

## Designing Ubiquitous Media Services - Exploring the Two-Sided Market of Newspapers

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### Abstract

The two-sided market of newspapers with its two customer groups, readers and advertisers, is changing due to digitalization. This former stable and profitable market has lately suffered from both decreasing subscription and advertiser revenue. In this paper we use the term ubiquitous media environments to represent the vision of future media environments enabling device independent mass-scale distribution of ubiquitous media services in integrated infrastructures. We build upon a two-year action research project where researchers worked together with the Swedish newspaper industry to envision future ubiquitous media services and explore the following research question: how can ubiquitous media services be designed to leverage and balance value in a two-sided market? Five examples of ubiquitous media services were developed in collaboration and thereafter evaluated. These services were then illustrated in movie clips to trigger discussions on how ubiquitous media services can be designed. Drawing on the value aspects of ubiquitous media services from an advertiser and reader point-of-view and the platform owner role of the newspapers in a future ubiquitous media environments, we describe and discuss how ubiquitous media services can be designed to leverage value for advertisers and readers, and how newspaper organizations can strategize ubiquitous media environments.

**Keywords:** Ubiquitous media services, Design, Digital platform, Two-sided markets, Newspapers

## 1 Introduction

Given the ongoing diffusion of laptops, tablets, phablets, smart phones and watches, as well as the advent of new service and platform providers, such as Google, Facebook and Apple, the media ecosystem is rapidly changing. These changes challenge traditional media organizations such as newspapers in several ways. First, the ongoing convergence of different information and communication technologies trigger the emergence of new channels for media content [30]. Second, nowadays the mainstream consumer possesses a range of different computing devices, and is thereby changing their use patterns and behaviors [27]. Third, the media industry converges and the boundaries between different media domains are becoming blurred [37], [42].

These ongoing changes in the media ecosystem started some 20 years ago. Since the introduction of online newspapers in the mid-1990s, the consumption of news in people's everyday lives has undergone a significant change [5], [6] and the fundamental business of printed newspapers has been challenged to its core [10], [37]. Newspaper markets are two-sided with both reader and advertiser customers [39]. Arguably, the change in reader and advertiser behavior enabled by new digital technology, as well as new players on the market, has brought important consequences for the newspaper industry. One major challenge facing the industry has been to innovate profitable digital news services in which consumers are willing to pay for content, as the subscriptions of the printed newspapers is constantly decreasing. Another challenge has been to gain the advertiser market's acceptance of new digital channels, as the advertisement revenue in print is rapidly declining. Furthermore, social media actors, such as Facebook, Twitter and Snapchat, as well as platform providers such as Google, Apple, and Microsoft, are aggregating or publishing news content themselves. As such, these new actors are competing with traditional media companies for advertising revenue. A third challenge has been to cope with the high costs of maintaining parallel channels of production and distribution of both printed text and digital media. An inability to face these challenges has severe consequences for newspaper organizations, something that has become evident the last few years for the newspaper industry as legacy news companies file for bankruptcy.

To meet these challenges newspaper organizations are exploring new opportunities in digital media [52]. There is however uncertainty of readers' and advertisers' perceptions of value in the new evolving media ecosystem. To capture value in digital media ecosystems, newspaper organizations need to understand and define how their intermediary role in the two-sided market changes, and what defines reader and advertiser values. Furthermore, the technological complexity of the infrastructure and platform needs to be understood in relation to the two-sided markets of newspapers.

One lens to understand the complex technological evolution is the notion of ubiquitous information environments [30]. In ubiquitous information environments, digital technology is embedded in our every-day movements and interactions, wherever and whenever usage situations might occur. Services in an ubiquitous information environment are distributed independently of devices or distribution channels, and are adapted to user context, see e.g. [1], [13], [51]. Access is provided cross this variety of channels, allowing users to interact fluidly with the services [8]. This is enabled by the underlying layered modular architecture of digital infrastructures that separate devices, distribution, services and content [50]. Media services in ubiquitous information environments today, such as iTunes, Rhapsody and Spotify, are organized in digital platforms [25]. These digital platforms are complex socio-technical systems of two-sided markets, digital resources and organizations with common interest in the platform.

In this paper we draw on literature on ubiquitous information environments and two-sided markets to explore how ubiquitous media services can be designed to leverage value in the two-sided market of newspapers. While there is a large body of literature addressing specific mobile services or ubiquitous applications, there is less literature providing empirically grounded and holistic descriptions capturing the complexity of ubiquitous information environments, see e.g. [45], [50], and two-sided markets in digital media ecosystems, see e.g. [16], [39]. We meet this void in literature with an action research approach to newspaper organizations' exploration of a future ubiquitous media environment (UME). We build upon a research project where researchers together with the Swedish newspaper industry envisioned future ubiquitous media services to explore the following research question: *how can ubiquitous media services be designed to leverage and balance value in a two-sided market?* Five examples of ubiquitous media services (UMS) were developed as concepts and demonstrators in a collaborative way involving researchers, newspaper organizations, advertisers, and readers. These services were prototyped and illustrated in movie clips that portray future scenarios in order to trigger discussions on how ubiquitous media services can be designed.

The remainder of the paper is structured as follows. First, we provide a literature background on ubiquitous information environments and two-sided markets. This is followed by a methodology section that describes the action research approach, the data collection and analysis. Then, we present our findings into four parts; a) visualizing the UMS and UME, b) the platform provider perspective, c) the perspectives of the two market sides and d) a synthesized description of an UME. In the following section we conclude the paper by discussing the design and strategical implications of an UME in the newspaper industry.

## 2 Literature Review

Newspapers as we know them today have been printed on paper since the beginning of the 17th century. This industry has been well established as a two-sided market with the two customer groups of readers and advertisers, and has been very profitable over time compared to other industries [35]. However, during the latest decades, newspapers all over the world are suffering from decreasing print circulation and declining advertising revenues as readers and advertisers are turning to digital media [8], [35]. Newspapers have responded to this trend by providing services on the Internet since the mid-1990s [20], on mobile phone platforms since the end of the 1990s [5], and lately also in social media. However, newspapers have experienced difficulties in keeping their traditional role as platform provider (in the analogue world) when exploring the digital ecosystem, since their two customer sides are changing behavior [21], [22], [45], and new actors are challenging the platform provider position.

The evolution towards ubiquitous media through constant introduction of new digital technology, increased mobility, changing media consumption and advertising patterns, as well as digital convergence are changes that radically challenge the newspaper industry [12], [36]. These changes are, for example, mirrored in decreasing print newspaper circulation and the radical increase in mobile news consumption, and in advertisers turning to digital media as they have need for more targeted and accurate advertising [53].

### 2.1 Ubiquitous Information Environments

In 1991 at Xerox PARC's Computer Science Lab, Mark Weiser envisioned a ubiquitous computing environment where information technology is naturally embedded in the physical and social interactions of our daily lives [49]. Some ten years later IS scholars were inspired by these visions of ubiquitous computing and started to discuss a new technological era to follow the era of personal and stationary computing, see e.g. [30], [44], [47], [51]. This literature conceptualizes seamless availability of services independent of time and place, ingrained in social and professional life enabled by the advanced development of mobile and interactive technologies, converging network technologies and new media applications.

In IS literature, ubiquitous information environments have been characterized as heterogeneous assemblages of integrated socio-technical elements [30]. As pictured in Figure 1, ubiquitous information environments have a layer of information infrastructure and a layer of digital services.

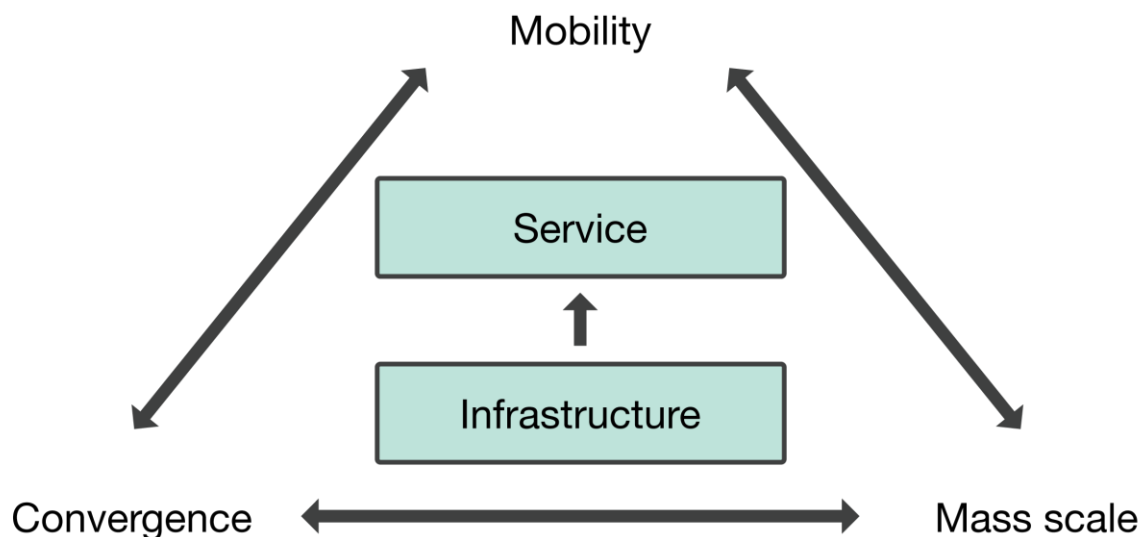


Figure 1: Ubiquitous information environments [30] p. 378

According to this conceptualization, the infrastructure layer enables seamless distribution of services, anytime and anywhere adapted to user contexts. Depending on users' contextual circumstances, and given the available resources, users interact with a multitude of interconnected devices in a given situation. The key enabling drivers of ubiquitous information environments are mobility, digital convergence and mass scale [30]. Mobility refers to both physical and social movements of users, objects, and services that move across and between devices. Digital

convergence refers to integration of infrastructures for processing and distributing services to a multitude of devices, mobile as well as stationary. Mass scale concerns the availability of infrastructure and services at a global level as well as mass scale volume and diversity of services.

The foundation of ubiquitous information environments is the architecture of digital technology. As outlined by Yoo et al. [50], the architecture of digital technology is characterized by homogenization (the use of binary digits for all types of data), re-programmability, and self-referentiality. These three characteristics of digital technology provide a layered modular architecture separating devices, distribution, services and content. This architecture enables the independence of physical limitations such as a specific device or geographical location for services. New services and content can be designed and offered without any changes of device or distribution.

In this paper we use the term ubiquitous media environments (UME) to represent the vision of future media environments that enable device independent distribution of ubiquitous media services (UMS) in integrated infrastructures and platforms, and in mass-scale [52]. In a UME, infrastructure and platforms enable the distribution of UMS, including advertising content, to any media consumer, anywhere, anytime, and to any device such as smart-phones, tablets, smart-TV, etc. In an UME, the user can thus seamlessly and fluidly access services and content with interconnected devices in multiple channels [52].

Accordingly, a very central aspect of UME, as in any ubiquitous computing environment, is the context of use [1]. This means that information about the background and specific circumstances surrounding the use situation is deployed in adapting UMS. Context information is any information that can be used to characterize a situation such as location, identity, state of people, groups, and computing resources [13]. In this view, context is regarded as information related to the situation in which interaction occurs. Context can also be regarded as a relational property between objects and activities [14], and thus dynamically shaped in action rather than pre-defined and stable.

The characteristics of UME's exhibit inherent values that are regarded as very promising in the newspaper industry [53]. Leveraging value in an UME involves innovating business models and creating new markets. However, to identify and exploit business opportunities and create value in ubiquitous environments is very challenging [18]. Lately, digital platforms have emerged as the dominant model, realizing business opportunities in ubiquitous information environments. A digital platform is a system of digital resources providing core functionalities that can be used, re-combined and extended [46]. Digital platforms provide a marketplace for applications and media content, and the partner firm that is in control of the platform is referred to as a platform provider [25]. Platform providers depend on other actors in the digital platform ecosystem to leverage value in the platform [45]. The ecosystem of a digital platform is constituted by a collective of organizations having a common interest in leveraging value and innovation in the digital platform [41]. Given that digital platform ecosystems enable a networked and collaborative business environment, they are increasingly important for media companies. In a digital platform ecosystem, firms can create value that no single firm could leverage alone [2]. However, to leverage value in digital platforms, platform providers enact control to reduce the flexibility afforded by digital platforms. It has been recognized that balancing this paradox of control and flexibility is key to leverage value in digital platforms [19], [24]. In this paper we use the theory of two-sided markets as a lens to discuss the dynamics of balancing the dynamics in UME, and in particular the opportunities for the newspaper industry.

## 2.2 Two-Sided Markets

The business models of businesses that have emerged in an UME, are often characterized as two-sided markets [46]. The economic theory of two-sided markets, also called two-sided networks or two-sided platforms, refers to economic platforms having two interdependent user or customer groups. These groups provide each other with network benefits. If a platform is built on more than two sides, it is called a multi-sided platform. At the core of a two-sided market is to provide a common platform (physical or digital), and to facilitate the interaction between the two customer groups. The company that creates value by providing this platform is a platform provider [39], which provides both the infrastructure and the architecture, as well as the set of rules governing the platform. A two-sided platform embodies a design, in turn defining certain aspects such as the architecture of the services that are offered, the enabling infrastructure, and the set of rules that govern the platform [4], [16].

In general, two-sided markets arise in situations in which there are externalities that the platform can contribute to with technology to solve, so that that transaction costs are minimized [39]. For example, advertisers can, through a media platform, reach a mass-consumer audience as opposed to reaching the consumers one by one. There are many industries where two-sided markets can be observed, and it is frequently exhibited in the media industry. For example, game console platforms attract gamers as well as game developers, music-streaming platforms attract music artists, advertisers and music consumers, and newspaper platforms attract readers and advertisers. In media platforms, the platform either buys content (e.g. the music streaming service Spotify) or creates content. In the case of a newspaper platform the platform provider creates content, the content attracts readers, and the mass-audience of newspaper readers attracts advertisers. One key implication of the interdependence in two-sided markets is that value for the customer groups differ, but still influence one another. For instance, the value of an advertiser's customer increases as the ads in a newspaper platform become more targeted, while the readers often value the increased exposure of ads negatively [40].

In two-sided markets, strategies are influenced by the indirect network-effects between the two sides of the platform. Network effects arise when participation of additional customers on one side changes the value of the network to the other. This effect can be categorized as either same-side network effects or cross-side network effects. Same-side networks effects arise when additional customers on one side influence the value for customers on the same side. Cross-side effects occur when additional customers on one side influence the value for customers on the other side [16] (see Figure 2). The network effect between newspaper readers and advertisers is that advertisers value platforms with many readers, and readers value content subsidized by the platforms advertising revenues, and in some cases for free.

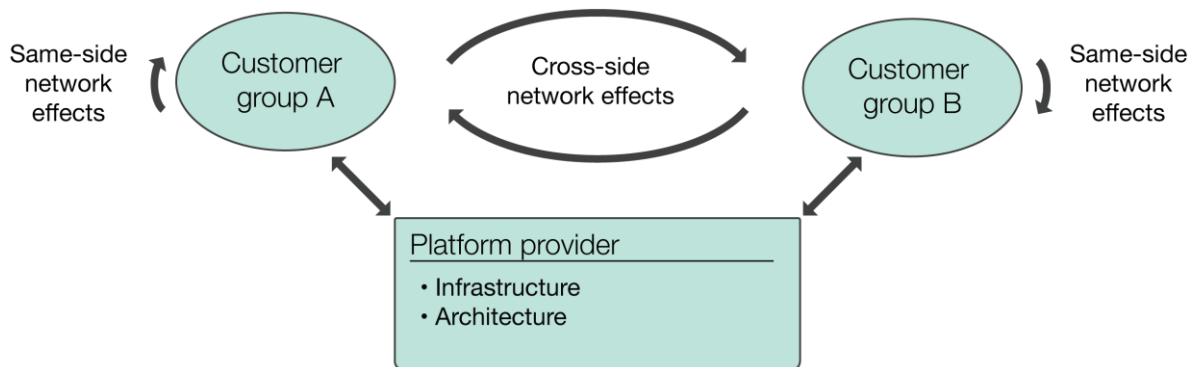


Figure 2: Two-sided markets - adapted from [16]

When network effects are positive, customers will turn to fewer or even only one platform [17]. In some two-sided markets there is only one or just a few platforms. For instance, in the mobile phone industry the Apple iOS and the Android platforms are the two dominant options, just as Google is the dominant search platform on the Internet. When a platform provider gains such a dominant position it is referred to as *winner takes it all* dynamics [16]. In other industries there can be many competing platforms, and customers can affiliate with many different platform providers. This phenomenon in the two-sided markets is called *multi-homing* [40], and it puts the platform providers in a complex competitive situation. In the media industry for example, where TV, magazines and newspaper organizations are platforms, there is a large number of competing platform providers. In the case of newspapers, dimensions such as geographical reach, language zone, political focus, etc., differentiate the many different platforms. In the two-sided newspaper market, both the readers and the advertisers use multiple platforms, which increases the complexity of competition [3]. This complexity is continuously enhanced as newspapers adopt new publication channels, such as on-line and mobile publishing channels where platform providers, from for instance social media such as Facebook, are competing platforms that attract both advertisers and readers.

In the economic literature, pricing for the two different customer groups has received focal attention as a strategic issue. The core conclusion is that pricing depends on demand and cost, and in the case of two-sided markets, how one side influences the other [39]. A low price on side A of the platform can attract a larger group of consumers, which in turn can create a high value for side B and thus motivate a higher price on the B side. This is the situation in newspaper platforms where readers are charged below marginal costs or offered services for free, to attract a large reader base, which in turn increases the value for advertisers who are willing to pay more in relation to how much larger the newspaper reader group is. In this paper we are paying special attention to the value that can be provided for readers and advertisers respectively in a ubiquitous media environment, as well as the interdependence and network effects between the two. We here regard customer value as the function of the benefits a customer receives from a product or service and the network externalities [23]. For instance, the value of a streaming music service such as Spotify for a music consumer is a function of the benefit of the music service itself as well as the network effect (the more consumers that join the platform results in the ability to lower the prices for consumers and more music artists being attracted to the platform for exposure). Another strategic issue of two-sided markets is openness.

Openness refers to the number of sides in the network and the compatibility and inclusiveness in relation to other platforms in the ecosystem [40]. Opening the platform to a multi-sided market is a strategic choice that increases the interaction and potential network effects of the platform, but also increases the complexity. While openness in relation to other platforms, such as advertising agencies in the newspaper case, can make the platform stronger, it can also have consequences for the direct sales to the advertiser customers [33]. Opening a platform can at the same time reduce switching barriers for customers and increase the competition among platform providers [17]. In Table 1 the concepts from the two-sided market theory used in the discussion of this paper are summarized.

Table 1: Concepts from two-sided market theory

Concept	Description
Two market sides	A market consisting of two sides of customer groups with different requirements, that provide each other with network benefits (or value)
Platform provider	The intermediary that facilitates the interaction between the two customer groups
Platform	The architecture and infrastructure for products and services
Set of rules	The protocols, rights, and pricing/value terms that govern transactions
Same-side network effect	Increasing the number of users on one side of the network makes it either more or less valuable to users on the same side
Cross-side network effect	Increasing the number of customers on one side of the network makes it either more or less valuable to the customers on the other side.
Openness	The number of sides in the network, and the relation to competing platforms
The winner takes it all	One platform provider serves the mature networked market
Multihoming	The condition of customers affiliating with more than one such platform

As a response to the limited literature on the dynamics of UME, this paper presents an empirically grounded description of how UMS can be designed to leverage and balance the values afforded in UME for both advertisers and readers. We draw on the theory of two-sided markets to provide an encompassing description of newspaper organizations efforts to explore the opportunities of UME. The primary goal here, however, is to demonstrate that the value of UME does, apart from residing in the services and content that they offer and in the distribution networks or technologies which they exploit, also and above all, resides in their ability to band together to form strong and take strong positions in the digital ecosystems.

### 3 Research Approach

This article utilizes data from a two-year research project (2006-2008) where researchers collaborated with nine Swedish newspapers: Aftonbladet (AB), Dagens Nyheter (DN), Expressen (EX), Göteborgs-Posten (GP), Nerikes Allehanda (NA), Norrköpings Tidningar (NT), Sundsvalls Tidning (ST), Sydsvenskan (SSD) and Östgöta Correspondenten (ÖC) to envision a future UME. This research project followed the canonical action research methodology [29], [43], including experimental prototyping. The project was organized and managed by three researchers (the authors of this article). The project organization included a steering committee, a project group with several representatives from the participating newspaper organizations representing the platform provider, and two focus groups (readers and advertisers) representing the two market sides. The advantages of focus groups are that the data illuminates both the diversity and consensus in the group, by the explaining and querying among the participants. Focus groups can contribute to research design issues at the group level as well as the project level [32].

The *steering committee* had representatives from newspaper management and researchers, as well as representatives from the trade organization. The main objective of the steering committee was to: a) contribute to the overall project goals, b) secure feed-back (learning) for the industry, and c) give input through discussions on important aspects. The *project group* consisted of 26 newspaper representatives (see Table 2) and three researchers (plus additional guest researchers at different stages of the project). The aim of this group was to conceptualize, visualize and evaluate the UMS and UME. The *focus group of readers* included two groups: a) four female and eight male participants between the ages 19-29 and b) four female and five male participants between the ages 30-61. Their task was to follow the project development and give input from a reader/user perspective. The *focus group of advertisers* involved six representatives from advertising agencies from well-known international brands and media bureaus with the aim to provide input from an advertising perspective.

The action research methodology based on [43] resulted in an iterative, rigorous, and collaborative research process based on the following five phases: diagnosing, action planning, action taking, evaluating, and specifying learning. The first phase, *diagnosing*, refers to the joint (researcher and practitioner) identification of situated problems and their underlying causes. During this phase, researchers and practitioners jointly formulate a working hypothesis of the research phenomenon to be used in the subsequent phases of the action research cycle. The next phase is the *action planning*, a process of specifying the actions which could improve the problem situation. *Action taking* is the third phase and refers to the implementation of the intervention specified in the action planning phase. After action taking follows the *evaluating* phase, which entails the joint assessment of the intervention by practitioners and researchers. The fifth and final phase, *specifying learning*, denotes the ongoing process of documenting and summing up the learning outcomes of the action research cycle. These learning outcomes constitute knowledge contributions to both theory and practice, but they could also be seen as temporary understandings that serve as the starting point for a new cycle of inquiry.

The project consisted of two action research (AR) cycles; cycle 1 was performed during the first year and cycle 2 during the second year (see Figure 3). In this paper we mainly focus on the results from the second AR cycle. The

outcome of the activities in AR cycle 1 was used as input to the visualization of the project's vision (UMS and UME) in three prototypes and three movie clips. These prototypes and movie clips were later evaluated and discussed in the steering committee, the project group and the two focus groups.

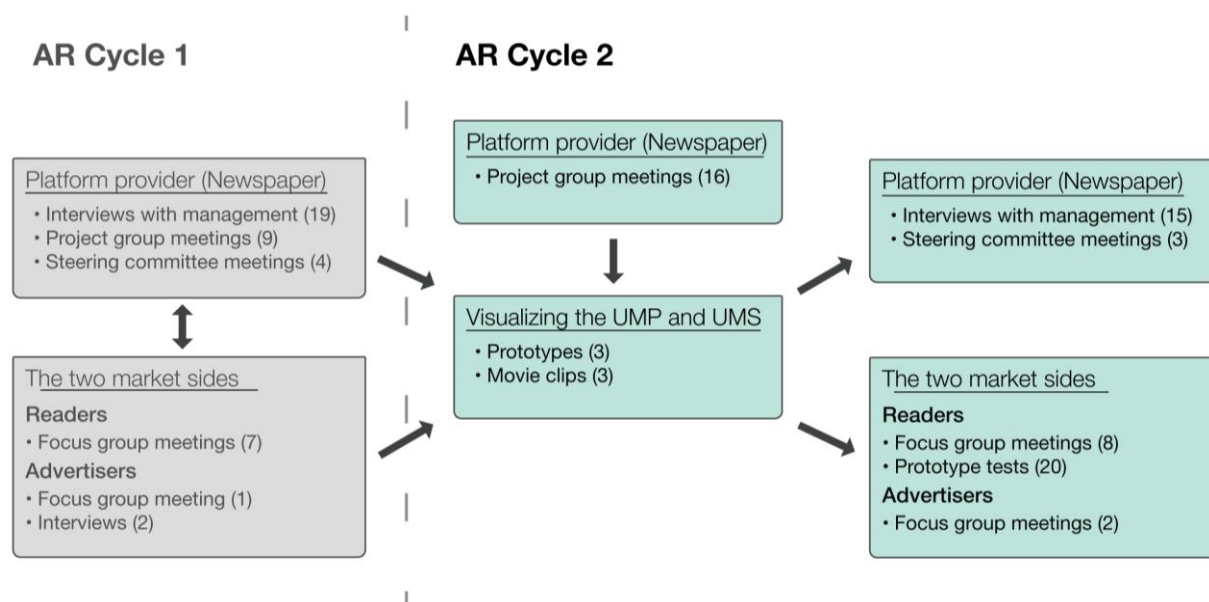


Figure 3: Project and data collection activities

During AR cycle 1 the project group was divided into two groups led by the researchers. These groups were selected to focus on their customers on the two market sides: the readers and advertisers. This cycle started with a diagnosing phase that resulted in several questions to be answered within the project. This was a matching process between the overall research questions and questions relevant for the industry. Based on these questions, different activities were planned (action planning), which resulted in a number of studies (action taking) that were performed within the project. Researchers and newspaper representatives jointly planned all activities and studies. The generated ideas and concepts as well as other results were evaluated with the focus groups and the steering committee. The first cycle was concluded with summarizing and documenting experiences that were presented and discussed (specifying learning) with the project group as well as with the steering committee. During this cycle 19 interviews with newspaper management were conducted (see Table 2). This AR cycle resulted in a) a shared view of challenges and opportunities of designing futuristic UMS and the underlying platform and b) the first ideas of possible services.

Table 2: Respondents and projects group participants

	INTERVIEWS	PROJECT GROUPS (NEWSPAPERS)
AR cycle 1	CIO (AB); Editor-in-Chief (AB); Head of Layout (AB); CIO (DN); Editor-in-Chief (DN); Marketing Manager (DN); Sales Manager (DN); Head of Development (DN); CIO (EX); CIO Digital Media (EX); CIO (GP); CIO (NA); CIO (NT); Editor-in-Chief (NA); CIO (ST); Editor-in-Chief (ST); Head of Development (ST); CIO (OC); Business Developer (OC)	<b>Advertisers</b> Manager Commercial Services (AB); Head of Private Market (DN); Deputy Director of Advertising Sales (DN); Sales-/business Development (EX); Business Developer Digital Media (GP); Development Director (GP); Keyaccount Sales (NA); Business Developer Digital Media (NT); Advertising Manager (ST); Marketing Director (SSD); Head of Online Media (OC) <b>Readers</b> Technical Coordinator (AB); Marketing Manager (DN); Head of Features (DN); Mobile Services Manager (EX); Development Editor (GP); Director of Business Development (GP); Designer New Media (GP); Web Developer (NA); Head of Editorial Development (NT); Head of Private Market (ST); Project Manager (SSD); Project Manager (OC)
AR cycle 2	Editor-in-Chief (AB); CIO (DN); Editor-in-Chief (DN); CIO (EX); Editor (EX); Head of Local Services (EX); Mobile Service Manager (EX); CIO (GP); Editor-in-Chief (GP); Head of Development (NA); Editor-in-Chief (NT); CIO (ST); Editor-in-Chief (ST);  Head of Bureau (Advertiser); Marketing strategist (Advertiser)	<b>Strategy</b> Deputy Director of Advertising Sales (DN); Development Director (GP); Keyaccount Sales (NA); Head of Advertising (ST); Marketing Director (SSD); Head of Online Media (OC) <b>Behavior</b> Marketing Manager (DN); Head of Editorial Development (NT); Business Developer Digital Media (NT); Head of Private Market (ST); Project Manager (SSD) <b>Design</b> Head of Layout (AB); Mobile Service Manager (EX); Sales-/business Development (EX); Head of Feature (DN); Development Editor (GP); Designer New Media (GP) <b>Technology</b> Technical Coordinator (AB); Head of Systems (AB); Head of Private Markets (DN); Business Developer Digital Media (GP); Web developer (NA); Project Manager (OC)

Due to the technical complexity of some of the generated concepts, it was decided to illustrate the UMS in prototypes and movie clips. In *AR cycle 2*, challenges relating to the development of the prototypes and movies were identified (diagnosing). When planning the activities for the second cycle, it was decided to re-organize the project group. Four new groups were formed to develop the vision: strategy (business value), behavior (reader), technology, and design. A newspaper representative led each group and the researchers alternated between the different groups. The work with envisioning the UMS and UME was continuously evaluated in the focus groups and with the steering committee. In this cycle 13 interviews with newspaper management and two interviews with advertisers were performed (see Table 2). The outcome of *AR cycle 2* was the future vision visualized in prototypes and movie clips (presented at Site 1) which served as a base for discussions (specifying learning) inside the newspaper organizations as well as at national and international industry events.

In the *visualization of the UMS and UME* (see Figure 3), the behavior- and design project group produced personas representing existing or potential target user groups based on statistics and data from *AR cycle 1*. Personas help focus on aspects of design that are hard to receive by other methods, by representing a group of people [38]. Based on the personas the first UMS ideas from *AR cycle 1* were further developed into descriptions of potential future UMS. Thereafter, scenarios were created for each persona. Scenarios are *stories about people and their activities* [9] that focus on describing a stakeholder's view of what, how and why a particular instance of use happens and can be presented as text, story-boards, video mock-ups, scripted prototypes, etc. Scenarios allow discussions of contexts, needs and requirements and are often the first step in establishing stakeholder requirements. The strategy project group focused on the business and strategic aspects from the platform provider's view, while the technology project group investigated and discussed technical challenges.

The next step in the visualization was to build three prototypes, one for each identified persona. As stated before, this action research project included experimental prototyping, in line with [11] suggestion of adding a building phase to concretize learning into an artifact such as prototypes, frameworks, or models. Prototypes could also be seen as manifestations of design ideas [28] as well as enablers for teams and users to gain actual appreciation of future situations through active engagement with prototypes [7].

The design project group produced the design elements, graphics and layouts and was coded into two versions of each prototype, one for smaller devices and one for big screens. Thereafter, storyboards for each persona (based on the scenarios) were created as a start to the movie making process. Storyboards are used in movie making to illustrate a sequence of still frames representing a moving sequence. By translating your vision on paper, from a rough sketch to a finished storyboard, which includes framing, placement of persons and objects etc., it works as a first draft in producing a movie clip [26]. A bureau was hired to produce the three movie clips, and then 20 readers evaluated the prototypes and movie clips.

The prototype test was designed to investigate the user experience of different design solutions as well as to investigate user attitudes towards the envisioned UMS. The tests consisted of a 60 minute user evaluation of the prototypes. Thereafter, the movie clips were shown, followed by a 45 minute structured interview [34]. The respondents were asked to think aloud [15] during the tests, and the user evaluations were both audio and video recorded and summarized in text.

In this paper we use qualitative data from *AR cycle 2* to exemplify results. The discussions with the project- and focus groups were digitally recorded. The recordings were summarized in text after each session. The interviews conducted with the different stakeholders in the project were semi-structured [34], ranging from 60-90 minutes in length. At least two researchers were present in each interview to ensure that all topics in the interview guide were fully covered. The themes and questions asked varied in the different phases of the project. All interviews were digitally recorded and fully transcribed.

In the experimental prototyping, we used a data-driven approach [48] to identify how the UMS and UME were perceived from the different stakeholder perspectives (platform provider and the two market sides). A coding system [31] was used and the data from *AR cycle 1* was coded into different themes relevant as input to the prototypes and movie clips. Examples of these themes were: possible content, preferred ways of interaction, ubiquity aspects, business value, new types of advertising, trust, integrity issues, payment options, security etc. These themes were also relevant when analyzing the data from *AR cycle 2*. The difference was that in the first analysis (*AR cycle 1*), we searched for different aspects and views in order to produce the prototypes, whereas in the second analysis (*AR cycle 2*) we could go more in depth into the views on the concepts of the UMS and UME since the respondents and participants have had the opportunity of evaluating the prototypes and watching the movie clips. New themes such as quality of service, security and adoption emerged in the second analysis.

The concepts from literature on ubiquitous information environment and two-sided markets were, for the purpose of this paper, used to synthesize the different stakeholder views into an overall description of a ubiquitous media environment. The description is presented in a figure where the different fundamental values of advertisers and readers, and the requirements on services and infrastructure to leverage and balance value for the two sides of the market. The concepts from two-sided markets are used to discuss strategic implications.



## 4 Empirical Results

The empirical results are centered on three different themes (corresponding to AR cycle 2 in Figure 3): a) visualizing the UMS and UME, b) the platform provider perspective, and c) the perspectives of the two market sides. The empirical data is thereafter summarized in a synthesized description of an UME.

### 4.1 Visualizing the UMS and UME

This project stems from a vision of a possible future where newspaper brands could band together to build a strong position for the media market through new and innovative digital services and advertising as platform providers. In the project we conceptualize this vision as a joint UME supporting UMS. This section describes the co-creation process of incorporating the vision (learning outcomes) of the project into three prototypes and three movie clips. This visualization process included: a) personas and scenario building; b) prototyping and movie making; and c) infrastructural and platform requirements.

The envisioned UMS were designed to complement the core businesses of newspapers, i.e. presenting news and feature material based on journalistic perspectives, to create value for and connect with their customers. The UMS had a common theme, to facilitate and support every day activities for the readers and their families. The UMS were built on the presumption that readers are willing to provide more personal information if they receive adequate and helpful services provided by newspaper brands. Initial studies in AR cycle 1 indicated that newspapers were perceived as trustworthy and thereby could work as platform providers for such services.

#### 4.1.1 Personas and Scenario Building

This initial phase started with discussions between the different project groups about whom their current readers were and which reader target groups they wanted to reach in the future. Statistics from different media-, consumer-, and user studies were used to ensure accuracy of target groups. The outcome of these discussions and findings from the studies in AR cycle 1 were used as input when creating three different *personas*: Albin, a 19 year old student living at home who loves soccer and socializing with his friends, Diana, a 30 year old single mother who originates from Chile who is very much into fitness, and Maria, a 50 year old business woman who is married with two kids and is very interested in media, arts and travel. Maria represents their loyal readers whereas Albin and Diana represent two reader groups that the newspapers were eager to reach in the future. Profiles and image boards were created to describe each character and their everyday lives.

The next step was to connect the UMS concepts developed in AR cycle 1 to the personas, resulting in UMS focused on five different themes: news, pleasure & leisure, health, travel and family. The UMS went under the umbrella name *Real life services*, and were aggregated chains of search packets with preset parameters and integrated payment services. A possible scenario was a subscription approach to these UMS, but these services primarily push information and notifications to the readers when suitable. The services are briefly described below.

- **News-check:** Includes integrated news services that summarize news personalized to the user and therefore especially interesting for them. By coding the news material properly it could be used to link to other services, for example linking soccer results with a ticket service to upcoming games. The news and other information presented in News-check are primarily based on time, readers' location and the use situation.
- **Pleasure & Leisure-check:** This service focuses on sorting, categorizing and presenting information related to pleasure and leisure. The service adapts to personal preferences and location and suggests, for example restaurants, music events and offers from nearby pubs. It is also community based and connects with friends if preferred.
- **Health-check:** This is an automated health coach where it is possible to prepare menus, plan training and document achievements. The service reacts and updates its information based on input such as e.g. which food is available at home and facilitates the possibility to order food based on your profile at the local store. The service could also help planning for upcoming events with dinners and suggest lunch and training alternatives accordingly.
- **Travel-check:** This service is based on different search engines for finding the right travel arrangement. Parameters to start push offers could be birthdays, vacation time etc. If the user shows interest, related offers will be available, such as currency exchange services. During the actual trip the service supports translations, maps, suggestions for activities and so on.

- Family-check: This is the project manager for everyday activities within the family. It synchronizes the family's calendars with news updates from school, future events, and menus from school and work, to help organize the everyday life of a family.

The scenario building activity started with a discussion about a typical day of each persona, which services they would prefer and how they would use them in an ideal world from the perspective of the platform provider. The first step resulted in an image that illustrated typical daily activities and when the check-services could be useful. Thereafter, several scenarios with detailed descriptions were created. While creating the scenarios, an idea was formed that focused on presenting the information from the different UMS on future screens and displays. For example, a bracelet concept (Figure 4) with a foldable menu was developed that was later used for connecting to screens and displays of larger formats such as e.g. interactive walls.



Figure 4: Bracelet concept



Figure 5: Layout example (Maria)

#### 4.1.2 Prototyping and Movie Making

The bracelet concept was developed further by the design project group together with interaction models and basic design solutions to meet the scenarios from the previous stage. The bracelet worked as a central node and information hub supporting some basic interaction with the UMS. To have a more in depth interaction with the UMS, larger screens can be utilized. The idea was to connect the bracelet as a remote control and to stream to computer screens, TVs, public displays and interactive walls where the information could be displayed. Therefore, to be able to demonstrate the services, the prototypes and the information content had to be responsive and adjusted to different screen sizes.

As the services would be personalized, both regarding content and design, three different layouts (Figure 5) were produced to mirror the personalities of the three personas. The different layouts also envisioned what the services could do at particular moments of use as well as display the aggregated information in new and exciting ways.

The design project group was responsible for providing input to the prototyping work. The challenge for this group was to think outside the box and envision future design solutions for the UMS. As the different layouts and design elements were designed, they were discussed in the focus groups and with the other project groups in the project. The layouts were then used when the prototypes for each persona was coded. The three prototypes were produced in two versions, one representing the bracelet (Figure 6) and one representing a large touch screen (Figure 7).



Figure 6: Layout example (Albin)

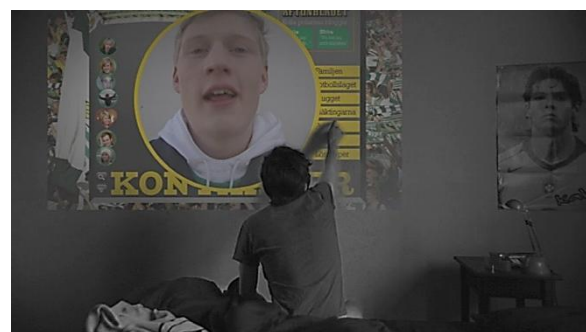


Figure 7: Interactive wall

In parallel with the work on the different layouts for the prototypes, storyboards for three movies were developed. The storyboards were discussed with the project group and the focus groups, to ensure that all aspects concerning business value, advertising, integrity, payment options, and quality of service, etc., were integrated in the different scenes. As the movie making progressed some changes were made to the original storyboards to further illustrate some features of the services and the media house vision. The movie clips can be found in English at the project website (Site 1).

### 4.1.3 Infrastructure and Platform Requirements

The technology project group was responsible for the investigation of the infrastructure and platform requirements for the envisioned UME, and they discussed several categories of requirements. The envisioned UMS are adaptive and context aware, therefore the platform is required to support *context adaption*, *personalization* and *dynamic customization*. The UMS react to different reader behaviors and create unique user profiles based on their preferences, which requires artificial intelligence solutions with machine learning algorithms that use collected reader data, from which the UMS learn and adapt. Based on this artificial intelligence, the platform can distribute content specifically targeted to individuals.

Supporting *tracing and tracking* technology is required for *identifying individuals*. When readers interact with different content, the *interaction* is logged to generate data that can be used to analyze and meet personalization options. For example, which ads are clicked, which ads lead to a successful sale, and where the reader interacts with different services. Targeting readers based on GPS data enable features such as finding restaurants, pushing local sale offers, finding information about public transportation, or other context aware services.

The platform also needs *intelligent integration* features. The platform needs to provide the interactivity needed to integrate content from different sources into a specific UMS. This includes gathering and aggregating data, packaging the data and presenting it in a user-friendly interface. Furthermore, the platform needs to transfer data in a *secure* manner between different stakeholders, for example credit card information or other personal information. Keeping the *integrity* of reader data intact was deemed of the utmost importance in order to sustain the credibility of newspapers as platform providers.

Other platform requirements identified were related to *analysis and measurement* of big data. The platform requires vast computational resources, as well as a network infrastructure capable of transferring large amounts of data. Most of the UMS need to be both proactive and reactive to user behaviors. In addition, computational capacity to adapt and target ads to readers in real-time is required. Therefore, data analyses and measurements create the backbone of a platform leveraging value-adding UMS in an UME. The platform also requires support for *multiple distribution channels* and *cross-media publishing*. The UMS is distributed to multiple devices, all having their own data and system requirements. The UME platform is therefore required to support different kinds of publishing platforms as well as other content platforms enabling cross-media publishing.

## 4.2 Platform Provider Perspective

This section illustrates the newspaper perspective regarding their role as a platform provider in a future UME. Here we provide illustrations of how the newspaper representatives exemplify concerns and ideas on how to leverage value and define their role as a platform provider.

The mobile market with mobile operators receiving up to 70% of the revenue was very evident in the initial phase of the project. As the printed editions of the newspapers had already begun to decrease, the growing mobile market was found to be promising. A general view was that the newspaper organizations had to stand united against the mobile operators to get a more reasonable split. In their view, they were, after all, the ones with the journalistic competence and know-how when it came to providing content. A newspaper manager expressed this view as:

- Currently, there is a steering group at branch level, where we discuss the commercial divergence in the mobile sector. Our standpoint is that we would never again be put in a situation where we are forced into different solutions in new technology platforms that only benefit the operators.

The situation where mobile carriers offered competing platforms triggered a discussion on how the newspaper industry could come together to find new positions in the changing media market. One way of addressing the competition from mobile carriers was for the different newspaper brands to start cooperating and team up with other stakeholders to enable a strong and competitive platform for delivering news services. The newspaper representatives saw themselves as the natural platform provider in the UME as illustrated in the following quote:

- I think that newspapers could take this role, I think it is our duty, I think that the newspapers have an opportunity to take this obvious position...because there is always a chance that some other actor will take that role.

As such a platform provider, the newspapers identified themselves as well suited for the brokering between the two market sides; the readers and the advertisers. However, as new stakeholders entered the market with competing services, the newspapers acknowledged the competition and that they had to be proactive to keep their intermediary role as a platform provider leveraging value to readers as well as advertisers. The main reason for the argument of being the natural platform provider in the UMS was the credibility of newspaper brands. One newspaper manager stated:

- The credibility that we have built during decades is that we stand by and vouch for the information.

This standpoint would secure safety for their customers, as stated by another newspaper manager:

- I think it is about creating trust or a trustworthy relationship with the receiver, if it is a newspaper that is responsible...one needs to know that this will not be used or sold whatsoever and that the information will not wander off to anyone.

Another reason given for claiming the platform provider position was their knowledge of their customers, that they already knew a lot about their readers' preferences, and would be trusted with even more information in coming years. The newspapers also stated that they could take a brokerage role between readers and advertisers due to their capabilities of analysis and measurement.

To leverage value, the newspaper representatives suggested, for example, the integration between editorial content and ads as an attractive way of leveraging value for both readers and advertisers. The newspaper representatives, however, agreed on that it was important to keep a firm grip on how these native ads were to be incorporated and how personal data from the readers was to be handled; otherwise there was a risk that advertisers would go too far and compromise the integrity of the readers. Furthermore, the issue of integrity was pointed out in the interviews with newspaper management:

- I think that coming too close to the reader's private or personal life is somewhat controversial and I guess that there will be a limit to how much someone is willing to open up their private sphere, we need to find that limit.

Other ways of providing value that was identified in the interviews was to combine different channels and content. As the newspapers already have a lot of non time-sensitive feature material, it could be combined with other material in UMS. One example given was to combine stories from Italy and Italian food, with both pictures and videos, to push for recipe services, offers in local stores, wine tips, appropriate music, etc. Another important issue in creating value was to provide anytime/anywhere personal information/ads, as illustrated by a newspaper manager:

- I think it is absolutely necessary to find the kind of solution where the individual decides that right now I need this information. If we are to have a future we need to respond to that need, whether it is commercial messages or journalistic information or entertainment.

Based on the interviews, it became clear that the newspapers identified themselves as a natural intermediary between the two market sides. In the next section, the perspectives of the readers and the advertisers are presented.

### 4.3 Perspectives of the Two Market Sides

In this section we describe the identified value of UMS from the reader and advertiser point-of-views.

#### 4.3.1 Readers

When evaluating the envisioned UMS, readers expressed several key features leveraging reader value. These were: *utility and entertainment, availability, relevance, personalization, interactivity, device independence, and seamless content migration.*

The interest for the different UMS varied drastically depending of the reader's life situation and interests. The majority mentioned two to three specific UMS that were of more interest and one to two that were of no interest of all. The pattern was that more readers were positive towards Travel-check, News-check and Pleasure & Leisure-check than they were to Family-check and Health-check (with exceptions). Reasons for interest mentioned by readers were related to the utility and entertainment features and the availability of relevant and information whenever one needs it. For example, readers stated that you have specific needs when you are traveling and Travel-check seems to provide utility by helping out with travel arrangements and guide you when you are away.

Readers liked the opportunities to make your everyday a bit easier with the help of UMS as well as, for example, being motivated and supported in relation to exercise. Other value adding features mentioned in relation to supporting everyday activities were the ability to seamlessly access content over different independent devices and thereby have the content from the UMS migrating between the bracelet and a multitude of different devices and screens during the day. Readers also expressed possibilities for added value via a UMS when travelling:

- You are a bit vulnerable when you are out traveling and in need of gaining information on the fly, I therefore liked the features of Travel-check.

Another common remark in relation to added value was the interactivity provided by the services and the access to information anytime and anywhere. Several readers also highlighted their interest in the personalization features of

the UMS as well as the entertainment possibilities in Pleasure & Leisure check. The main reason for not liking Family- and Health-check was related to integrity issues with risks for too much surveillance and intrusion by these UMS. Most readers involved in the evaluation of the UMS were concerned about integrity, as illustrated by expressions such as:

- You can be reached everywhere, you can easily access information that interests you, but on the other hand it is a bit like Orwell's 1984.

They mentioned that if Family-check were more oriented towards their friends, instead of purely family, it would be interesting. However, there were also some readers who really liked the features of Family-check as it was presented.

All readers were more or less positive towards context adaptation, but the majority believed it was important to be able to turn it off and to be in control of the information. Many expressed the possibility to have information adapted based on context as a value providing feature of the UME. The personalization feature was also mentioned as leveraging value in News-check, i.e. to get the content that was really of interest. Other arguments for added value by personalization were the flexibility and the possibility to get more relevant content and avoid information that was of no interest. However, some readers mentioned the risk of missing out on big and important news due to personalized content, exemplified by the following quote:

- There is a risk that you only get news within one domain, and only about your own interests, and that you lose the broader perspective on general news that one needs to know about, but I myself would like this personalized information offering provided by the services.

About half of the readers were positive towards the personalization that is visualized in the UMS. Very few were concerned by integrity issues and were willing to share more information given the added value received by the UMS. However, once again many stressed the importance of being in control of the information.

There was a two-way split among the readers regarding advertising. One group was negative to the type of ads that were exemplified in the prototypes and movie clips. In particular, pop-up ads, as shown in one of the movie clip were considered disruptive. They experienced the ads in the other two movie clips as more sophisticated. This group also mentioned the importance of having the option to reject ads from certain advertisers. Another concern was the possibility of *being surprised* and missing out on offerings if the advertising would be too personalized. For example, one reader said that:

- There is a risk that you only get the biggest brands and not any new or smaller brand which could surprise me as a consumer with a new offering... it would be good if I could sort and decide that I was not interested in a particular brand... I want a bit of serendipity, I need to be surprised by the ads....

The other group was positive towards the ideas presented, or stated that they were not bothered by the ads. The positive aspects mentioned was in regard to context based ads that provide value when e.g. looking for a nearby restaurant. These readers liked the ads and thought that the ads would be more *fun*. Some readers mentioned that more personalized ads would be more valuable.

All readers were willing to pay for the UMS with some reservations. Many were not willing to pay for news, but for other types of UMS visualized in the prototypes and movie clips, that leveraged added value. This can be exemplified with the following quote:

- I would be willing to pay for some of the more complex services such as Health-check if they provide tangible added-value.

The readers that were positive to Family-check were prepared to pay for this UMS due to what they regarded as obvious value for their family. A few were also prepared to pay for the news if it could replace their printed newspaper. A preferred way to pay was through a subscription model, but other forms, such as pay per view were also mentioned. Many suggested Travel-check as an UMS that they would like to use and pay for during a shorter period of time. The majority of the readers did not want ads in the UMS, and some were even willing to pay more to skip the ads totally.

Most readers were positive that a newspaper could act as the platform provider for these kinds of UMS and act as a broker or intermediary in e.g. the case of renewing one's travel card through Travel-check, as the newspaper brands are perceived trustworthy. On the other hand, a few readers did not feel safe with a newspaper being responsible for money transfers, and instead preferred a bank for these transfers.

#### 4.3.2 Advertisers

The targeting precision towards groups or individuals as visualized in the movie clips was perceived as a highly value adding feature of the UME. The possibility to reach the right target group at the right time is of great

importance for advertisers. Key concepts discussed were: *exposure, reach and coverage, targeting, relationships, serendipity, interactivity, and tracing and tracking.*

To reach and expose the right reader with the right ad, advertisers need to conduct reader analysis on demographical and geographical data that is collected by the UMS. With the right analysis, advertisers in UME's have the opportunity to target readers more precisely with the right ads compared to traditional advertising. As an UME provides information much closer to people's sphere of interest, the knowledge about readers can be deepened, thus leveraging value for advertisers as illustrated by one interviewed advertiser:

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

Another possibility for added value in relation to reaching and targeting is the situation-based advertising enabled by UMS. When a reader searches and looks for specific information about, for example a trip abroad, or when the reader is abroad, situation-based advertising targets the right reader in the right context. This is a way to mitigate disturbance for the reader and instead make it possible to deliver a value-adding experience by presenting a relevant ad at the right time. As stated by one advertiser:

- 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.

Advertisers also want to address the reader when he or she is in the right mode for a specific offering. This is also related to time and place and can be leveraged by the data collected about individuals and their context in the UME. The advertisers perceived the possibilities with UME to deepen relations with the readers as very interesting, partly by direct contact with target groups but also together with other advertisers. One aspect of deepening relations between advertisers and reader is to deliver reader benefits as exemplified in the following quote:

- We try to get away from the product thinking and more and more go towards talking about customer benefit.

To connect and co-brand was seen as a stimulating aspect to leverage value, as visualized by e.g. advertising sales of coffee beans in relation with ads for coffee makers. Another possibility with UME's for advertisers is serendipitous advertising. This advertising is similar to TV and radio commercials with the aim of providing ads that are surprising and sink unconsciously into the minds of the readers. However, this needs to be done without irritating readers and the ads need to interrupt in a way that it creates curiosity. As such, serendipitous advertising has the potential to engage readers and create *aha* moments, which can make a consumer respond positively to the advertising at hand. With the contextual data generated, and a deepened knowledge about the reader, serendipitous advertising could therefore be a promising opportunity to leverage value for both advertisers and readers.

Other important opportunities for providing added value for advertisers are the interactivity and tracing and tracking features leveraged. Interactivity is a way to provide means for readers so they, for example can find more information about an offer. This interactivity is highlighted in the envisioned UMS where readers are supported in making informed decisions based on different ads as well as making a purchase directly. These opportunities with interactivity in UMS will most probably change advertisement as we know it today as stated by one advertiser:

- 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 one's subscribers.

The interviews show that the tracing and tracking opportunities are important for advertisers as it can help identify who have noticed an ad. Tracing and tracking features can also provide detailed personal information about consumers, possibly even present information about how they felt when they watched an ad.

The advertisers emphasized the importance of finding viable business models in an ubiquitous marketing model. The current payment models (e.g. time, size, and placement) will not work in such a model. It was therefore considered important to develop new models, e.g. for reaching exact target groups or that advertisers only pay for direct purchases.

#### 4.4 Synthesized Description of an Ubiquitous Media Environment

Based on the notion of ubiquitous information environments, characteristics of digital technology and digital platforms we have synthesized the empirical findings into a description of an UME. In Figure 8, we provide an overview of an UME where UMS leverage value for readers and advertisers in the two-sided market.

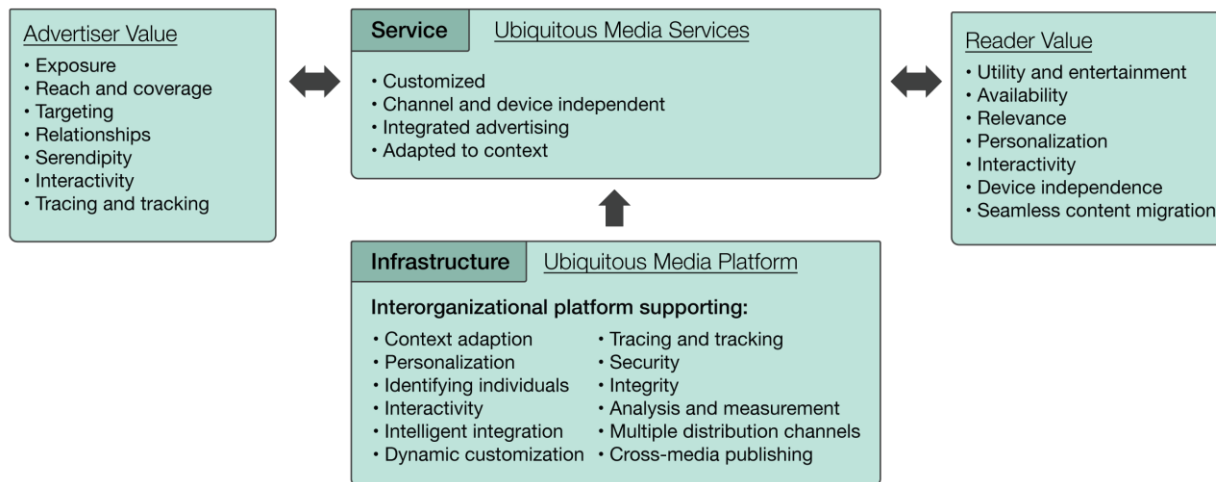


Figure 8: Ubiquitous media environment

## 5 Discussion and Conclusion

In this paper we set out to answer the question: *how can ubiquitous media services be designed to leverage and balance value in a two-sided market?* Through action research in the newspaper industry, a vision of a future UME was prototyped to help answer this question. In the following we will start by discussing the different aspects of designing an UME (see Figure 8) and thereafter discuss the strategic implications from a two-sided market perspective. After concluding the paper, we reflect upon the changes in the digital media ecosystem after the project was finished in an epilogue.

Ubiquitous media *services* are customized based on, for example reader preferences, context, and user generated data. They are independent of both distribution channel and device and can be seamlessly accessed and used between devices and contextual circumstances. UMS therefore need to be adapted for a multitude of different formats depending on device (e.g. laptop, tablet, smartphone, TV) [30], context (e.g. time and place) [13], [14] and preferences (e.g. preferences based on interests, profession, family situation). The services have integrated advertising in different forms adapted to, for example user context, profiles and generate feed-back data to promoters [53]. In the scenarios designed in this study, readers have a wearable hub, in this case in the form of a bracelet that enables continuous connectivity to the UME. This hub is used as the main interaction device that can stream content to larger screens when accessible.

The UME described in this study, is enabled by an inter-organizational *infrastructure* with interconnected technical and organizational platforms [45], [46] here termed as an ubiquitous media platform. The ubiquitous media platform supports real-time adaptation based on profiles, preferences and contextual information [1]. Real-time data, as well as reader set preferences and data generated in use of the services, are the basis for personalization of services. The user hub is a personal device (bracelet in this case), and enables the identification of individuals and collection of contextual user information. The intelligence is enabled by contextual data, aggregated data of use patterns and so on, to diagnose and predict user needs in order to push services and advertising that could be relevant to the reader's given situation. The platform supports dynamic customization of services and distribution cross channels, devices, screens, etc. The platform includes tracking technologies and support measurement of reader behavior, something that requires new standards and protocol. These are important resources to provide analysis and measurements of advertising effects [53]. In the platform there is advanced functionality to ensure security and integrity of readers. To enable the UMS, there are several challenging technological requirements, e.g. storage capacity, *smart* algorithms and artificial intelligence, and high demands on the processing and communication capacity of the ubiquitous media platform.

In an UME, newspaper organizations have the potential to provide *advertiser value* in new ways. Advertising content can be exposed in new ways and be integrated as parts of service concepts. Given that the UME as described in this study is enabled by an inter-organizational platform, advertisers can be offered an increase in geographical, as well as demographic, reach and coverage through the platform. The UME enables better precision and targeting through the identification of individuals' needs and preferences and dynamic customization of ads based on this information. As individual readers are identifiable in the UME, newspaper organizations can mediate contact information if readers have agreed. Advertisers can potentially build relationships and communities to relevant target groups. Furthermore, as illustrated with the UMS in the scenarios, advertisers can also build strong relationships with other companies through, for example, co-branding between advertisers. Serendipitous advertising is also highlighted as a possible added value for advertisers enabled by the contextual data used in the UMS. As such, serendipitous advertising can potentially engage readers and further strengthen the relationships between advertisers and their readers. Another important value adding feature identified was the opportunity to receive nuanced and detailed

feedback on the effects of advertising which enables accurate tracing and tracking capabilities through the functionalities provided in the ubiquitous media platform.

In this study several core *reader values* of an UME were identified. One core value is the anytime and anywhere availability of services. The utility of services in relation to solving everyday tasks and co-ordination was also perceived as a core value. Utility and entertainment can be provided by e.g. dynamically context adapted UMS, such as exemplified in the Travel- and Pleasure & Leisure-check services. Readers appreciated contextual relevance and personalization of service content and presentation according to personal needs and preferences. The advanced interactivity and device independence together with content migration were other features that leveraged reader value. As illustrated in the UMS presented in this study, readers could seamlessly use multiple devices to interact with different content providers as well as with friends and family. Readers emphasized that these values reside in trust, security and integrity in the UME.

There are several *strategic implications* for newspaper organizations with an UME as envisioned in this study. For newspapers to be platform providers in an UME requires re-thinking the digital architecture of media platforms, dynamic processes for analyzing the value for readers and advertisers, dynamic configurations of services and redefined relationship to other actors in the ecosystem. The architecture of an UME and its dynamics of context adaptation, real-time targeting etc., set new requirements on the intermediary platform provider role. Each UMS is in a sense unique depending on the contextual circumstances [13], and thus each access of a UMS embeds the dynamic relationship and tension between reader and advertiser value. One issue of importance is therefore to design balancing criteria into the set of rules governing transactions [4], [16].

The way the UME is designed in the scenarios in this study, there are same-sided as well as cross-sided network effects between the reader side and the advertiser side [3], [16]. One same-side effect is that an increasing number of readers raise the value of user-generated content, ratings, reader reviews and so forth. On the advertising side there is a negative same-side effect with increased number of advertisers since the competition of reader attention increases, and advertising prices might go up. On the other hand, when ads are bundled and integrated in such a way that synergy effects strengthen brands, as illustrated in the prototypes, there are potential positive same-side effects on the advertiser side.

The cross-side effect that an increasing number of readers make the platform more valuable to the advertiser side is obvious. So is the negative cross-side effect of more advertisers, if readers are over exposed to ads [33]. However, ads are also perceived as attractive content for readers if it is relevant and useful information, and increased advertising revenues may lead to lower prices for readers. The issue of pricing as discussed in two-sided market literature [39], [40], is clearly a salient challenge in an UME. The traditional relationship of pricing when readers are subsidized as newspapers have the majority of their revenue from advertisers, has not been working in digital publishing. The digital platform markets have developed to platforms that offer media content from several content producers. This strategic issue of openness [17], also regards the relationship to other media platforms, to advertising platforms and to new groups of customers such as media content buyers.

Both sides of the newspaper market are multi-homing [40]. Readers turn to many different newspaper brands and other platforms for news and information. Advertisers turn to all digital platforms where they expect to be exposed and receive impact on sales. It is not likely to expect that an UME, even if many newspaper brands should band together, will hold the potential of taking a *winner-takes-it-all* position [16]. Given the role of newspapers in a democratic society, a *winner-takes-it-all* position of newspapers would possibly not be of public good.

To conclude, this action research has shown how newspaper organizations can approach the new digital media ecosystem, and how UME can support the design of UMS leveraging value for readers as well as advertisers. We have also discussed the strategic implications for newspaper organizations when taking a position as platform providers in an UME, of dynamic balancing of reader and advertiser values, and of opening up for new relationships and cooperation in the ecosystem. This requires far-reaching change; they need to re-invent themselves. It has implications for their identity, their ingrained culture, their competence portfolio, and both technical and organizational resources.

With this research we have contributed to the literature on ubiquitous media environments and two-sided markets. The vision of UME and UMS designed together with the newspaper industry, their readers and advertisers, works as a trigger for discussions within the industry of the future to come and the importance to find and claim their place. There are limitations to this study. First, the study is limited to the newspaper industry with its classical two-sided market. Studying the design and strategic implications provided by this study in other ubiquitous information environments could contribute to further elaborate the findings. Second, this study is of explorative nature and further research is required where the design is actually implemented to confirm the implications discussed in this paper.



## 5.1 Epilogue

During the last years the newspaper market in Sweden has been more concentrated to different corporate groups in which the newspaper partners in the action research project are a part of; Schibstedt (AB), Bonniers (EX, DN, SSD), Stampen (GP), MittMedia (NA, ST) and NMT (NT, ÖC). These groups have developed and bought a mixture of digital services and have partnered up with numerous different partners to expand their digital ecosystems. The biggest group is already naming itself as platform provider. This shows that the newspaper industry is *getting the message* and attempting to find new roles. Although, not as a platform provider in a common UME, but rather as parts of competing digital ecosystems.

Due to the changing surroundings, the roles within the newspapers and corporate groups are also changing. New competence for analyzing consumer and advertising data is required as well as innovation managers. Technology skills are constantly sought after and digital business developers are hired from totally different sectors. The focus on digital is evident. Designing news and services to a multitude of devices is now a reality, and the underlying systems are exchanged or upgraded to support this migration. To collect as much data as possible to support their customers is a priority. A realization that the traditional business model from print could not be replaced by one digital equivalent is slowly sinking in, emphasizing the need for new ways of thinking.

As the vision of a future UME enabling UMS builds on the ability to access vast amount of consumer data to attract advertisers, the competition is the big players like Facebook, Google and Apple. Given the size of the Swedish media market, and the rivalry between corporate groups, this is not an easy task. Many of the features and technology in the envisioned UME are already in place, but there is yet a long way to go before everything is connected and the race to become a dominant platform provider is still in play.

However, the last years have shown that the newspapers have failed to collaborate over ownership borders and missed the opportunity to build up and claim this envisioned joint position in an UME. The tougher it gets, the more they guard their own ideas. Instead, from the interest of the newspapers, the market has become more fragmented with additional competitive actors. More brands, retailers and other actors are establishing themselves digitally, taking care of their own advertising and thereby bypassing the newspapers. Other bigger actors such as Google, Facebook, Apple etc. have attracted a big portion of the advertisement revenue share. The advent of ad-blockers has also severely damaged the current banner-based digital advertising. Traditional media such as television and radio now has their own websites covering news, contributing to the blurring media landscape. The concept of news is not limited to traditional news media anymore. Ordinary people and different groups of interest are attracting a lot of attention from readers in their blogs or websites, thereby also attracting advertisers. Today, there is an abundance of services offered to consumers regarding e.g. health, travelling, leisure and pleasure, often connected to new technology and devices such as smart watches, fitness trackers etc. Smart refrigerators, online scales etc. are already on the market and Internet of Things are here to stay. Social media actors like Facebook have filled the need to be connected with friends, family and so on.

## Websites List

Site 1: Ubimedia project website  
<http://www.ubimedia.se>

## References

- [1] G. D. Abowd and E. D. Mynatt, Charting past, present, and future research in ubiquitous computing, ACM Transactions on Computer-Human Interaction, vol. 7, no. 1, pp. 29-58, 2000.
- [2] R. Adner, Match your innovation strategy to your innovation ecosystem, Harvard Business Review, vol. 84, no. 4, pp. 98-107, 2006.
- [3] M. Armstrong, Competition in two-sided markets, The RAND Journal of Economics, vol. 37, no. 3, pp. 668-691, 2006.
- [4] Y. Bakos and E. Katsamakas, Design and ownership of two-sided networks: Implications for Internet platforms, Journal of Management Information Systems, vol. 25, no 2, pp. 171-202, 2008.
- [5] P. J. Boczkowski, Digitizing the News: Innovation in Online Newspapers. Cambridge, MA: MIT Press, 2005.
- [6] P. J. Boczkowski and E. Mitchelstein, The News Gap: When the Information Preferences of the Media and the Public Diverge. Cambridge, MA: MIT Press, 2013.
- [7] M. Buchenau and J. F. Suri, Experience prototyping, in Proceedings of the 3rd conference on Designing Interactive Systems: Processes, Practices, Methods, and Techniques, Brooklyn, NY, USA, 2000, pp. 424-433.
- [8] K. Carillo, E. Scornavacca and S. Za, An investigation of the role of dependency in predicting continuance intention to use ubiquitous media systems: combining a media system perspective with expectation-confirmation theories, in Proceedings of the 26th European Conference on Information Systems (ECIS2014), Tel Aviv, Israel, 2014, pp. 1-17.

- [9] J. M. Carroll, *Making Use: Scenario-Based Design of Human-Computer Interactions*. Cambridge, MA: MIT Press, 2000.
- [10] C. Christensen, D. Skok and J. Allworth, *Breaking news - mastering the art of disruptive innovation in journalism*, Nieman Reports, vol. 66, no. 3, pp. 6-20, 2012.
- [11] R. Cole, S. Purao, M. Rossi, and M. K. Sein, *Being proactive: Where action research meets design research*, in *Proceedings of 24th International Conference on Information Systems*, Las Vegas, NV, USA, 2005, pp. 325-336.
- [12] M. Conboy and J. Steel, *The future of newspapers: Historical perspectives*, *Journalism Studies*, vol. 9, no. 5, pp. 650-661, 2008.
- [13] A. K. Dey, *Understanding and using context*, *Personal and Ubiquitous Computing*, vol. 5, no. 1, pp. 4-7, 2001.
- [14] P. Dourish, *What we talk about when we talk about context*, *Personal and Ubiquitous Computing*, vol. 8, no. 1, pp. 19-30, 2004.
- [15] J. S. Dumas, *User-based evaluations*, in *The Human-Computer Interaction Handbook* (J. A. Jacko and A. Sears, Eds.). Hillsdale, NJ: Lawrence Erlbaum Associates, 2003, pp. 1093-1117.
- [16] T. Eisenmann, G. Parker and M. W. Van Alstyne, *Strategies for two-sided markets*, *Harvard Business Review*, vol. 84, no.10, pp. 92, 2006.
- [17] T. Eisenmann, G. Parker and M. Van Alstyne, *Opening platforms: how, when and why?* In *Platforms, Markets and Innovation*, (A. Gawer, Ed.). Cheltenham, UK: Edward Elgar, 2009, pp. 131-162.
- [18] E. Fleisch and C. Tellkamp, *The business value of ubiquitous computing technologies*, in *Ubiquitous and Pervasive Commerce: New Frontiers for Electronic Business* (G. Roussos, Ed.). London: Springer-Verlag, 2006, pp. 99-113.
- [19] J. Förderer, T. Kude, S. Schultz, and A. Heinzl, *Control versus Generativity: A Complex Adaptive Systems Perspective on Platforms*, in *Proceedings of ICIS 2014*, Auckland, New Zealand, 2014.
- [20] J. M. Gallagher and Y. M. Wang, *Understanding network effects in software markets: Evidence from web server pricing*. *Mis Quarterly*, vol. 26, no. 4, pp. 303-327, 2002.
- [21] A. Ghazawneh and O. Henfridsson, *Balancing platform control and external contribution in third-party development: The boundary resources model*, *Information Systems Journal*, vol. 23, no. 2, pp. 173-192, 2013.
- [22] A. Ghazawneh and O. Henfridsson, *A paradigmatic analysis of digital application marketplaces*, *Journal of Information Technology*, vol. 30, no. 3, pp. 198-208, 2015.
- [23] J. Hart, *The Art of the Storyboard: Storyboarding for Film, TV, and Animation*. Burlington, MA, USA: Focal Press, 1998.
- [24] O. Henfridsson and R. Lindgren, *Multi-contextuality in ubiquitous computing: Investigating the car case through action research*, *Information and Organization*, vol. 15, no. 2, pp. 95-124, 2005.
- [25] C. Ihlström and O. Henfridsson, *Online newspapers in scandinavia: A longitudinal study of genre change and interdependency*, *IT & People*, vol. 18, no. 2, pp. 172-192, 2005.
- [26] C. Ihlström Eriksson, T. Kalling, M. Åkesson, and T. Fredberg, *Business models for m-services - exploring the e-newspaper case from a consumer view*, *Journal of Electronic Commerce in Organizations*, vol. 6, no. 2, pp. 29-57, 2008.
- [27] C. Ihlström Eriksson, M. Åkesson, J. Svensson, and T. Fredberg, *Introducing the e-newspaper - identifying initial target groups*, *Journal of Media Business Studies*, vol. 4, no. 3, pp. 41-62, 2007.
- [28] Y. K. Lim, E. Stolterman and J. Tenenber, *The anatomy of prototypes: Prototypes as filters, prototypes as manifestations of design ideas*, *ACM Transactions on Computer-Human Interaction (TOCHI)*, vol. 15, no. 2, pp. 1-27, 2008.
- [29] R. Lindgren, O. Henfridsson and U. Schultze, *Design principles for competence management systems: A Synthesis of an Action Research Study*, *MIS Quarterly*, vol. 28, no. 3, pp. 435-472, 2005.
- [30] K. Lyytinen and Y. Yoo, *Research commentary: The next wave of nomadic computing*, *Information Systems Research*, vol. 13, no. 4, pp. 377-388, 2002.
- [31] M. B. Miles and A.M. Huberman, *Qualitative Data Analysis: An Expanded Sourcebook*. Thousand Oaks, CA: Sage, 1994.
- [32] D. L. Morgan, *Focus groups*, *Annual Review of Sociology*, vol. 22, pp. 129-152, 1996.
- [33] G. Parker and M. Van Alstyne, *Innovation, openness & platform control*, in *Proceedings of the 11th ACM Conference on Electronic Commerce*, Cambridge, MA, USA, 2010, pp. 95-96.
- [34] M.Q. Patton, *Qualitative Research and Evaluation Methods*. California, USA: Sage Publications Thousand Oaks, 2002.
- [35] R. G. Picard, *Capital crisis in the profitable newspaper industry*, *Nieman Reports*, vol. 60, no. 4, pp. 10-12, 2006.
- [36] R. G. Picard, *The future of the news industry*, in *Media and Society*, (J. Curran Ed.). London: Bloomsbury Academic: 2010, pp. 365-379.
- [37] R. G. Picard, *Twilight or new dawn of journalism?* *Journalism Studies*, vol. 15, no. 5, pp. 500-510, 2014.
- [38] J. Pruitt and J. Grudin, *Personas: Practice and theory*, in *Proceedings of the Designing for User Experiences Conference*, San Francisco, CA, USA, 2003, pp. 1-15.
- [39] J. C. Rochet and J. Tirole, *Platform competition in two-sided markets*, *Journal of the European Economic Association*, vol.1, no. 4, pp. 990-1029, 2003.
- [40] M. Rysman, *The economics of two-sided markets*, *The Journal of Economic Perspectives*, vol. 23, no. 3, pp. 125-143, 2009.
- [41] L. Selander, O. Henfridsson and F. Svahn, *Capability search and redeem across digital ecosystems*, *Journal of Information Technology*, vol. 28, no. 3, pp. 183-197, 2013.

- [42] I. Siles and P. Boczkowski, Making sense of the newspaper crisis: A critical assessment of existing research and an agenda for future work, *New Media and Society*, vol. 14, no. 8, pp. 1375-1394, 2012.
- [43] G. I. Susman and R. D. Evered, An assessment of the scientific merits of action research, *Administrative Science Quarterly*, vol. 23, pp. 582-603, 1978.
- [44] C. Sørensen and Y. Yoo, Socio-technical studies of mobility and ubiquity, in *Proceedings of IFIP WG 8.2*, Cleveland, OH, USA, 2005, pp. 1-13.
- [45] D. Tilson, K. Lyytinen and C. Sørensen, Research commentary-digital infrastructures: The missing IS research agenda, *Information Systems Research*, vol. 21, no. 4, pp. 748-759, 2010.
- [46] A. Tiwana, B. Konsynski and A. A. Bush, platform evolution: Coevolution of platform architecture, governance, and environmental dynamics, *Information Systems Research*, vol. 21, no. 4, pp. 675-687, 2010.
- [47] H. Topi, From the editors, *Information Systems Management*, vol. 22, no. 4, pp. 5-6, 2005.
- [48] G. Walsham, Interpretive case studies in IS research: Nature and method, *European Journal of Information Systems*, vol. 4, pp. 74-81, 1995.
- [49] M. Weiser, The computer for the 21st century, *Scientific American*, vol. 265, no. 3, pp. 94-104, 1991.
- [50] Y. Yoo, O. Henfridsson and K. Lyytinen, The new organizing logic of digital innovation: An agenda for information systems research, *Information Systems Research*, vol. 21, no. 4, pp. 724-735, 2010.
- [51] Y. Yoo and K. Lyytinen, Social impacts of ubiquitous computing: Exploring critical interactions between mobility, context and technology - a special issue for information and organization, *Information and organization*, vol. 15, no. 2, pp 91-94, 2005.
- [52] M. Åkesson and C. Ihlström Eriksson, From multi channel publishing towards ubiquitous media environment. *TAGA Journal*, vol. 10, pp. 126-148, 2008.
- [53] M. Åkesson and C. Ihlström Eriksson, Advertising challenges in ubiquitous media environments, in *Handbook of Research on Mobile Marketing Management* (K. Pousttchi and D. G. Wiedemann, Eds.). Hershey: Information Science Reference, 2009, pp. 77-93.