Distributed printing in newspaper organizations

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Abstract: - Information delivery is undergoing profound changes. The established media such as radio, television, and newspapers are faced with a variety of new digital content formats. New dimensions of publishing can be exploited in the case of newspaper production. This paper investigates the changes in the production models of newspaper organizations caused by the introduction of information technology. The study is focused on distributed (remore) printing. Two case studies of distributed printing are presented. Useful recommendations regarding distributed printing are also included.

Key-Words: - newspaper organizations, distributed printing, connection lines

1 Introduction

Information delivery is undergoing profound changes. The present transformation of the communications sector marks a fundamental shift from mass broadcast media to interactive media use. The Internet is already giving consumers more choice and control of content, and offers individuals, companies and both public and private organizations the chance to produce and distribute information. As a result, Internet news is proliferating, produced by individuals, freelance experts, public relations agencies and traditional news organizations. And most of this is available for free [1].

The published newspaper is the net of the integrated accumulative work of a group of people. The traditional publishing systems used by the majority of the newspaper organizations limit the ability to enter the new era of conducting business. Successful organizations continually renew their basic architectures and platforms to take advantage of new technologies [2-4]. One important objective of the newspaper organization is to improve the publishing process using the technology as a key enabler [5].

The newspaper industry has also undergone a substantial change in ownership patterns. Newspaper publishing businesses have consolidated, with the result that there are fewer newspaper publishers responsible for individual titles. Most newspaper publishing companies produce more than one title and have extensive supplemental interests in regional or local newspapers. This is having an effect on circulation patterns and competitivity as large groups extend their reach into new regions and new media. The emergence of large newspaper publishing groups ought to provide substantial economies of scale for the publishers' technology investments, uniformity in production methods and centralized resource management [2].

Publishers have examined many new ways of removing cost from their production and delivery models, largely through effective deployment and automation. Production efficiencies have helped to steadily improve the newspaper industry's market responsiveness, and this too contributes to changing circulation patterns. The industry is getting closer to readerships than ever before, even though readerships have access to more content sources.

This paper investigates the changes in the production models of newspaper organizations caused by the adoption of information technology. The study is focused on distributed (remote) printing. The rest of the paper is organized as follows: In section 2 we discuss the transition of newspaper from the analogue to the digital format. In the next section we discuss distributed printing and its various parameters. Section 4 presents two case studies of distributed newspaper printing. Recommendations for employing distributed newspaper printing are discussed in section 5. Concluding remarks can be found in Section 6.

2 From Analogue to digital

Analogue printing is the major production model for the majority of the newspaper industry and only a small proportion of newspapers is printed on a digital press. The remote analogue model has been developed so that newspapers can reach market more quickly and in order to provide later

production deadlines. However few newspapers take advantage of time zone differences in order to produce different editions for remote markets and few if any take advantage of digital networks to phase their information distribution. Content for international editions is generally published as a single edition, and it is not shaped with a view to the time zone or market in which it is to be published [2].

For the past two decades some newspaper organizations have taken advantage of digital technologies in order to accelerate production throughput, and to optimize capital investments. Electronic production is now the established model for successful newspapers worldwide [6]. In such systems there is a central information retrieval system, which effectively supports the publishing process. All information is stored in digital format. All parts of the newspaper organization are interconnected via the company's intranet. The system incorporates all the information in such a way that each user can easily access the information from a central repository. The central repository structure includes all the different kinds of information (text or image, video). An important requirement of the system is to automatically provide the newspaper online service. The use of digital typesetting, digital image capture, databases and electronic front end systems for both advertising and editorial management, has long been established practice. This is a key component to developing an infrastructure able to take advantage of digital printing technologies and variable information processing [7].

Over the last few years the rapid development of digital networks has dominated newspaper production. Digital network deployment has created a channel for delivering content to a digital press [8]. All of the newspapers that have fully digital systems also have infrastructures theoretically capable of delivering content to a remotely located digital press. Together the development of digital data delivery and the direct to output production models have shaped current production practices. They operate within the context of larger social and technological trends affecting the newspaper industry. Today's society is highly mobile with changing expectations for media delivery. Digital delivery and the adoption of working practices to support remote content delivery enhance the newspaper industry's capacity to respond to evolving reader and advertiser requirements [2].

3 Distributed Printing

3.1 General
In general newspapers with a substantial circulation reach do not print their products in the same location as editorial and advertising content are developed and produced. The use of digital delivery of pages to remote print manufacturing sites has grown steadily over the last few decades. Distributed printing in the newspaper industry is now commonplace, allowing newspapers to reach market more quickly, to reduce overheads through the use of secondary and tertiary value premises, and to provide optimal support to core functions [9]. Sophisticated page pairing and RIPping technologies, plus powerful output management technologies have combined to make remote printing highly efficient and economic. The combination of digital distribution, web offset and local communications networks including roads, rail and air has developed to be extremely successful and cost effective. It is a model with compelling economics and it provides a basis on which to develop new digital printing models, including digital newsprint [10-11].

3.2 Format
Recent studies show that 75 percent of all commercial publications in the world are printed using the PostScript language. Adobe PostScript is a proven software technology, and the PostScript language is the world's leading printing language. Adobe PostScript software, which Adobe delivers through original equipment manufacturers (OEMs) that develop output devices and workflow solutions, offers high-quality, reliable printing, along with value-added features such as printer drivers and fonts [12].

PDF has been used for several years to address the issues of digital ad delivery. PDF files are completely portable and platform-independent. In addition, files converted to PDF are highly compressed, enabling rapid transmission over medium-bandwidth communication lines. Proofing using PDF is faster and easier because users can make annotations directly within the file and the creator can summarize all the comments. Another contributor to improved efficiency is the ability to create a PDF Digital Master, which contains all the graphics, fonts, text, images, and other elements of pages in a single compact file. PDF is also a secure file format, within which Acrobat users can specify levels of security for their files. A file can be saved with password protection so that it cannot be resaved without the password. PDF documents also

are searchable, an important capability especially after documents are archived. Many third-party tools allow PDF files to be searched for specific text strings. PDF even has features for interactive document use. Hyperlinks can be added in order to move from page to page with ease.

Another key advantage of PDF is its open architecture. Acrobat is an extensible application, and third-party developers are taking advantage of this to develop innovative plug-ins and solutions for the newspaper industry that make an investment in PDF scalable and flexible. Now, the use of PDF is being extended to the digital workflow process to overcome many of the challenges of strictly PostScript technology-based production processes. In PDF-based workflow, PDF is the common file format that maintains the integrity of editorial content originating from a variety of typesetting equipment and distributed over a range of computer systems [12].

When newspapers compose pages in a page layout program and send files off for print production, they send more than just text. Files also include illustrations, photos, and fonts. Combining these elements into a PDF file provides everything that is necessary, all in one place, reducing the chances of error and the difficulty associated with tracking hundreds of different elements. This is why retailers delivering ads digitally and newspapers transmitting files to remote printing sites are increasingly converting their PostScript files to PDF using Acrobat Distiller and then transmitting them to the remote location.

3.3 Connection Lines

The lines employed to transfer the data for remote printing may fall under the following categories:
High-speed data lines. Provided by the local telephone company, data lines come in two varieties: dial-up, and dedicated. The most common dedicated high-speed data line is called a T1, operating at 1.5 Mbits per second. A T3, at 44.8 Mbits per second, can mean later deadlines. A new kind of technology called a Digital Subscriber Line (DSL) can be configured point-to-point and provides the same 1.5 Mbit at a much lower cost than T1. Another dial-up service is Integrated Services Digital Network (ISDN), starting at 64 Kbits per second and expanded up to 128 Kbits per second.

Zero Hora is a Brazilian newspaper with a daily circulation of 180,000 and Sunday circulation of 300,000. It is a fully paginated tabloid that recently installed new presses in Kruz Alta, approximately 400 kilometers from its main offices in Porto Alegre. Zero Hora had an existing

PostScript technology-based workflow, which it wanted to maintain. However, like most newspapers with remote printing facilities, Zero Hora faced the bandwidth issues associated with distributing compressed bitmap data for printing. This problem is typically solved by using either satellite or high-speed land lines to transmit the data. The newspaper had two 128 Kbits communication lines available and did not want to install dedicated high-speed transmission lines or expensive satellite equipment. Instead, Zero Hora decided on a solution based on products, like PDF, and Adobe PostScript 3.
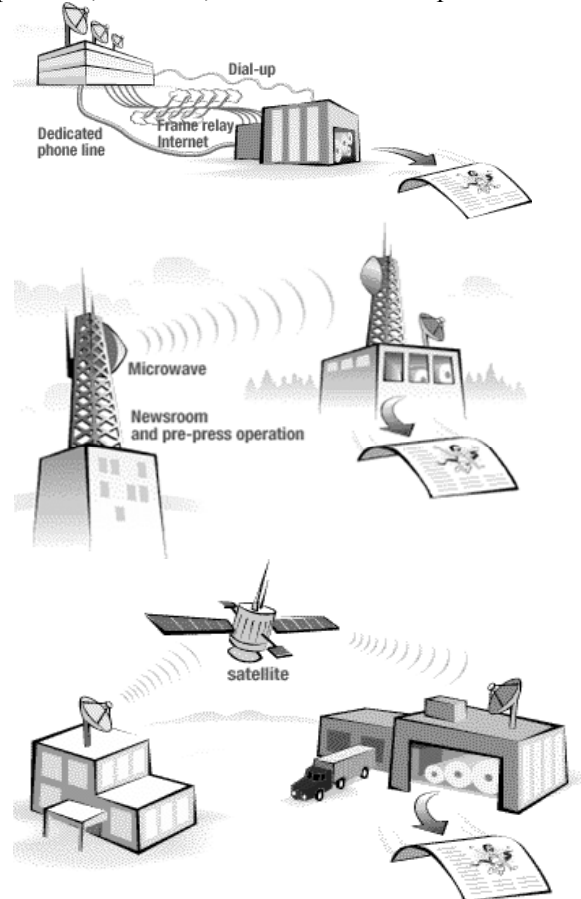

Fig 1: Various connection lines employed in distributed printing.

Frame relay. Direct links connect each of the plants and the local office of the phone company—but the links are shared. The maximum rate of speed is 44.7 Mbits per second. The upside of frame relay is that it is good at connecting multiple facilities; the downside is a "cloud," resulting from sharing the lines with other customers. The lines can become clogged.
Internet. This is a cheaper solution but it may produce a lot of problems. The technology would be similar to frame relay, except that instead of the

frame relay "cloud," there is the Internet, with all its attendant potential problems such as congestion and failure. Like dedicated high-speed lines, the Internet can carry up to 44.8 Mbits per second. A newspaper can pay to set up a digital line with plenty of bandwidth between its office and an Internet service provider.

Microwave link. When the newsroom and the presses are in a direct line of sight, a microwave system is a good alternative to the other delivery methods, as it requires capital, rather than operating, costs. In addition to a router, a microwave transmitter-receiver sits at each end of the link. Microwave operates in the 2-to-38 gigahertz frequency bands; the newest stuff runs from 18-to-38 gigahertz at the equivalent of roughly 6 Mbits per second, though most systems have the option to upgrade to roughly 12 Mbits per second. Line of sight can be an interesting concept: With relays, the microwave signal can be "banked" off antennas in other locations to get it to right place.

Satellite link. In this case the technology roughly mirrors a microwave link and is exactly the same as the satellite phone.

4 Case studies of distributed newspaper printing

4.1 Athens 2004

One of the leading companies in digital document management and delivery solutions (Océ), has digitally printed 13 foreign newspapers in Athens for morning delivery throughout the Olympic season. This innovative digital printing technology creates a newspaper with the same look and feel as the offset version. The national edition of The New York Times was the only U.S. based publication, participating in DNN's (Digital Newspaper Network) digital-printing runs during the Olympics [13].

Océ DNN printed newspapers from several continents: Neue Zürcher Zeitung, Daily Telegraph, The Guardian, Financial Times, Aftenposten, De Volkskrant, Sydney Morning Herald, Sing Tao from Hong Kong, the Japanese Asahi and the Times of India, Corriere della Sera, and La Gazzetta dello Sport. One newspaper, the Sydney Morning Herald, carried special advertisements in the digital version with good luck messages to Australian competitors. Another paper, Asahi Shimbun, produced a special Olympic supplement purely for the Athens edition, and printed also further copies digitally at Océ's London printing site, which were supplied to Japanese airlines flying out of Europe to Japan. From August 3-31, the Monday through Saturday issues of The Times were printed digitally in Athens, Greece. The entire Sunday newspaper was
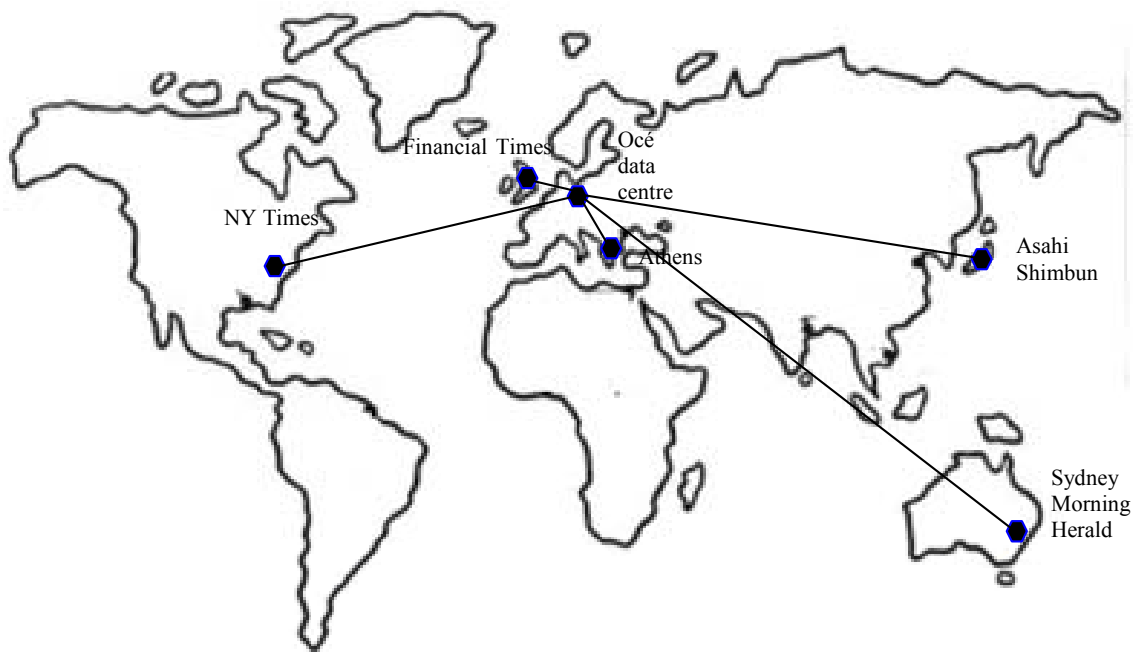

Fig 2: OCE digital Newspaper Network during the Athens 2004 Olympic Games.

flown in to Athens from the U.S and available for sale the following Monday.

Once editorial and advertising pages were completed, the publishers sent their ready-to-print digital templates in a PDF file to the Océ data centre in Poing, Germany (see fig 2). From there, the data was routed within minutes via a secure network to Delta Singular Outsourcing Services (located in Athens). The service provider produced the newspapers with an Océ Newspaper System 7000 that was being used specifically for production during the Olympic Games. This system delivers one thousand 24-page newspapers per hour, all with the same look and feel as the conventional versions. The newspapers were distributed by the Hellenic Distribution Agency, Greece's largest newspaper importer, within minutes of editorial sign-off, thereby avoiding costs and delays of flying in newspapers. The company was accredited to deliver straight to the International Broadcasting Centre and International Media Centre in the Olympic village. The circulation per newspaper was between 150 and 2,100 copies, with a total volume of approx 6,000 units across all newspapers [13].

4.2 The Print-it Project

The Print-it [14] project was funded by the European Union and its overall objective was to bring the printing and publishing industries in-line with currently available and emerging information and communications technologies. The specific objectives were to: build a Distributed Printing network integrating ISDN, Satellite and ATM transport with specific developments for network management facilities; develop missing tools and modules required to create a Distributed Publishing Service; run two pilots to demonstrate the viability and benefits of Distributed Publishing to potential users such as Content Creators, Service Providers, and End-Users; conduct a techno-economic survey defining and promoting the development and acceptance of this new service; deliver recommendations and guidelines for Distributed Publishing service development scenarios.

One of the pilot services was the newspaper service pilot which was aimed at distributing electronically a financial daily newspaper through satellite broadcasting, printing it locally at local production centers, and then distributing the prints. This service was characterized by very tight time constraints since the information handled has a very short life cycle (financial data), and the pilot was expected to demonstrate how Distributed Printing can be the enabling technology for such services. For the Newspaper broadcasting pilot the central

content production was located at Il Sole 24'Ore premises in Milan (Italy), and uploaded to the Eutelsat satellite. The production centers (receiving and printing the files locally) were located in Stuttgart, Amsterdam, Montauban and Paris. The central EDI database was located in Lyon.

In the Newspaper Trial, complete daily newspapers and special editions were sent by ISDN to an uplink station and than broadcast by satellite. A simple PC equipped with a special board received the data, optionally with an encryption technique to match subscriptions with local accessible data. The data were viewed and printed from the PC to either desktop or professional digital printers. Users of this services can be individuals or commercial services printing newspapers at the location closest to the end-user.

Technologies used in the first phase of this field trial were automation of the communication to the groundstation, broadband satellite distribution of data, the use of standard TIFF as well as PDF - Adobe's Portable Document format - as the data format, reception plus the economics of printing remotely small runs of newspapers for special users or agents of Il Sole 24 Ore. In a second phase of the Newspaper Trial full use of PDF, EDI and selective reception was expected to be tested.

5 Recommendations

Based on the above case studies of distributed newspaper printing we can conclude in the following recommendations concerning the needed technological infrastructure:

- ➢ Format: PDF format and especially in the form of PDF digital master.
- ➢ Connection line: the type of connection line depends on various parameters. Thus we must take into account:
  - o Distance.
  - o Size of transmitted files.
  - o Timetables.

In the case of small to medium distances the most cost effective solution is the DSL lines. Now if the size of the transmitted files is not very big (a few Mbytes) and the timetables are not extremely streaked the transmission can be made through the internet. The more costly solution is to install leased lines and use DSL connections. This solution guarantees superior security.

Now in the case of long distances (intercontinental), satellite connection is the most suitable choice. There is a substantial number of companies that provide this kind of services [15].

Typical services of a Satellite Service Provider are included in fig 3.
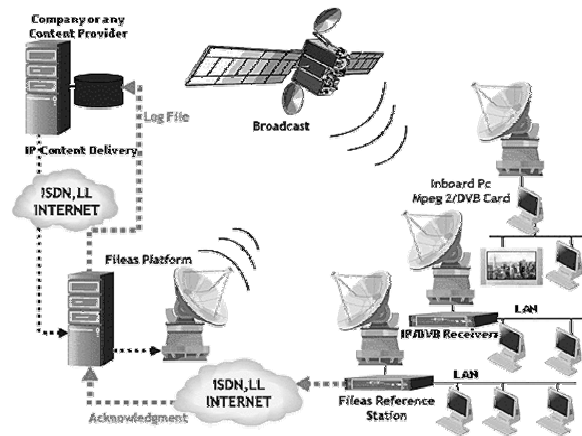

Fig 3: Typical services of a Satellite Service Provider [15].

6 Conclusions

Information technology had a major impact on the way a newspaper organization operates as well as the form of the products it produces. The newspaper is the basic product resulting from the publishing process. The introduction of information technology in the publishing process allows newspaper organizations to establish new production models that enable them to produce edition in various forms, and to overcome limitations imposed by different geographical locations. Thus the model of a truly global newspaper organization is fully applicable.

Distributed newspaper printing has become progressively more viable during the last decades as more efficient transmission and production technologies became available to help realize publishing market potential. As newspaper production continues to evolve, two trends, micropublishing and mini-publishing, will shape the future of the distributed newspaper. Fueling those trends are the digital offset and the 100 percent digital printing, allowing newspapers to publish papers tailored to very precise groups. Micropublishing - print-on-demand newspapers - is a business model that has been around for a long time but has yet to become a commercial success. Several technologies have been successfully used to print newspapers in homes, hotels and airports, from short-wave radio in the 1920s to several Internet and computer approaches in the 1990s. But these attempts failed because none was able to deliver a printed newspaper with sufficient content and economic value. Based on the above we can predict that print media can be transformed into even more popular and versatile form of communication in the next decade.

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