Abstract
The introduction of new information technology can be a rationale for reconsidering what digital products organisations produce and reconsidering how work should be organised around the production of artefacts. In this article a pilot study covering three World Wide Web publishing cases is presented. Through a holistic view on documents, work and technology the three cases are described. The conclusion of the article is that the promises of digital documents are far from realised in the organisations studied and that the products provided are traditionally founded. This can be related to a number of factors but the little involvement of technical skilled people, inappropriate tools and uncertainty on how WWW technology can be integrated with the existing organisation are factors contributing to the weak implementation of digital documents.

1. Introduction
The promise of digital documents is not that of an end to paper, but the promise of new tools that enable humans to collaborate in new ways [1], that enables consumers to get the information they actually need [2], and tools that enables people to change the organisation of the way they produce, store and retrieve information in documents [3]. The Internet is the first infrastructure that enable these possibilities at a large scale. In this article the production of digital documents for the World Wide Web in three Scandinavian newspaper organisations is presented and discussed.

Newspapers are important institutions in the western world of today. As sources of authentication they play a central role in the writing of modern world history. With a global computer network, the Internet or its successor, some expect this to change within a short period of time (cf. [4, 5]). Newspapers are turning to the WWW for several reasons. One possibility is the use of it to gather information material and do research with the purpose of writing articles, another kind of use is the provision of a WWW service, in other words some sort of digital newspaper. This last approach has gained much attention in the newspaper business and estimates spring 96 were that world wide more than 800 newspapers provide such services [6].

Introducing new technology into organisations can be a rationale for change [7]. This article documents a pilot study of three World Wide Web publishing cases, the aim of the study being to investigate how WWW technology is used to produce digital documents and how work is organised in relation to the documents produced. In this article we focus on the introduction World Wide Web publishing technology. The WWW can also be used for information retrieval but is not the focus of our study. As described by Blomberg, the same technology can have different impact on work in different settings [8], for which reason we have picked three newspapers to study.

2. Research Background
The digital documents produced, stored and retrieved in computer networks are not simply one-to-one analogue to prints on paper. Fundamental differences separate conventional documents from their digital counterpart. With the diffusion of computer networks these differences are becoming apparent to more and more people. Paper documents are typically limited to text and still images, while digital documents can contain sound and live images arranged in hypertext format (i.e. hypermedia). Where paper documents are static entities, digital documents can be “virtual”, they can be generated on demand to suit individuals needs, the document content dependent on when and where
they are generated, the document being generated from underlying sources [3,9]. Having escaped the limitations of print on paper authors are no longer in complete control of what the readers view, making it harder to figure out what to write in the first place [1, 4, 10].

With the current use of Internet and World Wide Web, there is a discrepancy between technical potential and actual use. The World Wide Web protocols offer the change to go beyond static documents. The Web language Hypertext Mark-up Language (HTML) was initially designed as a language for communication over the Internet, deliberately designed so simple that computers as well as humans could generate it [11]. What we see today is that not only has HTML been accepted as a language of communication, but it has also become a de facto language in which many documents are encoded on the web. As a result, a large proportion of the World Wide Web has become a vast collection of documents in the classic sense: static and even preformatted documents. In this way the potential of Internet protocols as program interfaces is not used, the Internet solely being a distribution channel. Rice, Gruber and others argue that Web browser should not be seen as state of the art software for Internet use, but instead as neat and attractive interfaces for much more powerful applications yet to come [12].

In their article [4] Levy and Marshall discusses digital documents as related to work and technology in libraries. Based on work by Yates [13] they establish and describe dependencies and relations between documents, work and technology. In this article we use the framework of Levy and Marshall to discuss how web technology relates to and influences documents and work in the three organisations studied. Any new digital document (library) product will be based on an enabling technology. In the cases of the three newspapers this enabling technology is WWW.

The research approach to collect and analyse data for this article and the motivation for the data presentation is described in section 3. Section 4 presents the three cases. The cross case findings are summarised in section 5. Section 6 contains a discussion of the findings and section 7 concludes the article.

3. Research Method

The research presented in this article was mainly based on qualitative studies carried out in three Scandinavian newspapers. The aim of the study was to contribute to a clearer understanding of what challenges newspapers and other organisations currently face. From this desire to understand the impact of a new medium in such organisations, an applied research project was established [14].

The organisations chosen for the study were purposefully selected: All are early starters with Internet. The studies were carried out in three different countries: Denmark, Sweden and Norway. The diffusion of Internet has taken different pace in these three countries, our impression (although not clear) being that Denmark lags behind in terms of number of users and in terms of experience in organisations with using the Internet. This factor is expected to contribute to higher variation between the selected organisations. With the terms of Patton this way of selecting cases can be described as intensity sampling [14].

Within each organisation a chain sampling strategy was used to identify people with knowledge and skills of interest for the study. The unit of analysis were individuals. Some of these were interviewed (tape recorded and transcribed) while others were overtly observed in their everyday work. Parts of the interviews could not be taped, since we also talked about the topics when the interviewees showed us around in the newspaper organisations.

The interviews carried out were all based on an interview guide approach [14]. On the one hand we had a desire to get a holistic view of the organisation and the production of the Internet edition, but on the other hand little was known in advance about what was actually going on. The interview guide was used to ensure that we got the information we needed in the interviews, but it did not determine the sequence or structure of the interview. Our aim was to allow new topics of interest to emerge as the interviews went on.

A wide range of questions were discussed covering design aspects, user interaction, current status related to the future expectations, the impacts on everyday work processes, the production of articles and tools used in this process. The results reported, i.e. the case descriptions and the similarities and differences between the papers, have been derived in a bottom up approach.

In two of the three organisations we observed the process that lead to the production of the Internet edition. In both organisations this observation was done within a four hour period. We also studied the Web services of the three papers. As a research method this can most appropriately be described as unobtrusive measures [15], although in principle our access to the Web services could be logged and hence was not purely unobtrusive.

Through an inductive analysis [14] data has been analysed to yield the results presented in this article.
4. Cases

In this section the three cases are presented. For each case a brief history of the Internet publishing service is described to answer question on how and why the services were initiated. For each case we then presents aspects of products, technology and work from a perspective based on work by [13] and [4]. The digital product each newspaper provide is described at a general level. The Internet and WWW in itself is considered the enabling technology, but for the organisations to publish on WWW additional technology must be used to the produce the material for the Internet edition. The organisation of work in relation to the product and the technology is also described for each case. Finally each case description presents the rationale of the services in order to give a situational context for the design of the services.

4.1 Jyllandsposten

In number of printed newspapers Jyllandsposten (JP) currently is circulated in 170,000 copies and is thereby the largest newspaper in print in Denmark. Through an aggressive market campaign and an increased focus on journalistic competence (an increase in employees) this status has been achieved over the last two years. In comparison with other Danish newspapers, Jyllandsposten has the largest journalistic staff in Denmark and correspondents around the world. The focus on journalistic competence has meant that less attention has been given to technical aspects of newspaper production. The paper, although its name refers to a specific part of the country, is distributed and read in the whole country. At the time of the interviewing, Jyllandsposten was the only major newspaper in Denmark providing a Internet service. Jyllandsposten became visible on the Internet in the summer of 1995. Initially the motivation for going on the net, was the establishment of a “computer club”, a service that provided Internet access and software to subscribers of the printed newspaper. This evolved through autumn 95 into a service which provided news in brief. In November 1995 it was decided that Jyllandsposten should have a substantial service on the Internet. The 15th of January 1996 “Internetavisen Jyllandsposten” was launched. The initiative was the work of three individuals involved in the establishment of the first service. During autumn 1995 these three people, one journalist, one with a Master's degree in media science and a student, designed a full blown Internet news service and got upper management approval for their idea. Through the use of a consulting firm specialised in Internet services, the requirements for the service were balanced with the technical possibilities.

Product

“Internetavisen Jyllandsposten” mainly consisted of replicated articles from the printed newspaper. There was little use of pictures in conjunction with the articles. A search facility enables registered users to search all material published in the Internet edition since it was established. Beyond these facilities, the “JP Computer Club” offered downloadable software. Registered users had full access to all articles, where non registered users had access to a few news articles without any depth. The fee for using the service was 1,800 DKK a year, a price similar to the subscription rate of the printed newspaper. The access control mechanism was in the process of establishment when this study was carried out.

The layout and design of the service reflected the desire to duplicate the printed newspaper. The Internet edition was separated into section and within each section a number of articles was available through an overview bar that was designed with the aim of allowing flexible navigation through the service.

Technology

The technical system used for the production of the printed newspaper was a dedicated text-based interface system ATEX introduced in the early 80'es. At Jyllands-Posten articles for the printed paper were arranged manually. The articles were printed out on transparent film and by hand arranged on pages that eventually become the master from which the newspaper was printed. In comparison with many other newspapers in Denmark the technical level of sophistication was low at Jyllands-Posten.

When an article leaves the hands of the journalist a copy is spooled into a separate directory of the ATEX system. Within this directory a dedicated software program automatically converts the ATEX representation to HTML, the language of the Web. When all articles have been converted and checked for major errors the HTML representations are transferred by file transfer protocol to the Web server, situated outside the organisation at an access provider, for further processing. At the server additional software indexes the articles and arranges them in a file structure that allows consumers to navigate through the material.
Work

The Internet publishing division at Jyllandsposten was formed as a project group with three members. The editor of the printed papers IT section was responsible for the journalistic issues of using of the Internet and in charge of the project. Besides working with the Internet edition he was involved with the production of the IT section for the regular paper. The media expert was responsible for further development of the service and for attracting advertisers. The third participant in the project was responsible for the daily routine of creating HTML versions of the articles and transferring the articles to the Web server. None of these people had any specific technical skills. The initiative for new products was largely the responsibility of these three people. By entering into a dialogue with the consulting firm, the software needed for realising new designs is developed.

The use of the Internet for distributing the contents of the newspaper did not mean any changes in the work of people not active in the Internet publishing division. Being based on the printed paper, the main task was that of transforming the representation of the articles in ATEX to HTML, this process being highly automated through the use of dedicated software. Although the process was supposed to be fully automated, some minor mistakes did occur from time to time, and the staff at Jyllands-Posten had to manually edit the HTML files in order to make the text appear in a proper way. Further the articles needed to be categorised manually for the indexing software running at the server to place the articles correctly into the digital paper.

Rationales

Two distinct rationales existed at Jyllandsposten for having an Internet service. The first and initiating rationale was that of experimenting with the technology. There was a feeling of a need to be up-to-date with the new technology. A combination of future fear and fascination of the technology lead to the establishment of the WWW service, as expressed:

“No doubt what so ever, it is important for a newspaper to be on the Internet. Because it will have an impact, in one way or the other ... without anyone knowing exactly how it will make a difference, therefore you have to be [on the Internet]”

P.N., Jyllands-Posten

Jyllandsposten had a clearly stated short term goal of earning money on the service. Jyllandsposten is specialised with regard of news concerning Denmark, no other Web service in the world offers the same coverage of events and sports in Denmark. Further by being written in Danish it is aimed at people who prefer this language, thereby being specialised with regard of language. The statement being that if not economical sound from the beginning, the service never will be.

<table>
<thead>
<tr>
<th>Jyllandsposten</th>
<th>Internetavisen Jyllandsposten</th>
</tr>
</thead>
<tbody>
<tr>
<td>URL:</td>
<td>http:www.jp.dk</td>
</tr>
<tr>
<td>Age of service when studied</td>
<td>3 month</td>
</tr>
<tr>
<td>Estimated accesses a day</td>
<td>4000 people/day</td>
</tr>
<tr>
<td>Staff</td>
<td>3 part time employee</td>
</tr>
<tr>
<td>Main digital Product</td>
<td>Electronic copies of articles from printed newspaper</td>
</tr>
<tr>
<td>Product Technology</td>
<td>External filebased Webserver</td>
</tr>
<tr>
<td>Production Technology</td>
<td>Conversion scripts, html-editors.</td>
</tr>
<tr>
<td>Work</td>
<td>Development and duplication</td>
</tr>
<tr>
<td>Rationale for design of service</td>
<td>distribution to people not having access to printed edition.</td>
</tr>
</tbody>
</table>

Figure 1. Characteristics of Jyllandsposten's service.

4.2 Göteborgsposten

Göteborgsposten (GP) is a regional newspaper covering the city of Göteborg and the region of the Sweden in which Göteborg is situated. GP is circulated in 270,000 copies a day. The journalistic strength of GP is the extensive covering of events in the local area and sports. The paper is what journalist defines as a regional market maker, an information source extensively covering the region.

Göteborg city was the host of the world championships in athletics in August 1995. In order to provide information for participants and the public, an intensive use of WWW as a channel of information on the games and the city was established. One of the organisations involved in this was Göteborgsposten. It seemed obvious to the management to use the WWW for distribution of news as well and 14. of august 1995 “GP Direkt” was in existence. In October 1995 the

1 When the studies were carried out, Jyllandsposten was the only major Danish newspaper publishing on the Internet.
service was heavily redesigned, the amount of content increased and the “fact databases” were established. In November “GP Direkt” started providing updated news on the Internet throughout the day. In November a classified adds service DAGS² was started as the result of a joint venture between SISU¹ and Göteborgsposten, Sydsvenska Dagbladet¹ and Dagens Nyheter. Through December 95 to February 96 additional service on film reviews and more “fact databases” were initiated.

**Product**

The “GP Direkt” service offered selected articles from the printed newspaper. These were kept on the Web server for a week and then discarded. Besides the mirror of the printed paper a variety of information was available. Lists of film and CD reviews could be accessed, these list were updated regularly and formed an ever growing archive of reviews. As an experiment aimed at schools, a series of “fact databases” were available. These “databases” cover such events as the war in ex-Yugoslavia. The material in the databases was mainly articles from “GP Direct”, but in order to make a consistent source of information, additional documents and text have been added. The “GP Direkt” is free of charge.

**Technology**

The printed newspaper was produced by the use “Quark Express” a high-tech graphical interface system. Through the use of Macintosh Computers and graphical displays, the newspaper was edited and arranged directly on screen. Images and text was presented in a “WYSIWYG” manner that enables Göteborgsposten to print out the master for the printed newspaper directly from “Quark Express”. The process of producing the Internet edition is in itself an add-on to Quark Express.

Two software programs written specifically for Göteborgsposten allows the staff to extract articles from Quark Express. One program is used in conjunction with Quark Express to extract and convert articles. The second program assembles the separation articles into a hyperlinked structure of HTML documents arranged in a file system.

The product provided was based on the use of an external placed Webserver to which files were uploaded on a daily basis.

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¹ Swedish Institute for System Development, established 1984, URL: http://www.sisu.se
² http://dags.gp.se
³ http://www.sds.se

**Work**

Five people were, in various degrees, working with the production and maintenance of the Internet service. The manager in charge of the Internet service was responsible for electronic media and electronic publishing. Besides working with the Internet edition, he had several other tasks at Göteborgsposten to attend. Two journalists were the “core” of the Internet edition. They were responsible for maintaining a consistent set of pages and also worked on the establishment and development of "fact databases”. And they were responsible for continuously updating the content of the service throughout the day as new stories arrived from their newsbroker, a Swedish equivalent to Reuters. Besides this they updated the different archives on music, film and Internet material. Another journalist is responsible for developing new uses of the Internet, with a special concern to technical issues. The last of the five is responsible for developing the commercial side of the product and selling space for Internet commercials.

The production of the Internet edition contained much trivial work. The aim of the Internet staff was to be “on the net” around 9.30 in the morning. To reach this goal they started at 8 o’clock by deciding what articles to put on the Internet. This was done by going through a printed paper, taking notes of which articles to put on the net. When the selection process was over, one hour was spent on the extraction of the material from Quark Express into preliminary HTML documents. This was done by the use of the add-on for Quark Express, that enabled a journalist to click on text blocks in a particular order, thereby specifying which text was the header, which was the author and which was the main body of text for a particular article. The preliminary HTML files were named in a particular way to indicate their contents. The add-on unit could not fully transform “Quark Express” representation to HTML, therefore the journalists had to check and to some extent rewrite the HTML extracts in order for them to conform to the HTML syntax. When all articles had been extracted, the files were transferred to a PC, where a script processed the files. This script added navigational links to all documents and generates indexes for the Internet edition. This new set of HTML documents was then transferred back to the Macintosh, from where it was transferred to the server situated at an access provider. Thereby the Internet edition became available to the rest of the world. By transferring the articles the process was far from over. Over the next two to three hours the product is polished as bugs are reported (often by users) and further by using HTML editors to insert images and additional headers.

In an attempt to utilise the Web as a resource one journalist each morning appended links to articles when
he knew of WWW resources that related to an article. Through the use of his own archive and the use of public WWW search mechanisms he tried to find interesting links to append to the articles.

**Rationale**

At Göteborgsposten the editor in charge was very carefully with not expressing thoughts on what the Internet Edition would evolve into. The main arguments for being on the Internet in this organisation was to experiment with the technology, to learn by using the technology. With regard of the product the aim was to use the Internet for products that either were not fit for the printed edition or to expensive to produce by using traditional paper, for this reason the "fact bases" had been developed.

<table>
<thead>
<tr>
<th>Göteborgsposten:</th>
<th>GP direkt</th>
</tr>
</thead>
<tbody>
<tr>
<td>URL:</td>
<td><a href="http://www.gp.se">http://www.gp.se</a></td>
</tr>
<tr>
<td>Age of service when studied</td>
<td>7 month</td>
</tr>
<tr>
<td>Estimated accesses a day</td>
<td>3000 people/day</td>
</tr>
<tr>
<td>Staff</td>
<td>3 part time employee, 2 full time</td>
</tr>
<tr>
<td>Main digital product</td>
<td>Electronic copy of selected articles from printed newspaper and Web-tailored article bases.</td>
</tr>
<tr>
<td>Product technology</td>
<td>External filebased Webserver</td>
</tr>
<tr>
<td>Production technology</td>
<td>scripts for conversion</td>
</tr>
<tr>
<td>Work</td>
<td>Development, maintenance and duplication</td>
</tr>
<tr>
<td>Rationale for design</td>
<td>Experiment with the technology</td>
</tr>
</tbody>
</table>

Figure 2. Characteristics of Göteborgspostens service.

**4.3 Dagbladet**

Dagbladet is Norway's third largest paper, with an average circulation of 209,000 copies in 1995. It is published in Norway's capital Oslo. Dagbladet is a tabloid paper, with few subscribers and many copies sold over counters in kiosks, cafes and shops. It was founded in 1869 as a liberal, democratic paper, strongly supporting the opposition fighting for parliamentarism in Norway. It became associated with the liberal party Venstre. Since 1977 Dagbladet is politically independent, with no formal ties to any party. Dagbladet is in heavy competition another tabloid, Verdens Gang - VG, which is Norway's largest paper with a circulation of 371,000 in 1995. Both Dagbladet and VG lost readers in 1995, whereas Aftenposten (a morning paper with a circulation of 282,000) gained readers.

The service was launched the 8th of March 1995, then the first such service in Norway. The idea of making a WWW version had been mentioned very informally after the paper got connected to Internet in the autumn of 1994, but this did no lead to any decision. In February 1995 Dagbladet was contacted by an access provider, Scandinavia Online, which was going to launch its services in March the same year. They offered Dagbladet free “access out” for one half year, if Dagbladet provided the material. The idea was supported by the editor-in-chief, and also by the IT-department, and the decision to accept the offer was made at the editor meeting. Within 14 days decisions were made and the service was established. The decision was motivated by the paper's slogan “Alltid foran” (always first). Clearly, there was a positive attitude to trying out new technology.

**Product**

Dagbladet's service on the World Wide Web had an opening page pretty much like the newspaper itself. It appeared well-designed, with lay-out and colours similar to the newspaper. “Dagbladet :på nettet” contained a selection of the day's articles, in general with the same textual content, but sometimes with shorter headings. Previous articles in some categories (editorials, theatre and film reviews, etc.) were available. There was a considerable amount of non-news material, and there were even facilities whereby readers could enter into discussion groups, give feedback to the editors, place ads in the electronic paper (the service was free), etc. All the interactive services required the user to register with a user-name and password chosen at the user's discretion. To register, users also answered a few questions about sex, age, profession and educational background. "Dagbladet :på nettet” also contained some commercial advertisements. These did not cover the costs of the service, however.

“Dagbladet :på nettet” being the oldest service was also the most diversified service. The users were prompted with a variety of different choices when entering the Dagbladet web service. With regard of layout and content the service was aimed at the casual male user aged 30. The interface which has been redesigned several times was complex and hard to overlook, a challenge for the user, one can not from the pages overlook the service and its content. The service had turned into an entertainment mall, where the user

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5 This user profile is known from the users who register
with the service in order to use classified services and discussion group facilities
through interaction could spend time with or without any specific purpose.

**Technology**

*Dagbladet* was produced with a typesetting system from CCI in Århus, Denmark. Text for “Dagbladet : på nettet” is captured by copying the files transmitted to the printing house. In this way it is guaranteed that “Dagbladet : på nettet” is based on exactly the same text as Dagbladet itself. CCI has developed a generator of HTML, and it is expected to switch to this generator soon in order to reduce mark-up overhead.

As for the two other cases the service was based on an external file-based server to which HTML-files were uploaded. The production of the material for the Internet Edition was based on a script that supported the processes of conversion from the type setting system.

**Work**

The production of the Internet edition involved people from several parts of the organisation. In the beginning “Dagbladet : på nettet” was produced by people from the IT-department and from the news desk, but already in May an experienced journalist was assigned to the project. In the summer of 95 one of the senior personnel in IT joined the project. In September an experienced administrator was appointed project leader and in January 1996 another journalist joined the project. In addition one and a half man year of work by editorial assistants are assigned to the project.

The daily routine of duplication began at six o’clock in the morning where an editorial would start the production of the Internet news service. The first hour was spent on extracting all the articles from the text system and converting them to a local variant of HTML. Tools were used for this, but mistakes often arise and had to be corrected manually. Then he or she will leaf through the day’s paper and select articles for “Dagbladet : på nettet”. Some were given, like the editorials, the chronicle, some columns and some reviews, while other news were picked out quite selectively. The selection process leads to an automatically generated front page.

**Rationale**

At Dagbladet, having been on the Web for more than a year, the purpose of the Internet edition had become to advertise for the printed newspaper. Charging money from the users was not considered an option currently, too many other newspapers are on the market and offers free services similar to that of Dagbladet. The printed paper, of which most issues are read during lunch break, have few regular subscribers and is read as much for its entertainment value, the aim is to reflect this in the service.

<table>
<thead>
<tr>
<th>dagbladet</th>
<th>dagbladet: på nettet</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>URL:</strong></td>
<td><a href="http://www.sol.no/dagbladet">http://www.sol.no/dagbladet</a></td>
</tr>
<tr>
<td><strong>Age of service</strong></td>
<td><strong>12 month</strong></td>
</tr>
<tr>
<td><strong>when studied</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Estimated</strong></td>
<td><strong>5000 people/day</strong></td>
</tr>
<tr>
<td><strong>accesses a day</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Staff</strong></td>
<td><strong>4 part time employee, 3 full time</strong></td>
</tr>
<tr>
<td><strong>Main digital</strong></td>
<td><strong>Electronic copies of few articles from printed newspaper and games, discussion &amp; reviews.</strong></td>
</tr>
<tr>
<td><strong>Product</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Technology</strong></td>
<td><strong>External file-based Webserver</strong></td>
</tr>
<tr>
<td><strong>Production</strong></td>
<td></td>
</tr>
<tr>
<td><strong>technology</strong></td>
<td><strong>Script-based conversion</strong></td>
</tr>
<tr>
<td><strong>Work</strong></td>
<td><strong>Development, maintenance and duplication</strong></td>
</tr>
<tr>
<td><strong>Rationale for</strong></td>
<td><strong>Advertise the printed edition</strong></td>
</tr>
<tr>
<td><strong>design</strong></td>
<td></td>
</tr>
</tbody>
</table>

Figure 5. Characteristics of dagbladets service.

5. **Cross Case Summary**

Overall, the three newspapers studied were in an experimental phase, using the World Wide Web with the primary purpose of experimenting with technology rather than to provide a specific digital product. One reason for the presence of these newspapers on the Internet is the belief that the Internet technology eventually will have an impact on the way people and organisations exchange information. Newspaper organisations being heavily involved in information provision, the people interviewed simply saw no other choice than to start using Internet technology in order to understand and master it. The belief being that technical know-how is a prerequisite for being able to compete on the networks of the future. But at the same time great uncertainty was expressed with regard of how the technology can be used and what it should be used for.

**Products**

The products provided and their rationales differs significantly between the three organisations. Jyllandsposten differs from the two other newspapers with a clearly stated short term goal of earning money on the service. The WWW allows the organisation to distribute the content around the globe in no-time to
consumers without access to the printed newspaper. For this reason the digital product had been designed as an electronic copy of the articles of the printed newspaper and the Internet was seen as a distribution technology.

Where Jyllandsposten deliberately did not consider “surfers” as their target group, dagbladets editor interpreted the role of the WWW service as an advertisement for the printed edition, and aimed the service at the surfers with only a few selected stories from the printed edition and a variety of additional information, games and discussion groups not available in the printed edition. At dagbladet the WWW was used as much as an interface that allowed consumers to interact and browse casually around.

Göteborgsposten tried to utilise the WWW for what was an expensive and costly affair with the use of paper namely creating special editions on topics that had the interest of special target groups such as schools. The WWW was in this case used as an access channel to an on-line storage.

Although different, the newspapers to a large extent used the WWW for redistribution of an electronic copy of material from the printed newspapers. At Dagbladet where several members of the staff had technical competence, this electronic copy was supplemented with a number of more technical initiatives.

Technology

Very few technological initiatives had been initiated to support the production of digital newspapers. In all three organisations software that enabled the staff to transform the articles to a HTML representation had been developed, but beyond these programs no additional software had been developed. To a large extent the staff used of-the-shelf software such as ordinary wordprocessors and early versions of HTML editors to edit raw HTML code.

The digital product provided was as mentioned more an electronic copy than a digital document. Advanced software that realises potentials of digital documents was almost not present. The digital products provided were based on trivial Web-server technology based on the filesystem of the server, and did not implement advanced solutions that realised digital documents (cf. [3, 9]).

Work

Two main tasks seemed to exist in the projects in all three organisations, that of transformation and that of development. All three Internet editions were initially, and will continue to be, based on the articles of the printed newspaper. For this reason an identifiable daily task was the transformation of the articles to a format that allowed consumers to access the documents via WWW-browsers.

In the design of existing production chains, the possibility of multiple publishing channels had not been anticipated, for which reason it was a cumbersome process to transform material aimed at a printing press into a format that was accessible over WWW. At Jyllandsposten having the least technically advanced newspaper system, this task was highly automated whereas tools for the transformation process were inappropriate at dagbladet and Göteborgsposten. The second task, that of development appeared to be on a more ad-hoc basis, where individual staff members developed new products as they had time to spare. At the two oldest and most comprehensive services, dagbladet and Göteborgsposten, the task of maintenance also appeared as a part of everyday work. With the growing complexity of the services, some resources were used for adjusting the existing product to match consumer demands.

The digital product being based on a transformation of prewritten material, the Internet services and the people working there were pretty much isolated from the rest of the organisation as with regard of work and collaboration. They took over the products, the articles for the printed edition when they had been prepared for the printing press.

Initiatives beyond the duplication of material from the printed newspaper were to a large extent implemented without the involvement of the rest of the organisation. Jyllandsposten did not have such services, dagbladet offered a classified adds service that was not related to the classified adds in the printed newspaper and Göteborgsposten re-edited material to create their fact databases.

Rationales

Although the Internet Editions are not expected to replace the printed version, the belief is that the Internet services will become a part of future news publishing. One common goal of newspaper on-line services is that of complementing the printed newspaper. By using the World Wide Web on its premises with regard of virtually infinite storage capabilities, program execution and user interactivity, the newspapers will be able to provide material not suited for the printed newspaper. Göteborgsposten has with its fact databases taken a first step towards new ways for newspapers to produce material for educational purposes. The complementary approach is also seen at Dagbladet, the service with the longest history, the defined purpose of the service is to advertise the printed newspaper and this was done by offering a web service. This is in no way in trend with the initial expectation
of Internet newspapers, that the Internet edition would replace the printed version.

6. Discussion

The three newspapers studied were all early starters in an experimental phase of Internet publishing. By duplicating the printed newspaper on the WWW they had entered the age of digital publishing. The interesting question yet to be answered is that of what will happen in the future, will and can the Internet services justify their own existence? How can the newspapers move from electronic copies to digital documents, not simply duplicating the printed newspaper?

With regard to staff, one observation is the lack of high-skilled technicians at Jyllandsposten and Göteborgsposten. This may explain why the products are more "electronic copies" than "digital documents". Although individuals start to publish on the WWW and understand HTML, they will simply not be able to realise digital documents without a firm understanding of the programming often needed for the implementation of digital documents. In opposition to Jyllandsposten and Göteborgsposten, dagbladet had from the beginning involved people from the IT department, leading to the development of a much more diversified service. In the discussion of future digital libraries the same observation is made by Levy and Marshall: "To participate most fully, librarians will need the help of technologists to better understand the possibilities being created by digital technologies [...]" [4], the observation being that without the direct involvement of people capable of understanding the technical possibilities, the products provided are quite conservative [4].

A more direct involvement of people from outside the Internet publishing divisions also seems a step that might be valuable to define the role of the WWW product in relation to the printed newspaper. As the journalists will need the help of technicians to realise the digital potential, so will the technicians need the help of the journalists to understand the traditions of journalists. This step might also lead to an integration of the Internet publishing much earlier in the production process, leading to the creation of material based on the Internet technology and hence not appropriate for the printed newspaper. Cases such as the Raleigh News Observer indicate that an organisational adoption of IT leads to new work routines increasing the skills of the individual journalist and enables them to use and produce digital documents [17].

Being early starters the three newspapers studied were all without appropriate technology to support the development and maintenance of the product. The services provided were to a large extent based on standard Web-servers based on the filesystem, not using the common gate interface (cgi) to implement such basic technology as relational databases. For these newspapers to realise the potential of digital documents much more attention must be given to the technological possibilities of such technology as the Java-language and the use of cgi, allowing the newspapers to implement more functionality in their services, thereby implementing truly digital documents.

There might be reasons beyond the technology, products and staff that have limited the implementation of digital documents. The Internet is superior with regard of interactivity and the time it takes to update information. The printed edition have a deadline once a day, whereas the Internet edition can be updated continuously. In their current form the Internet editions are sources of marginal outlet for which reason it may not be desirable to compete with the printed edition.

If the newspapers increase the resources invested in digital products a positive turnover will be required. Currently there is little knowledge on what people are willing to pay for and the consumer population is small compared with the ordinary newspaper. For this reason the initiation of a large scale Internet service will be economically demanding and may lead to a loss not desirable if the service fails to attract consumers.

7. Conclusion

The initiation of an Internet news service have so far meant only few changes in the organisation of work in the three cases studied. The gap between what is technically possible and how the organisations use Internet technology is still in existence. The products provided are more "electronic copies" than "digital documents".

The organisations studied were at an experimental stage, where the technical possibilities of Internet technology and the promises of digital documents had not yet been realised. Through experimenting with technology, the organisations implemented digital products. These products were limited in radicality over traditional documents to the extent the organisations understood the technology. Being in an experimental phase, the understanding of the technology was limited.

The lack of appropriate tools for conversion of material from the typesetting systems and the decision to base the Internet products on material from the printed edition meant, that many resources were used on the duplication of material from the printed newspaper.
The involvement of additional people from outside the Internet publishing divisions seems a natural next step to take. Through the involvement of more technically skilled people the organisations will get a clearer understanding of digital documents and at the same time resources to implement them. Through the involvement of journalists and other people from the existing organisation, products aimed at the Internet and its users may be created.

Differences in the three cases indicate that the diversity between the content of different newspapers will become even more visible on the World Wide Web. A tabloid paper sold as much for its entertainment value have no purpose in creating databases of knowledge on events such as a war in Bosnia. Few, who wants educational facts, turns to a tabloid paper for information on such events. What the cases shows is that the most conservative newspaper Jyllandsposten used the Internet for providing what it considers it main strength: Serious news articles. Whereas the tabloid newspaper Dagbladet used the service to entertain the user and promote the printed newspaper. The Internet is a different media than printed paper, and the products offered vary to a larger degree than first anticipated.

More research is needed on how to integrate Internet publishing into existing organisations to realise the potentials of digital documents. Further the development of dedicated tools for creation of material aimed at several distribution channels is needed to allow non-technicians to produce digital documents.

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