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E-paper News Publishing

Strategies for Product and Production

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Abstract

Electronic distribution is challenging the newspaper industry to seek new ways of publishing; consequently, news content could be processed on and for a variety of output platforms. Electronic paper (e-paper) could turn into a major newspaper publishing channel due to its ability to display content in a paper-like manner, with lower weight, lower power consumption, and facilitated handling compared to a computer, but without the major publishing and distribution costs associated with printed newspapers.

This work is based on seven case studies of newspaper companies in Sweden, Europe and North America, and analyses newspaper companies' views on future e-paper publishing. The objective has been to examine the conditions that would enable the e-paper medium to become viable as a newspaper-publishing channel.

Newspaper companies regard the idea of a future e-paper edition as very promising, but are uncertain as to what strategy to use. The final product will be a balance between cost, reorganization, the available number of rich media, and updates. Based on the companies' views, five models of how to incorporate an e-paper publishing channel into existing newspaper production have been proposed. The appropriateness of the models depends on each newspaper company's conditions, including assets, consumer base and demographics, current workflow, and future strategies.

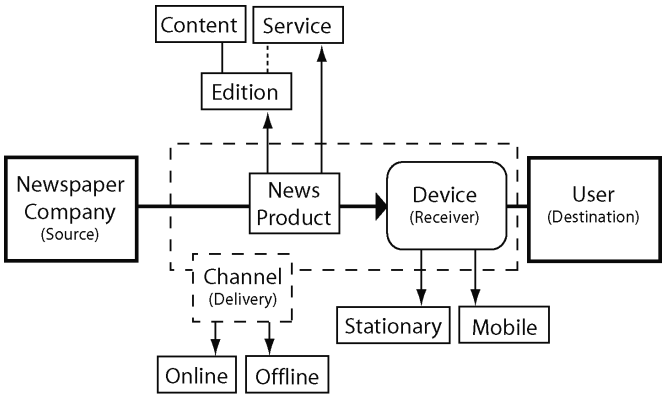
Key Words: newspaper, e-paper, multiple channel publishing, electronic publishing, newspaper strategies, online business models, newspaper production

Introduction

Newspapers are one of the oldest, most ubiquitous and most standardized elements of the modern media landscape and, according to Boczkowski (2002), they are closely associated with ink printed on paper. As a consequence, the conversion to electronic publishing has been treated with a great deal of scepticism by the newspaper industry (Fidler, 2000). Still, according to the data collected in the present work, most newspaper companies' production workflows and editions are based on the production of the traditional, printed newspaper. However, the newspaper industry has several reasons for introducing new publishing channels: declining circulation of printed newspapers in Europe and North America, increased competition in the media market, readers' interest in and familiarity with electronic media, and the development of media technology that may be suitable for newspaper media, including timeliness of distribution, and lack of dependence on costly aspects such as printing, paper and distribution (cf. WAN, 2006; Fidler, 1997; Picard and Brody, 1997).

At present, many newspaper companies incorporate at least one additional publishing channel besides the (major) printed newspaper. The largest additional edition is that published on the World Wide Web (WWW) (cf. Boczkowski, 2002; Fidler, 1997; Molina 1997), here denoted as the *online channel* or *online edition*. In Sweden, 65% (TU, 2005; TS, 2005) of newspaper companies publish an online edition in addition to their printed newspapers. Other electronic newspaper publishing channels and editions (for definitions of channel and edition, see Figure 1), such as mobile services, web-TV and radio, static and dynamic Portable Document Format (PDF) newspapers and similar editions based on proprietary formats[1], should at present mainly be regarded as business ventures that are not expected to be commercially profitable or viable until technology and consumer habits have developed. According to the newspaper industry (cf. Carvajal, 2006; Ifra, 2006), one promising potential new publishing channel is the electronic paper (e-paper). The e-paper is indented to be a paper-like, lightweight, low-power, and flexible digital device. However, e-paper technology is still under development, and though a few devices have just recently become commercialized, it does not yet exist as a news service. Thus, newspaper companies have a great opportunity to influence the future of e-paper publishing.

Figure 1.



Note: The definition of a newspaper publishing channel, edition, and service is not straightforward. Here, however, a channel is considered to be the means of delivery from the producer to the end-user, and can include both the output platform (hardware) and the news product. A news product is commonly an edition, the packaged content, and can include services, but does not have to (e.g., a printed newspaper). A service is commonly interactive and provided through an edition, but can also be provided exclusively (e.g., news delivered through Short Message ServSMS, SMS).

The current article presents views on e-paper newspaper publishing from the newspaper companies' perspective and is divided into two parts. The first part investigates what strategies the newspaper companies envision for a potential e-paper publishing channel, regarding target groups, technology and design of the content and device, as well as production and distribution. Comparisons are made to strategies related to the online publishing channel. The second part of the article presents ideas on how e-paper can be produced, compiled into five workflow models. The models are aggregated based on the analysed views on how the studied newspaper companies imagine e-paper editions will be produced, and on their ideas regarding potential strategies, as presented in part one.

The two parts are preceded by a brief presentation of the methodology used and an introduction to e-paper technology and, finally, the present work is summarized in a conclusion section. The objective of the work has been to examine the conditions that would enable the e-paper medium to become viable as a newspaper-publishing channel.

Methodology

Since the aim of the current work was to study an intervention that does not yet exist – e-paper news publishing and production – a situation in which the intervention being evaluated had no clear single set of outcomes, the case study design method (cf. Stake, 1995; Yin, 1994) was chosen.

Multiple case studies (Yin, 1994) were used as sources of evidence. Seven newspaper companies participated in the case studies: the Swedish newspapers *Göteborgs-Posten, Sundsvalls Tidning, Syndsvenska Dagbladet,* and *Östgöta Correspondenten*, the European newspapers *De Telegraaf* and *Rhein Zeitung* (online), and the North American newspaper *Los Angeles Times*. These are referred to in the text as the *Swedish*, the *European* and the *North American* newspaper companies, or more generally, as the *newspaper companies* or *companies*. The participating companies were selected with regard to their explicit interest in new ways of delivering and displaying news content, in particular (the future) e-paper. All companies are well-established mid-sized or large enterprises in their respective countries.

The study consisted of embedded (Yin, 1994) case studies. At each company, the managers of Development and Strategic Planning (or similar function), IT strategies, IT technology, Advertisement, Sales, Image Processing, and Distribution were interviewed.

The evidence (data gathering) came from three main sources, listed in a case study protocol: documents, interviews and direct observations. The documents were mainly former studies of the same companies (Leckner and Nordqvist, 2002; 2003), related research articles, and technical documents. In-depth interviews were carried out consisting of semi-structured interviews and focused interviews (cf. Bryman, 2001; Dawson, 2002; Yin, 1994). At the semi-structured interviews, which lasted a few hours, a series of questions were asked in the general form of an interview guide. The sequence of questions could vary across interviews and latitude further questions asked in response to what were seen as significant replies. The focused interviews lasted about an hour. In order to corroborate the interview data, direct overt observations were carried out at the European and the North American newspaper companies. The direct observations included less formal observations of the editorial departments of the paper edition, the online edition and in some cases the editorial departments of other electronically published editions. Analysis methods such as pattern coding, open coding and pattern matching (cf. Glaser and Strauss, 1967; Miles and Huberman, 1984; Yin, 1994) were used to examine the collected data.

Furthermore, to corroborate the information collected in the case studies, but with different perspectives than those of the newspaper companies, additional semi-structured interviews were carried out with a Swedish e-book distributor, *Elib*, and a prominent North American technology research centre, *Palo Alto Research Centre*, and unstructured interviews (cf. Bryman, 2001; Dawson, 2002) were conducted with several manufacturers of electronic publishing of software solutions. A workshop was also carried out in Sweden, where several national and international newspaper companies were present, including the national newspaper companies participating in the case studies, along with

interested parties and researchers specialized in newspaper publishing. The workshop consisted of a brief general presentation of the results from the interviews and observations, with the main emphasis on group exercises, in relation to the obtained results from the case studies. The exercises involved modelling of production workflows for various publishing scenarios for e-papers and the difficulties related to incorporating an e-paper product into existing newspaper production workflows.

All the case study information was collected during autumn 2004.

E-paper Technology

E-paper is a digital display device constructed of a thin, flexible substrate that can be bent, flexed, and rolled without losing functionality. Because of the diversity of the application space for the technology, it is hard to propose an all-encompassing definition (Crawford, 2005). At present, e-paper, or flexible display technology, is being developed based on various technologies, however, an e-paper commonly consists of a front-plane technology (the ink that will create the 'print' on the display) and a backplane technology (the flexible electronics required to generate the patterns of ink). The commercialized e-paper devices are at present rigid (consisting of glass and therefore fragile, heavy and inflexible), have a smaller display area (~A5) than common notebook displays and newspaper formats, are still monochrome (commonly black and white), and compared to paper rather costly. The price of an e-paper device ranges between €300-€650 (iRex, 2006; Sony, 2006). However, commercialized e-papers have approximately double the resolution (~170 pixels per inch (ppi)) of common computer displays, such as Cathode Ray Tube (CRT) or Liquid Crystal Display (LCD) technologies (cf. Prismo, 2006; Hoffner, 2004), which is comparable to the resolution of a printed newspaper, are bistable compared to other portable displays, hence do not need charging as often, and are predicted to become flexible, hence more robust, lighter, and cheaper, in a near future. Thus, an e-paper is, or at least is planned to be, a computer device with a paper-like constitution. (cf. Crawford, 2005; Johnson and Zhou, 2005; Miller, 2004).

Many large media technology corporations are developing their own e-paper, or in joint projects with each other, for example *Fujitsu*, HP, *Philips*, *Seiko-Epson*, *Siemens*, *Sony* as well as companies specializing in e-paper technology, for example *E Ink*, *iRex*, *Plastic Logic*, *Polymer Vision*, *Sipix*. Most of these companies have not yet developed their e-paper technology past the prototype stage, and most prototypes are monochrome, but announce that they will commercialize an e-paper within a few years (Thomas, 2006; AFAICS, 2005). The exact dates seem to be delayed, as it has proven to be more complex to develop the technologies than predicted (AFAICS, 2005), especially the development of high-quality flexible substrates (MacDonald *et al*., 2005), large sized screens, and full colours. However, at least two e-paper devices were commercialised in 2004 on the Japanese market: the *Sigma book* from *Matsushita/Panasonic/Kent Displays* and the *LIBRIé* from *Philips/Sony/E Ink* (cf. Amundson, 2005; ebook2u, 2004). They are approximately A5 size (but the *Sigma book* has two screens, like a spread), have 4 to 16 grey levels, and a resolution of 170-180 ppi (E-book society, 2006). In 2006, at least two e-paper devices were commercialized on the European and North American markets: the *iLiad* from *iRex/Philips* (iRex, 2006) with an A5 (8.1 inches) sized display, a resolution of 160 ppi, and 16 grey levels, and the *Sony Reader* from E-ink/Sony with a 6-inch screen, 170 ppi resolution, and 4 grey levels (Sony, 2006; E-ink, 2005).

E-paper News Publishing – Strategies for the Product

Initiating new publishing channels entails some level of risk taking. Time and money have to be allocated to a publishing channel that may not be successful. Newspapers through Videotex, in the 1980s, and Tablet PCs, in the beginning of 2000s, are examples of newspaper-related ventures that did not succeed[2]. Because there is no straightforward reason why some ventures do not take off, it is hard to know when the technology and the market for a specific medium and publishing channel are ready. On the other hand, successful business ventures are profitable, and being among the initial providers on the market can be important for future revenues. Thus, new publishing channels are seen as a great challenge, or threat, in the newspaper industry.

While the online publishing channel has provided newspaper publishers with the most successful electronic outlet yet for their content, it is doubtful, according to for example, Fidler (1997), that it will emerge as the digital successor to the printed newspaper, because the online platform, at least at present, lacks several important attributes associated with characteristics of the physical device, the graphical presentation, and the connectivity. Preferably a consumption device needs to be more portable than today's in many cases ungainly portable computers, possibly flexible or foldable, and easy to access via any available telecommunication network, wherever the user is located. Moreover, the device must be simple to use, comfortable and convenient to read in various environments, for example, in bright daylight or in dim surroundings, and be able to integrate some of the more compelling elements of electronic media, such as interactivity, hypertext, and rich media. One such potential device, which could be used for an existing or new newspaper service, is e-paper. However, many factors affect the potential success of an, in some respects, entirely new publishing channel: the timing, the design of the device, the features and services of the edition, its production and distribution, and choice of appropriate business models, i.e., how the publishing channel is to be made profitable and how soon.

Business Models for the Online Publishing Channel

The online newspaper was introduced around 1995 (cf. Boczkowski, 2004; Molina, 1997). Now, more than a decade later, the online newspaper has become established as a publishing platform, hence strategies used for the online publishing channel are interesting in comparison with other potential new electronic channels. The main reason concerns the dilemma of how to turn a profit through electronic delivery of news. Traditionally, newspaper companies have two revenue streams: from circulation and from advertising (Sparks, 2000; Picard and Brody, 1997). The online newspaper has been, and still is, considered to be an uncertain investment. Until recently, the advertising revenues have been negligible and no successful business model has existed. According to Alves (2001: 63), one reason why newspaper companies lose money online is that they fail to find "a successful business model for new media", while Mings and White (1997:2) claim that newspaper companies' "rush" to the Internet has "vastly outstripped their understanding of how to profit from these ventures" (cited in Lewis 2004:2). Thus, in 2002, 17% of the newspaper websites globally were profitable, according to a study performed by *Innovation International Media Consulting Group* (2002, in Lewis, 2004). Moreover, *American Opinion Research* (Celina, 2000, cited in Ewart, 2003 and in Schiff, 2003) reported that 24% of newspaper online executives said they were making a profit. At present (2007), 98% of the North American newspapers are profitable

with their web operations, with an average profit margin of approximately 60% (Borrell, 2007). Both large and relatively small sized newspaper companies show profits for their electronic counterparts, for example the Swedish newspapers *Aftonbladet* and *Östersundsposten*, yet these are modest compared to revenues for their printed editions (Hedman 2004; WAN, 2001).

What dissatisfy content providers are that newspaper content (commonly) is given away for free online, and they still have to work out the most effective ways for online content to become commercially viable. According to Hedman (2004), either the companies decide upon a free product in order to reach a wide audience, or they choose a product including exclusive services that they can charge for. With the free product, the newspaper companies count on getting a large number of readers, thereby attracting advertisers. With exclusive services, subscriptions will generate most of the revenues. Nonetheless, few newspaper companies consider it possible to charge for online news (Hedman, 2004; Sparks, 2000). However, in recent years, the advertising revenues for the online channels have been growing fast (IABEurope, 2006; NAA, 2005), as has the number of consumers (Bergström, 2004; Hedman, 2004), changes supported by the maturity of electronic publications, changing reader habits, and technological developments. Hence, attitudes towards electronic publishing are changing, and have strengthened the newspaper owners' conviction that the Internet provides opportunities and challenges to which they need to respond. In a survey of US online newspapers, Peng *et al*. (1999) found that the three top reasons for publishing online were: to reach more readers (39%), to generate more revenues from advertising (27%) and to use the online version as a promotional tool for the printed product (24%). Compared with the above three reasons, reducing printing and distribution costs was much less important to the publishers. However, as is often the case with new technologies, their initial cost/performance is hardly competitive with what is offered from the well-proven, standardized product and production method of an established technology. Investments on the media market often need a long period of repayment, according to Hedman (2004), although it is often not the investments themselves that are the greatest economic matter (cf. Molina, 1997), but rather the operational costs.

Because online newspapers have initially generally been regarded as electronic supplements, publishers' means of protecting their franchises and building circulation for their printed editions, online producers, independent of background, have generally not been especially creative when taking advantage of the value-added services offered by an electronic medium, a consequence of already established resources and infrastructure to fund the start-up period. For a long time, content providers thought they could just copy and paste the material from yesterday's newspaper onto their online editions (cf. Hedman, 2004; Molina, 1997), with no or few updates. Even though many publishers are attempting to address the aforementioned problems by adapting their online content and services to the inherent strength of the WWW, Engebretsen (2006) found in a study of nine major Nordic newspaper companies (and three TV company sites) that 20% of the newspapers' articles were presented exclusively in the online channel, and that the remaining articles also appeared in the print edition, either the same day (43%) or the next (37%). A similar investigation made by Fetcsherin and Knolmayer (2004), using questionnaires answered by 19 newspaper and magazine companies, showed that 16% of the content was provided exclusively for the online channel, whereas 64% of the content was provided simultaneously in both the printed and the online editions.

A subject of interest within newspaper publishing has been whether the printed newspaper would be 'cannibalized' by new emerging electronic services, or whether they could support each other. Deleersnyder *et al*. (2002) found, while investigating 85 online Dutch and British online newspapers over a few years, that the cannibalization fear has been largely overstated. However, when the new electronic channel was positioned too close (content-wise) to its traditional counterpart, cannibalization was more likely take place (see also: Fetscherin and Knolmayer, 2004; Stahl et al., 2004). Contradictory to what could be expected, however, there seemed to be only a small overlap between the online and print customers, a finding further supported by Schiff (2003), who claims that online time seems to have cut more heavily into the TV audience than into the (printed) newspaper readership (see also: NORDICOM, 2005.2:32; Pew, 1999). The time spent by the Swedish population on reading a printed newspaper and using the Internet, on an average day in 2004, was nearly the same, 8% and 7%, approximately 30 minutes (NORDICOM, 2005.1:20). However, the Internet is used for activities other than primarily reading the newspaper. Reading the online newspaper was the fourth most common activity of Internet users in Sweden, during an average week in 2004, surpassed by Internet activities involving e-mailing, searching, and accomplishing errands (e.g. bank) (Bergström, 2005:96;NORDICOM, 2005.2:27), an order that has remained more or less the same since 1999 (Sparks, 2000).

The Newspaper Industry's Views on E-paper

Why do newspaper companies want an e-paper publishing channel? According to the empirical data, the major reasons why the examined newspaper companies want to produce an e-paper edition are the timeliness of distribution, with extended access to areas and subscribers, the freedom of deadlines and updates, and the independence of printing, paper and distribution, including the environmental aspects. Further reasons are the declining subscriptions (of the printed newspaper) and the declining readership among younger people; hence, there is a need for a new attractive product. Some newspaper companies believe the e-paper edition will be a complement to the printed edition; others forecast that it might replace the printed edition.

In the initial phase, most of the newspaper companies would prefer to use material from the printed edition, in some cases in combination with material from the online edition, to produce an e-paper edition that is as automated as possible, i.e., to cut costs. Later on[3], the two European newspapers will continue to use their current dynamic replica of the printed edition[4], whereas the Swedish and North American newspaper companies would develop their workflows parallel to the development of the e-paper device technology, in order to include extended features, services and the exclusivity of the e-paper edition. They envision that their (further developed) e-paper editions will be produced either as a unique product (two of the companies), or included in the workflow of the online edition (one company), or produced as a part of a multiple channel publishing workflow (two of the companies). Hypothetical productions of these editions are further discussed in the second part *E-paper news publishing – strategies for production.*

All the newspaper companies agree that the dynamics of the e-paper edition are very important; the edition should be interactive and easy to navigate, and take full advantage of the features that can be included in a digital medium. However, preferences regarding business strategy deviate. The majority of the companies do not want the e-

paper edition to become a unique product from the start, as that means production personnel have to be allocated especially to this edition. However, at the workshop, where additional newspaper companies were present, the general conclusion was that an e-paper edition had to be a new concept, whereas one of the interviewed European newspaper companies was keen on making the e-paper product resemble the printed edition, in order to count it into the total circulation of the newspaper. The (large) North American newspaper was determined that the e-paper edition has to be a unique service from the start, if it is to become a success.

The e-paper edition should combine the best of the Internet with the best of the print medium, according to the companies. It should be newspaper-like, with a recognisable and familiar layout. All companies agree that the overview of the content is the main challenge; it is not easy to get a satisfactory overview in an electronic device. It is important that the articles have an obvious ending and that the commercial and editorial content be clearly distinguished from each other. One core aspect mentioned is that the edition must include value-added features, otherwise customers will not choose the e-paper edition over alternative publishing channels. Furthermore, interaction is considered to be a feature of great importance. Value-added features include: forums and discussion groups, extra services such as dating, immediate information such as stock markets and sport results, advertisements with customized change of colour and size, internal and external links, features such as archives and encyclopaedias, search functions, fun extras such as moving comics and interactive cross-words, and booking and ordering services. To better compete with other immediate pull-and-push media such as TV and Internet; audio and video are prerequisite features if the e-paper edition is to be made relevant. Moving images are considered to be especially interesting for the newspaper companies, as well as articles that can be consumed through audio. Many of these features provide an opportunity to give the readers more without added cost (of producing additional content).

Updates throughout the day are also a key feature in the success of an e-paper edition, according to the companies. However, one problem related to all fast publishing channels is, and will increasingly be, the control of content such as facts and quality.

The companies like the idea of 'freedom of output'; an e-paper edition can be saved, displayed on a screen, listened to through an audio output component, or printed. The hardware should be cheap, lightweight, and versatile: all features developers are trying to incorporate into a laptop. It should not merely serve as a newspaper, but should also handle books, magazines, and additional content, i.e. a media consumption device. The display size should preferably be larger than A5 with horizontal viewing, and ultimately consisting of a spread. The hardware interface should be uncomplicated, with limited need for add-on equipment, such as a keyboard. The opinions diverge among the companies as to whether scrolling should be used. The importance of colour was touched upon; the newspaper companies question whether the e-paper edition will take off if the device cannot display colour. Distribution should preferably be carried out through various distribution networks suggested by the companies, such as Transmission Control Protocol/Internet Protocol (TCP/IP), e.g. Ethernet and WiFi, and Digital Audio Broadcasting (DAB). Hence the device needs various transmitter/receiver interfaces, as well as extra connections for printing, e.g. Bluetooth or Infrared (IR), an audio output component, and storage capability.

Possible target groups for the e-paper product suggested by the newspaper companies are newspaper consumers living in sparsely populated areas, which are difficult to

reach with the printed newspaper distribution system; early adopters, who are somewhat overlapping with the target group of roaming readers; commuters, travellers, and people living abroad; and furthermore readers who prefer newspaper editions other than the printed edition, e.g. the younger readers.

Other Attempts at Electronic Publishing

The idea of using a paper-like and convenient electronic device as a newspaper medium is not new. Examples of ventures related to newspapers are the developments of Teletext[5] and Videotex services in the 1970s and 1980s. In the beginning of the 1990s, *Apple Computer Inc*. released a precursor to handheld computer devices (Personal Digital Assistants [PDAS]) called the *Newton Message Pad*, and *Sharp* released one called *Zaurus* (Duran, 2003; Fidler, 1997). In retrospect, many of these services and devices were too early for the times, or not sufficiently technically developed, but later became successful following further development. In 2002, several companies, such as *Compaq*, *Fujitsu*, and *Toshiba*, launched the Tablet PC, which is a lighter version of a portable computer, with a 10-inch display of higher resolution (120 ppi) in portrait mode, touchscreen and handwriting recognition (Toner, 2006; Duran, 2003; Rosenberg, 2002). The cost of Tablet PC when launched on the market was around $2,200 (Toner, 2006).

Fidler (cf. 1997; 2000; 2005) has long emphasized the idea of an electronic newspaper, for example with Videotex in the 1980s. With the release of the Tablet PC, he was finally able to realize his idea of a paper-like electronic newspaper. In cooperation with the *Los Angeles Times*, he developed a prototype edition in 2003, which featured non-scrolling, PDF-based newspaper-like pages that could include other multimedia formats (Foss, 2002). The summary pages were designed to preserve the experience of browsing a newspaper as well as the brand identity. Headlines and summaries were linked to full-text content pages with a consistent three-column format, which could be broken into 24 standard units for displaying ads. Clicking on unobtrusive ads or images linked either to full-paged ads or larger images, or launched video clips, i.e. could be either static or interactive. With sound and video being optional, the size of the edition ranged between 2-25 MB (Rosenberg, 2002; Fidler, 2005). According to Fidler, the business model for the Table PC edition resembled that of a printed newspaper, rather than that of an online edition (Toner, 2006; Foss, 2002). However, the Los Angeles Time Tablet PC edition was never commercialized, though a similar version was made for The Denver *Rocky Mountain News*, a software application offered through their website in 2003 (Duran, 2003).

The aim of the Tablet PC was that it should be used for multiple activities, not only as a reading device for newspapers, but also as a device for reading student literature, and as a writing device through the touch screen. The *Los Angeles Times* means that the reason why the Tablet edition was never commercialized was that there were too few available Tablet PC s on the market, and those that existed were too expensive in relation to their technical benefits. As with the handheld devices in the 1990s, the Tablet PC was not appealing to reach the critical mass[6], the device was not yet good enough, and was too expensive.

The e-paper device may at present be in the same position as the Tablet PC was a few years ago. To date, only few e-paper devices have been commercialized, most companies are still developing their prototypes, although e-paper technology is considered to have great potential as a reading medium in the near future (Carvajal, 2006; Ifra, 2006).

Recently, in April to June 2006, the Belgian financial newspaper *De Tijd* was one of the first newspaper companies to test an e-paper edition (Carvajal, 2006). *De Tijd* used its traditional printed newspaper fitted to the screen of an *iLiad* e-paper, with automatic updates during the day (Schroeder, 2006). The 200 readers were mostly highly educated men, selected to match the profile of early adopters[7] as well as the newspaper's demographic reader profile (Carvajal, 2006). The result indicated that *De Tijd's* readers, especially travellers, considered the e-paper product to be pleasing, but generally still preferred the printed newspaper because the test edition had several shortcomings and required further development. Above all, the complaints concerned the extensive download time when switching from page to page, and the lack of search functions. *De Tijd* considered that these complaints were caused by the readers' established habits of reading the news online (Burke, 2006).

Further tests with e-paper editions will be compiled in 2006. The French newspaper *Les Echos* will make a test edition with a layout designed exclusively for the e-paper device, as opposed to *De Tijd*, and will use the *Sony Reader* e-paper device (Carvajal, 2006). The test will run with 500 of their readers. Also, the *New York Times* will be running a test in 2006 with an e-paper edition of their newspaper on 300 of their readers (ibid.).

Discussion on Strategies for the E-paper News Product

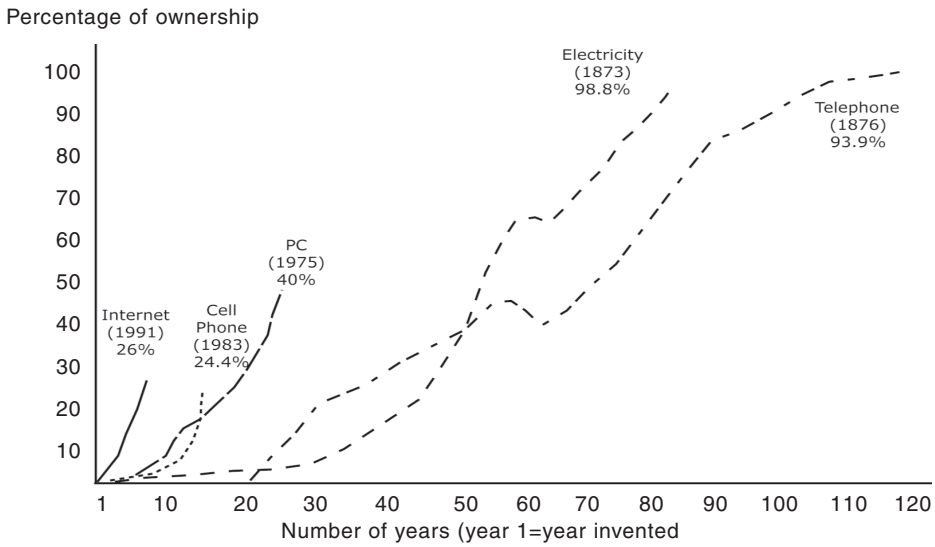
The possible success (usefulness) of the e-paper edition is three-fold:

First, success largely depends on the hardware developers. The newspaper companies doubt that the product will take off until the device is mature and well established on the market, which seems accurate if we consider earlier attempts at electronic newspaper channels, for example the Tablet PC and its edition. Hence, the companies' business strategies largely depend on how and when the hardware will be technically matured.

Second, the e-paper edition is largely dependent on the target groups selected for the product. People living in sparsely populated areas are an especially attractive target group, according to the newspaper companies, as distribution of the printed newspaper to such areas is expensive and hampered by delays. However, it is questionable whether customers living in sparsely populated areas will be among the first category to purchase and use a new electronic device. They would more likely use the already established online edition on a computer, as they may not primarily be in need of the mobility, but of regular delivery, and a computer and the Internet can also be used for other activities. Roaming readers are another potential target group, however most of the examined newspaper companies do not have any, or few, commuters and travellers among their readers. Furthermore, according to Sparks (2000), the suggested target groups of online editions are readers who cannot be reached by distribution of the printed edition, persons who seldom or never purchase or read the printed edition, mainly younger people. Apparently, it seems that the target groups for the online and e-paper editions are, at least in the initial phase, mainly the same.

Third, customers' media habits are of importance to the success of e-paper publishing. Media habits are closely connected to people's life situation: identity, lifestyle and everyday life (Weibull, 2004). The future of new media services depends on how strongly they can penetrate these aspects. The customers' habits of consuming news have to change in order for a new, unique channel to be successfully introduced, or have to

Figure 2. *Examples of the Technology Adoption Curve*



Note: It has taken the Internet only seven years to reach the level of adoption it took the telephone 35 years to achieve (in the Western world) (IEC, 2005).

be introduced in an already existing habit, as with the free newspaper (e.g., Wadbring, 2003;2006). The Internet has perhaps had the fastest adoption rate of any technology in history (Rogers, 2003:346; Edelman, 1998, in Stafford, 2003), as shown in Figure 2; with the e-paper news edition there will most likely be a long period of parallel publishing with the printed edition, which will be costly.

Research has shown that it is hard for the newspaper companies to make their online edition profitable. Not that it necessarily cannibalizes on the printed edition, but because the online edition must deliver unique services for readers in general, or for specific target groups, in order for publishers to be able to charge for the content. This is probably a consequence of the fact that many newspaper companies lack initial strategies for the online edition regarding design, services, and target groups. But, as no established business models yet exist for e-paper publishing, newspaper companies have an opportunity to initially start charging for the content. Successful business models will be more likely if the e-paper product provides value-added services, besides its physical advantages over paper and computer displays. For example, *Aftonbladet*, the first newspaper in Sweden to provide value-added services exclusively online (Alström *et al*., 2001), is still, after more than ten years on the online market, the most popular (number of unique visitors) online newspaper site in Sweden (cf. NORDICOM, 2004: 88), and one of the most popular in Europe (WAN, 2001[8]). Thus, in order to succeed, the basic applications of an e-paper news product and the device, such as downloading time, readability, and search facilities, has to be equal or better to what the reader is accustomed to on the online channel, as indicated by the test carried out by *De Tijd*. Or, the product has to satisfy a (basic) need not yet provided by any other newspaper medium, for example for a specific target group, otherwise customers will use already established channels. The e-paper channel cannot only rely on its digital advantage to succeed, as could the online channel ten years ago, because an electronic channel is now already established. Thus,

the functionality of the device, the target groups, and the level of value-added services will determine how the e-paper edition should be produced; this is discussed further in the next section, *E-paper news publishing – strategies for production*.

In summary, the newspaper companies want the e-paper product to be inexpensive, interactive, include embedded and extra features, be dynamic, have a newspaper-like layout, and be totally different from, or serve as a complement to, the print newspaper. Especially moving images seem to be an attractive feature. Why? When checking the online sites of the newspaper companies that participated in the case study on a normal day (060223), they included few or no moving images or other media features. This is emphasized by Karlsson (2006:122f), who found in an investigation of four major Swedish newspaper sites that only 1-5% of the articles included web-TV, radio or moving images (not equivalent with *interactivity*). Engebretsen (2006), examining somewhat fewer Nordic online articles, found that 11% of the articles included video and sound, which Engebretsen judged to be few. According the interviewed e-book distributor, their customers (publishing houses) have the option of embedding moving images and colour in their digital books, but few of them make use of that possibility. Interaction also requires two-way communication, and if the main feature of an e-paper product, mobility, is going to work flawlessly, this requires distribution networks that cover most geographical areas successfully, a task not yet completely accomplished (e.g., SVT, 2006). Moreover, many of the features the newspaper companies attach to a potential e-paper edition are very similar to those associated with the already established online edition. The gist of this study must be that the newspaper companies might not yet have properly thought through many matters concerning the impact of the strategies for e-paper publishing. In their defence, it could be stated that it is not possible to have a complete business concept for a product and a device still under basic development. However, the overall impression from the results of the present study is that the newspaper companies need to more realistically adjust the e-paper product to *their own* business models, customer base, and production conditions.

E-paper News Publishing – Strategies for Production

Introduction

Because electronic publishing channels constitute a relatively new phenomenon, most newspaper companies' production workflows and editions are at present typically constructed based on the production of the traditional, printed newspaper, often including at least one additional publishing channel, where the largest is the online channel. An edition for a new output platform could be produced in several ways, but there is no patent formula for how to successfully incorporate a new channel into an existing newspaper production workflow.

Based on the analysed empirical data, i.e., how the newspaper companies envisioned the production of an e-paper edition, together with views on the characteristics they attribute to a successful e-paper news product (presented previously in the section *The newspaper industry's views on e-paper*), five models have been compiled and are presented below. The models are proposals on different ways a newspaper company could incorporate an e-paper channel into its existing newspaper production workflow. The proposed models, and hence their complexity and the time and money required to implement one of them, differ depending on the company's purpose in producing the edition, i.e., the level of added values included, selected target groups, the technical con-

ditions of the device and the connectivity (discussed in the previous section *Discussions on strategies for the e-paper news product*). The models may apply to the implementation of other electronic publishing channels besides e-paper, however, they have been constructed with the e-paper channel in mind.

In order to facilitate understanding of the models, a brief description of an existing newspaper production workflow is first presented. It is a generalized, simplified description, based on the empirical data gathered in this work and other (Leckner and Nordqvist, 2002; 2003) case studies of newspaper production workflows.

Present Newspaper Production Workflow

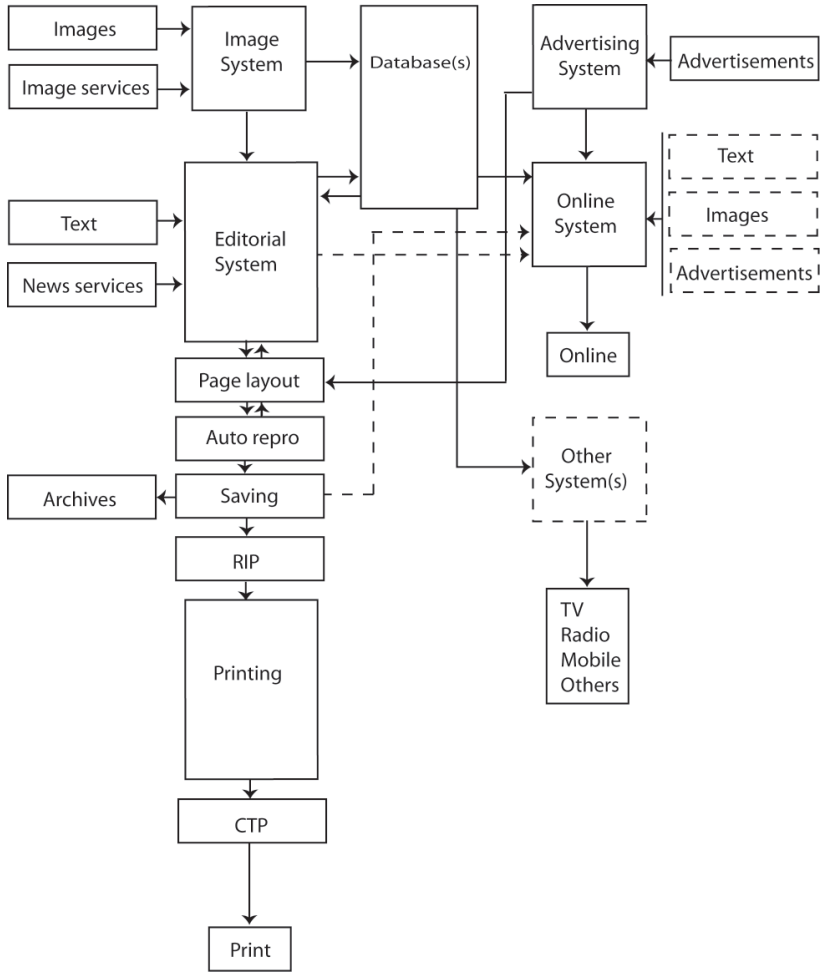
Typically, most newspaper companies' production workflows are based on production of the printed newspaper. Such a workflow basically consists of at least three subworkflows: production of image content, production of editorial content, and production of advertisement content, merged into a newspaper product, and printed. The general structure of a newspaper production workflow is shown in Figure 3[9].

In the *image workflow*, most photos today are acquired with digital cameras, and graphic images are created through image software, in-house. External images are purchased from various image services and databases, fetched by File Transfer Protocol (FTP), through e-mail, or downloaded through browsers. All images[10] are usually tagged through the use of eXtensive Mark-up Language (XML) with information such as producer, time, date, output channel, etc., and saved in various file formats, such as Encapsulated Post Script (EPS) and Tagged Image File Format (TIFF), into the image system.

The *editorial workflow* process consists of acquisition and aggregation of the newspaper content: text, images, and advertisements. The text is partly produced by reporters, in-house or imported through e-mail or extensions[11] to the editing system, and partly purchased from external services and agencies and imported into the system. All text content is usually tagged and stored in the editorial database. The copy editors, who at some companies also function as reporters and/or photographers, aggregate the content manually through the editorial software system by placing the content into modules[12], specified beforehand for that particular content by the section editor. Because the content has been tagged beforehand, it can easily be fetched from the respective database or server – the text from the editorial database, and the images from the image database. The image content is automatically reproduced (autorepro) parallel to the editing, including processes such as separation, resolution, sharpening and resizing. Some content, such as advertisements and special content from news agencies, is commonly placed into the edited page by automation.

The *advertisement workflow* and its production system, is commonly separate from the editorial production system, as well as the imaging system. Most advertisement materials are sent print-ready from the advertiser by e-mail, FTP, or downloaded through browsers, commonly in formats such as PDF and EPS. The advertisement material commonly acquires a specific identification and is automatically pre-flighted[13] before it is, often manually, controlled, to assure that the content corresponds to the booking. Finally, the file is stored in the advertisement database, where it is fetched and placed into the newspaper page through automation, based on its means of identification. Advertisement material could also be created at the newspaper company, created through special web browser services by the advertisers, or the production could be outsourced to other companies.

Figure 3. *A Simplified and Generalized Description of a Newspaper Production Workflow*



Note: The presented workflow is based on production of the printed edition, with possible additional publishing channels incorporated into it, such as the online channel and "other systems"; publishing channels such as TV, radio, and mobile services.

When the newspaper page has been edited, and controlled by the editor, it is considered print-ready and saved in several formats with different resolutions for various output channels and archives. Typically the file is saved in PDF format for most applications, and in PostScript (PS) format when sent to printing. The PS file is raster image processed (RIPed), often into TIFF G4 (bitmap) format, and sent to the printing plant, or the file is sent directly, commonly in PDF format, to the printing plant and they perform the RIPing. In the *printing workflow*, the plates are made based on the TIFF G4 files through computer-to-plate (CTP), then placed into the presses and printed.

Additional Publishing Channels

At present (2007) many production workflows include additional publishing channels besides the printed newspaper; the most common and largest is the online channel. The production of the online edition (or other additional channels) depends mainly on the resources allocated to that channel. The content can be exclusively produced for that edition, produced in parallel with the printed edition, include recycled content from the printed edition, or a mix thereof. Still, newspaper content is mainly produced for the printed edition; hence the online content is commonly parallel published, or in some cases recycled material from the printed edition. However, content such as breaking news is published for the most part online, before it is published in the printed newspaper. The content could be fetched from the editorial and image database(s) of the printed edition, or produced by allocated online personnel. The text is commonly customized manually, generally re-written (shortened), and the images are auto-reproduced to fit the online channel. The content is produced and edited either through software or through direct coding, saved in the online database, and made available (published) on the newspaper website. For online advertisements, the location and space are often the same every day, and a major part of the advertisements are parallel published with the printed edition through automation, however specific ads, such as banners, are often produced manually by the online workflow personnel. If other publishing channels exist, they are generally produced the same way as the online edition, however, most commonly with less allocated resources, less manual work, and less content produced exclusively for that channel.

Proposed Production Models for an E-paper News Channel

Five different ways of producing an e-paper edition are presented in sections I-V below, however, the models can also be combined, or include parts of other models. The proposed production workflows are generalized and simplified.

I. A replica of the printed edition

In the first proposed model, the e-paper edition is produced as a replica of the printed edition. This model can be accomplished in different ways; however, it will always be based on the printed edition in the sense that it is consistent in content with that edition, but not necessarily an exact replica, yet it should include the characteristics of the printed edition. A possible workflow for this edition is shown in Figure 4, and below, three ways of producing this edition are presented: one static and two more dynamic versions, versions which are currently offered by several newspaper companies, published on regular computers, but not on e-paper.

The simplest way to produce an e-paper edition is to use the print-ready production file, which typically means a PDF. This presupposes that the display size of the device does not differ much from the size of the newspaper page, or reformatting issues come up. Alternatively, page division or scrolling can be used to avoid reformatting, however scrolling may be too power consuming for the e-paper device, or not possible for other technical reasons. An existing example of this kind of news product, sold through some newspaper companies' websites or sent by e-mail, is a *PDF paper*, an exact, digital reproduction of the print version of the newspaper. This is a *static edition*, which usually only allows page-based zooming or other global-level operations and is downloaded to the reader's computer. Many newspaper companies presently offer this edition as an

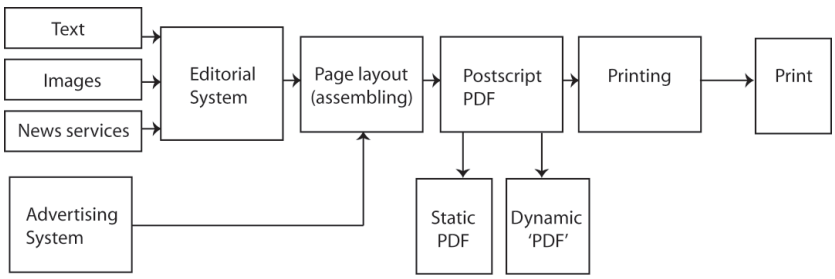
extra service. Application service providers that print physical hardcopies by print-on-demand through outlets around the world also provide this type of edition. Examples of such providers are *Newspaper Direct* (www.newspaperdirect.com) and *Satellite Newspapers* (www.satellitenewspapers.com).

Alternatively, the print-ready production file can be processed into a more *dynamic edition* using software solutions, for example through XML, which allows, for instance, individual expansion of single articles. Using software, the print-ready file is exported to XML format. From this tagged XML data, it is possible to extract information, such as structures, hierarchy, metadata, links and keywords, which is included in the documents of the file to create a source document with structure information. The structure information can be written back into the PDF file (as structured PDF), or exported as an XML image (a XML schema that preserves each original document's appearance) or converted into an image format, such as Joint Photographic Experts Group (JPEG) or Portable Network Graphics (PNG). These steps convert the file into a dynamic version of the printed edition – digital, searchable, with the possibilities of external and internal linking, enlarging of articles and advertisements, embedding media and interactive additions, and encyclopaedias and archives. (However, not all these features are included in all solutions). These types of editions are called *dynamic PDFs, electronic editions, e-editions, digital editions* or *even e-papers* (for example in Germany); currently no standard definition exists. Two approaches to this dynamic edition are common:

One approach involves the edition inheriting the traditional format of the printed edition and allows the reader to navigate and consume it as an ordinary print product, downloaded onto the reader's computer device and read through locally installed software. This type of edition is offered through application service providers, for example *NewsStand* (www.newsstand.com) and *OliveSoftware* (www.olivesoftware.com).

Another approach involves the original publication style and format of the printed edition being saved as an image, linked to text files of the article in XML or HTML format. The newspaper companies administer the software themselves using a software license that permits them to perform the hosting and segmentation internally, where the text and images are linked to the editorial system. No local software is needed to read the content, but the reader needs to be online. This edition is offered by many newspaper companies through software, provided by for example *OliveSoftware* and *TietoEnator* (www.tietoenator.com).

Figure 4. *Generalized Print Workflow, with the Output of Printed Edition, Static and Dynamic PDF Edition (or similar proprietary formats)*



Independent of how the edition has been created (or approached) as presented above, the file is saved, which can be done in several ways; the method of choice depends on the provider. For example, the edition created at the newspaper company is saved in an archive and stored/updated on a file server. From the server, the news content can be pushed to, or pulled by, the recipient. Notification of delivery can be done by, for example, a signal from the reading device, by e-mail or by SMS.

De Tijd's e-paper edition is an example of a publishing channel that is a replica of the printed edition (see the previous section *Other attempts at electronic publishing*), and existing editions of a replica of a printed edition, though not (yet) published on e-paper devices, are PDF newspapers (see e.g., www.dn.se > DN.PDF[14]) and image and metamarkup language based newspapers (see e.g., rhein-zeitung.de/epaper/).

Benefits of this workflow: It implies no or relatively small investments in, or change of, the existing workflow of the (print) newspaper production. The production is almost completely automated. It keeps the "look and feel" of a printed edition and the recognition of the newspaper company brand. And, the edition is relatively independent of output platform, however the screen size cannot be too small.

The drawback of this type of workflow is that the e-paper edition is entirely static as a downscaled PDF and relatively static even in the more dynamic approaches. The features of a digital medium cannot be fully utilized, i.e., the recipient (customer) is offered a traditional newspaper digitally. Furthermore, the automated downscaling from the full size format (tabloid, broadsheet, berliner, etc.) to the smaller (at present approximately A5) size format of the e-paper device can cause reformatting problems, for example for advertisements and images.

II. A replica of the online edition

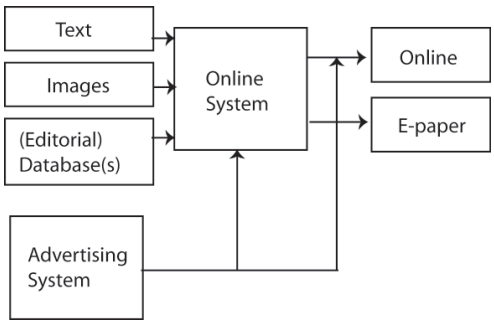
Unlike the previous presented edition, which is based on the print-ready file, the replica of the online edition is assembled as for the online edition, i.e., by the online production staff and through automation. The content can be selected from different locations: from the content database where tagged material is matched to the output channel automatically, from the content catalogue of the printed edition, directly from the edited printed edition documents, or written directly into the edition templates by the online journalist. At present, most online newspapers still consist of content that is selected mainly from the printed edition, although the number of reporters working exclusively on the online edition is increasing. The selected content will be edited (placed) into templates designed for the e-paper edition, which are linked to the database. Some content (e.g., news from news agencies and weather maps) is placed in the templates as XML text through automation. An example of this kind of workflow is shown in Figure 5.

Updating of the edition's content could be scheduled or random. Naturally, even if schedules are used, updates are performed instantly in case of important breaking news events. If this workflow handles more than one channel (e.g., both the online edition and the potential e-paper edition), they could be provided with different publishing schedules. If the edition itself has different updating schedules, for instance in different sections, the template elements could be divided into different priorities. Some section that would benefit from automated updating, for example in niche sections such as sport results or stock markets, could be updated more frequently and are more suited to automated action, compared to other sections, such as culture or news articles.

When the page has been edited, it will be stored in the news archive and saved as a composite file, and the links are replaced with the actual text, images and graphics. The

file is then formatted to the e-paper file format and stored/updated on the file server, ready to be pushed to or pulled by the recipient. Cross publishing of this file (edition), for example, also on the Internet, is possible.

Figure 5. *Generalized Online Workflow where the E-paper Edition is Integrated Into the Production of the Online Edition*



Benefits of using this model: Production of the e-paper edition could be integrated into an already existing workflow, hence allocated resource(s), e.g., personnel for editing and checking of the final content, already exist. Value-added features in use in online applications, such as instant messaging, interactivity, multimedia, personalization, image gallery, can be utilized. With greater possibilities for a true dynamic workflow versus a format tied to the traditional print edition format, this type of new product could include extended services and features from the start and it would, thus, increase the chance of a successful product.

The drawback of this model is that it requires at least some allocation of resources and re-organization, hence the production cannot easily be adapted into an automated process, therefore will be relatively expensive, and is not optimized for multiple channel publishing.

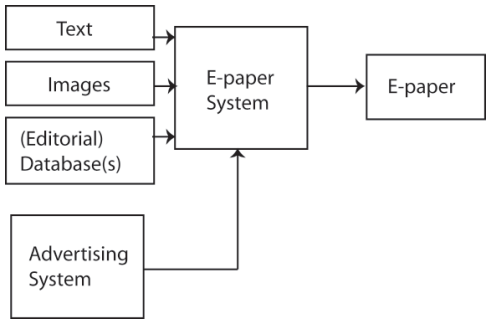
III. Produced as a unique edition

In this model, the e-paper edition is approached as a unique product. The content of the e-paper will be produced exclusively for this product or re-edited from material in the existing content news flow, not from another edition as a secondary media channel. Production staffs are assigned exclusively to producing this edition, and the layout and format are designed to fit the e-paper device through the use of templates. See Figure 6.

Updating and scheduling are similar to the replica of the online edition (Model II, a model that could be equally produced as to a unique edition), and saving and delivering are performed as described in the replica of the printed edition (Model I), with the addition of two-way communication required, while using, for example, interactive features/rich media[15].

Benefits of this model: The e-paper edition can get into production without delay; no adjustment and integration into another workflow is required. The format is exclusively designed to fit the e-paper device, which will assure that no reformatting is needed. The potential of a new medium can be fully utilized: rich media, embedded files, interactive services, two-way communication, etc., to make a "unique" new product, which could

Figure 6. *The E-paper Edition is Produced as a Unique Edition, Shown in a Simplified Figure*



increase the chances of a successful business model from the start. Furthermore, constant updates are easily achieved.

Drawbacks of this model are that the existing production workflow cannot easily be adapted to an automated process, it needs allocated resources, and hence, it is expensive.

IV. Produced as a part of multiple channel publishing

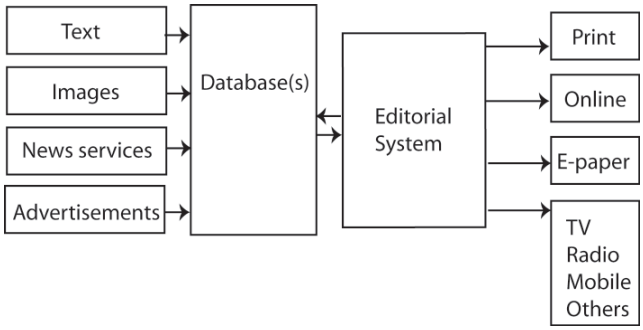
One possible extension of the previously mentioned workflow is to treat the e-paper edition as one of several publishing channels (e.g., print, online and e-paper), i.e., multiple channel publishing, shown in Figure 7. The key to an efficient system is that all material is stored at one location: moving and still images, text, etc. The (multi-channel) system consists of a logical unit, one or more databases, where the material could either be dependently or independently stored according to output channel, pulled when needed by each department, and formatted for each specific channel. Depending of the level of dynamics the e-paper edition will exhibit, there are several ways to implement this type of edition:

One way to implement a *static* edition is by using templates consisting of modules stored in a template library in a database. The templates and elements are coded according to editorial decisions, ranked by importance. The number of elements to be used by each article and advertisement is specified, and all the material is placed automatically onto the templates, by order of appearance in the database. There is no allocated copy editor for this edition, or alternatively, all the output channel editions, but someone, like the news editor, is in charge of the appearance and in the control of the content.

Another way is to implement a more *dynamic* product, which could be achieved by layout-controlled production, using a central copy editor who is in charge of all editions through a specialized software system. The system formats the material, which has been chosen and assembled by the copy editor, for each channel using templates. The system formats the image size and resolution to fit each specific output channel, such as an e-paper, a PDA or the print newspaper, and gives the maximum length of the text that will fit a predefined space[16] for each channel. If such a software system is not used, the automation is somewhat reduced, but the editor can still utilize pre-defined templates, created to fit the conditions of each channel, and XML material, tagged according to the publishing channel. An extension of this production is to use the same type of software system, but to have the journalist function as both reporter and copy editor, and possi-

bly also as a photographer, creating the whole article for one or more publishing channels. The reporter writes directly into a pre-defined space of a page using a software program, following the text flow on the page, and ensures that the text length fits the predefined space in the page, placing additional parts, such as images, onto the page. Or using a combination of the alternatives described above.

Figure 7. *Generalized, Simplified Multiple Channel Publishing Workflow, where the E-paper Edition is Treated as One of Many Publishing Channels*



Updating and scheduling in this type of workflow is similar to Model II, and saving and delivering are performed as described in Model I, with the addition of two-way communication to secure utilization of value-added features, such as interactions.

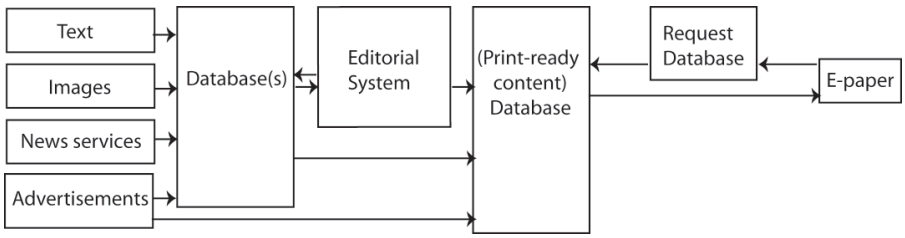
Benefits of using this model: Newspaper publishing is heading towards multiple channel publishing, which this kind of workflow supports. The main benefit is efficient news production, hence cost-effectiveness, and if additional channels is added to the workflow, a marginal amount of work would be required. The utilization of value-added features may not be as easily used as in the unique news product workflow, but it may still be possible to add appeal to the product. However, this workflow requires major reorganization of the production system and reallocation of human resources in the initial phase, as well as innovative thinking on the part of the company and its employees. Moreover, additional resources for control of the content (facts and quality) may be required for this type of workflow.

V. An edition produced on the fly

In multiple-channel publishing, the publishing rhythm often differs depending on channel. The printed edition has limited (no) possibilities for updates during the day. One of the advantages of digital editions is that they enable continuous updates several times a day, and that ”breaking news” can be flashed in addition to the regular publishing schedule. This allows e-paper editions produced on the fly efficiently, exemplified in Figure 8.

When the recipient requests a new edition, the latest available material is aggregated through an automated process into allocated element(s) in a template. The allocation is possibly made according to a priority set beforehand, and the priority depends on the type of content and the amount of material to be updated. The major manual step in this workflow is checking the content before it is pushed to or pulled by the recipient. This type of workflow can also be a part of previously described models.

Figure 8. *Generalized Workflow Incorporating an E-paper Edition Produced on the Fly*



Benefits of this workflow consist primarily of truly updated publishing. However, this product requires material stored in standard formats; the elements associated with different articles need to be linked to the articles through metadata tags; hence a production process with a large degree of automation is required. Thus, as with several of the previously described models the production requires, for example, major reorganization, hence is costly in the initial phase.

Discussion of Strategies for E-paper News Production

Looking back at the past two decades, newspapers have undergone vast changes and improvements regarding content, design and technology throughout the world (cf. Fidler, 2000; Picard and Brody, 1997). In the future, the newspaper business will have developed even further into digitalization. New ways and devices to electronically deliver and display news content are therefore to be expected. Hence, there will be further incorporation of new publishing channels into the newspaper production workflow, besides a potential e-paper channel, as newspaper companies like to provide their customers with the output channels of their liking. Thus, at least at present, the most optimized newspaper production and a long-term inexpensive workflow would consist of an integrated workflow including multiple channel publishing, i.e., where content converge (editorial, image, advertisement, booking and invoicing material are integrated into the same system), and the output channels diverge (e.g., print, online, e-paper, mobile services, etc.). Hence, many newspaper companies are heading towards such workflow, yet the implementation is slow as most newspaper workflows today are based on the production of the printed edition, and it is not economically possible to change an existing (print-based) workflow all at once.

With the integration of the e-paper channel, most newspaper companies expect the e-paper news product to be a replica of the printed edition in the initial phase. It should not be as static as a plain PDF, but preferably with added features, for example equal to the existing proprietary format editions, because this e-paper product requires minor modifications of the companies' existing (print) production and organization and, hence, is inexpensive. One argument *against* this type of product is found in the question "why would the reader want exactly the same product as the paper edition, which is already available through the online channel?" Moreover, this type of edition is relatively static, and has to be produced for an output device with a relatively large screen (>10 inch) if it is to work satisfactorily, hence modification of the production workflow *is* required to fit the smaller display of the (current) e-paper device. To squeeze a broadsheet or a

tabloid format into a much smaller format, such as the current e-paper screen, is one of the challenges of the replica of the printed edition. The argument *for* this type of edition is that it is a cheap way to provide the customer with a familiar product, with more mobility than is allowed with a notebook computer, and that it includes, however limited, digital features not found in a printed newspaper. Moreover, a replica of the printed edition might also be an attractive alternative, in some case the only alternative, for smaller newspaper companies that do not have the assets to experiment when initiating a rather uncertain new product, or that may not have a consumer base with an adequate number of early adopters, who could make a venture of an unique edition financially feasible. However, if the e-paper technology is not enough matured, as shown in the currently commercialized devices, and a replica of the printed edition is used as e-paper news product, i.e. not much added value, competition may be imminent with the online newspaper, as these two electronic editions are likely to attract the same kind of audience. Here, the online newspaper always has the advantage of being only one of the Internet's many functions, in addition to already being established. Thus, before the e-paper technology is fully matured, the added value – the main competing attribute – can primarily be offered through the content. A larger company, assumed to have more assets, could possibly initiate exclusive features and services from the start, i.e., a unique product, making it market relevant. Some of the smaller newspaper companies in this study have even commented that it might be necessary for a major actor to pave the way for an e-paper edition and establish it on the market, before they would be willing launch an e-paper edition.

In between producing a truly cheap product, or a truly value adding product, varying levels of uniqueness and efficiency can be attained by using an e-paper product produced as a replica of the online edition, as a part of multiple channel publishing, produced on the fly, or a mix thereof. In an initial stage, however, they are all more expensive than the product reproduced as a replica of the printed edition, yet, as with the unique product, make more use of the advantages of the e-paper technology.

Research has shown that there is less competition between the printed newspaper and its online counterpart than what was initially feared. However, when this study was performed many newspaper companies believed that if the e-paper news product becomes successful, it would replace the printed edition, some believed within ten years from the news product's introduction on the market. As early market establishment could provide a great market lead, this may be a major reason why many newspaper companies are interested in developing services for a device that has hardly been commercialized.

Conclusion of Strategies for Product and Production

Entirely new publishing ventures such as e-paper – a technology hardly commercialized on the market – require large investments and have a rather uncertain outcome. The conclusion of the present work is that the success of an e-paper edition involves three main aspects to be included in the publishing strategies: sufficient device technology, a target audience, and timing, as the success in the end is dependent on the advantages for the customer: the level of convenience, cost and added values. These aspects determine, and can be influenced by, how the edition will be produced, hence how it will be incorporated into present newspaper production. In the present perspective, when the e-paper technology is still immature, there seems to be two alternative ways to produce

an e-paper news product, of varying degrees: An edition including exclusive features and services has higher chance of succeeding with the current state of technology, as it will be more appealing to consumers, and have greater potential to compete with other media channels, but will be expensive to produce. A replica of the printed edition may require small investments and few modifications of the existing workflow, but means that the new edition is tied to the traditional edition, with few added values, possible through a digital medium. However, most future newspaper publishing will certainly include several publishing channels, and new media will continue to be developed and integrated as publishing channels. Hence, in the long run, multiple channel publishing consisting of integrated content-managed workflows seems to be the optimal choice for newspaper production, including e-paper, but requires significant changes to be made in the present (print-based) workflow structure. Nevertheless, regardless of the production model chosen for the e-paper edition, it is most important that each newspaper company carefully investigate their own specific purposes for initiating an e-paper channel with respect to the basic conditions of their specific company.

Notes

1. Commonly such services or editions mean a software application based on a metamarkup language and an image format. An example of this edition or service is the *Active paper* used by many newspaper companies from the software manufacturer Olive Software (www.olivesoftware.com). This is further discussed in the section *A replica of the printed edition*.
2. *Videotex* were computer-based interactive systems that electronically delivered information via the telephone or two-way cable, through TV or video monitors (cf. Boczkowski, 2004; Fidler, 1997), and the *Tablet PC* is a portable computer with higher resolution, lighter weight, and a touch screen, compared to a general notebook display, also thought to be more paper-like.
3. Exactly when was not specified by the companies. However, the authors interpret this as when a critical mass (Rogers, 2003: 351) has been reached.
4. The construction and production of these editions are further described in the section *A replica of the printed edition*.
5. *Teletext* is a "one-way system for the transmission of text and graphic via over-the-air broadcasting or cable channels for display on a television set" (Aumente, 1987: 14, cited in Bosczkowski, 2002:271). A successful example of Teletext is text-TV.
6. *Critical mass* is the point at which enough individuals in a system have adopted an innovation so that the innovation's further rate of adoption becomes self-sustaining (Rogers, 2003:351).
7. *Early adopters* are the second group in a social society to adopt an innovation (Rogers, 2003).
8. Newer data could not be found (061123).
9. The description in Figure 2 is mainly based on Swedish newspaper companies' production workflows.
10. All image content, e.g. photos, graphics, illustrations, will henceforth be referred to as "images".
11. For example plug-ins – auxiliary programs that work with a major software package to enhance its capability.
12. *Modules* – several, often square-shaped, elements into which the page is divided.
13. *Preflight* – a quality check of the file, controlling the correctness of the fonts, images, separations, links, etc.
14. http://www.dn.se/DNet/jsp/polopoly.jsp?d=1349&previousRenderType=3&pdfAction=demo
15. *Rich media* are digital and interactive media, which may include characteristics such as video, graphics, text, animation and audio (SNM, 2006).
16. For example, a specific article can be 750 words long in the PDA edition and 1500 words long in the printed edition.

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