on the potential impact of the advertising message. *Fourth*, to succeed with serendipitous advertising it is essential to find a balance between interrupting and disturbing as the tolerance among consumers is decreasing. *Fifth*, the publishers see the potential of taking an intermediary role, providing an interface between advertisers and consumers, thereby creating the means for feedback and interactivity. *Sixth*, the respondents stress the importance of discussing tracing related to each channel and finding ways to integrate several models for revenue collection. *Finally*, the choice of channel influence privacy issues. The