### Modeling Computer Supported Collaborative Work in a newspaper editorial process

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*Abstract:* - The published newspaper is the net of the integrated accumulative work of a group of people. This paper addresses the issue of modelling the workflow in the editorial process of a newspaper organization, in preparation for the implementation of a Computer Supported Collaborative Work (CSCW) system. The editorial process is studied in every detail and interesting conclusions are drawn, concerning the opportunities offered by the introduction of a CSCW system in the editorial process.

Key-Words: - Computer Supported Collaborative Work, newspaper, modeling.

#### **1** Introduction

Starting from late in the 20th century, there has been an enormous growth of the computer and communication industries. As a result the integration of computers and communication networks has increased dramatically. The advanced possibilities of networking have forced many researchers and developers to begin thinking about systems that allow people to work together [1]. Thus people would be able to handle difficult interactions between multiple tasks performed by multiple groups [2]. That has resulted in the creation of the Computer Supported Collaborative Work (CSCW) discipline [1,3,4,5].

Collaboration is the collective work of two or more individuals where the work is undertaken with a sense of shared purpose and direction that is attentive, responsive, and adaptive to the environment. In collaborative work relationships, the awareness of the environment develops through access to information and knowledge about how work done by a group, influences individuals at every layer of context [6].

A Collaborative Work System (CWS) is an organizational unit that occurs any time that collaboration takes place, whether it is formal or informal, or occurs intentionally or unintentionally. Intentional focus on CWS requires the conscious and deliberate arrangement of organizational systems aimed at enabling collaboration and limiting impediments to collaborative work. All work groups have elements of collaboration, but intentional focus on CWSs increases and improves collaborative capability [6].

Computer Supported Collaborative Work (CSCW) is a multi-disciplinary research field that focuses on tools and techniques that support multiple people working on related tasks. CSCW provides individuals and organizations with support for group cooperation and task orientation in distributed or networked settings [7].

The published newspaper is the net of the integrated accumulative work of a group of people [8,9]. In this group collaboration takes place and it is well suited for the introduction of a CSCW system. Digital technologies have been a part of the daily newspaper world for many decades. Newspapers began setting type using computers in the early 1960s. By the early 1980s, most newspapers were using digital systems to set type in galleys, which were cut and pasted into pages, and then imaged. Today the world's leading-edge newspapers are moving to 100 percent digital page assembly and distribution, streamlining workflow processes while ensuring higher quality.

This paper addresses the problem of modeling the Computer Supported Collaborative Work in a newspaper organization. The study is focused on the editorial process of a newspaper. The rest of the paper is organized as follows: The second section discusses the organization types of CWS. The issues of Computer Supported Collaborative Work and Collaborative Editing Systems are presented in sections 3 and 4. The modeling of a newspaper editorial process can be found in section 5. Concluding remarks are included in the final section.

#### **2** Organization types of CWS

In this section we define the types of CWSs at the organization or site level. We must note that there are also other ways to organize the types of CWSs. There are five organization types: Traditional Bureaucracy, Organization using teams, Spontaneous Cooperation organizations, Team-Based Organizations, and Collaborative Organizations [6]:

*Traditional Bureaucracy:* No teams exist at any level. Norms, rules, and procedures inhibit informal collaboration. The focus of systems is on the individual. Individuals are usually organized in functions. There is a high level of hierarchy in reporting structure.



Figure 1: Organization types of CWS.

*Organization Using Teams:* Some teams are used, but only at the worker level. Norms, rules, and procedures inhibit informal collaboration. The focus of systems is on the individual. Individuals are usually organized in functions. There is a medium to high level of hierarchy in reporting structure.

*Spontaneous Cooperation Organization:* Few to no teams used at any level. Norms, rules, and procedures support informal collaboration (for example, a norm that individuals consult with each

other when they need help). The focus of systems is on the individual. Individuals are usually organized in functions. There is a medium to low level of hierarchy in reporting structure.

*Team-Based Organization:* A variety of team types are used as the basic units of accountability and work; workers and managers are organized in teams. Norms, rules, and procedures do not actively support informal collaboration. The focus of systems is on individual, team, and organization. Teams are usually organized around processes, products, services, or customers. There is a low level of hierarchy in reporting structure.

*Collaborative Organization:* A variety of team types are used as the basic units of accountability and work; workers are organized in teams; managers may or may not be organized in teams. Norms, rules, and procedures actively support informal collaboration (for example, common spaces like lounges are created and employees are encouraged to meet there to discuss issues). The focus of systems is on individual, team, and organization. Teams and individuals are usually organized around processes, products, services, or customers. There is a low level of hierarchy in reporting structure.

We must also mention that there are other organization types but for the sake of simplicity, only the types with the most contrasts are discussed.

# **3** Computer Supported Collaborative Work

Understanding and solving the main issues presented by Computer Supported Collaborative Work (CSCW) depends on conceptualizing how people work. People work together in many modes. They may be in the same room at the same time working on activities ranging from group-decision operations, to group authoring, to running a CAD program. This is called synchronous mode. If these activities take place at the same time but participants are located at different sites, they are working in distributed synchronous mode (see Table 1) [10]. If these activities are taking place at different times but in the same location, they are asynchronous; if they are taking place at different sites at different times,

Table 1: CSCW applications and modes.

<b>CSCW Modes Applications</b>	synchronous	Distributed synchronous	Asynchronous	Distributed Asynchronous
Decision-Support System	$\checkmark$	$\checkmark$		
Joint authoring	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$
Workflow	$\checkmark$	$\checkmark$		
Joint design	$\checkmark$		$\checkmark$	

they are distributed and asynchronous. Table 1 includes several typical CSCW application areas to show which modes are used the most.

#### **4** Collaborative Editing Systems

The use of computer tools to support the collaborative creation of documents dates from the first applications of computers to document preparation. The research has concentrated on creating tools to enhance the ability of an author or group of authors to effectively plan the structure of documents, and tools to provide explicit techniques to control the process of conceiving, planning, creating, and resizing documents. While almost any writer's tool (outliners, spell-checkers, editors, etc) is conceivably relevant to the problem of how people write on computers, the research literature on this problem is typically grounded in theories of the writing process and analysis of experimental observations of authors' activities.

Collaborative editing systems allow physically dispersed members of a group to jointly compose, view, and edit a document [1]. The document that can be edited collaborative may include text, graphics, sound, video, etc. As in the case of CSCW systems, collaborative editing systems can also be asynchronous or synchronous. In a asynchronous collaborative editing system, documents are stored in a central database. Before a document can be edited, a copy is made from a central database to the local site. Each user edits its own local copy. After the editing process has completed, the document (stored in the central database) is updated or saved as a different version. In the case of simultaneous changes within a single file, the most common solution is to indicate the occurrence of conflict and let the users resolve it [1, 11, 12].

Synchronous collaborative editing systems allow multiple users to simultaneously edit the same document. These systems are highly interactive where changes made to the document are automatically updated to all sites instantly [1].

#### 5 The case of a newspaper

#### 5.1 Organization

The organization of a typical (greek) newspaper is presented in fig 2. At the top of the hierarchy is the publisher. At the second level of the hierarchy there is the director of the newspaper. The director has under his supervision a number of chief editors. The number of the chief-editors maybe equal or smaller, to the number of the sections of the newspaper (Politics, Financial, Culture, Sports, etc.). The chief editors cannot carry out all the editing functions although they remain responsible for what is included in the newspaper. Each section is



Figure 2: Organization of a typical newspaper.

supervised by an area head officer. The later deals with the desk officers, varying in numbers depending on the size of the newspaper, that write the articles and the text editors that edit the articles. There are also a number of content and material officers that supply the desk officers with material for the articles. In the case that there are some external correspondents, they deal directly with the director of the newspaper. We must note that the above organization has to do only with the editorial section of the newspaper. We must also mention the advertising section, which deals directly with the director of the newspaper and defines the space for the articles in each edition of the newspaper. The types of users that are involved in the editorial process are summarized in table 2.

Table 2: Users and	l responsibilities.
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User	Responsibilities
desk officer	write the articles
Text editor	edit the articles produced by the desk officers.
area head officer	assign the writing of the articles to the desk officers
content and material head officer	inspects the articles and defines the title of the articles, the photographs and the general layout.
chief editor	overview the procedure and inspects the final outcome
director	supervise the procedure and inspects the final output.

Based on the above it easy to say that in the newspaper editorial system is an organization that employs teams especially at the lower levels of the hierarchy. These teams include the desk officer, the text editor, the content and material editor, and the area hear officer. But as we move up in the hierarchy the focus of the system is on individuals. Of course teams may also exist in the upper levels of the hierarchy. In this case we may argue that the editorial system is a team based organization. From the above we can conclude that in a newspaper editorial system there is an organization that employs teams or a team based organization depending on the degree of collaboration that exists in the upper levels of the hierarchy.

#### 5.2 Article control

Document control concerns who manages the document and how that can change during the course of the editorial process. Staff members and

other groups of personnel are active at different times, with varying access rights [13,14]. Posner and Baecker describe four types of document control methods [15]:

- 1. *Centralized:* one person controls the document during the whole project.
- 2. *Relay:* one person at a time controls the document but it is not always the same person;
- 3. *Independent:* each person controls the section on which he/she is working;
- 4. *Shared:* everyone has equal access to the document.

In the case of a newspaper article the control methods is relay. The control of the document passes from one user to another as presented in fig 3.

In figure 3 we plot the path of the document from the time of its creation till the final proofreading, versus time. The various users that are involved in the creation of the document are included in axe y.

It is worth noting that at one time instant, only one user has the right to edit the article, but other users may have the right to read (only) the article in order to keep informed about the status of the article. The control of the article changes based (in most cases) on time. The publication deadline defines the time periods that each user has the control of the article. Of course several other parameters must be taken into account, such as breaking news, second editions, etc.

## 5.3 A CSCW system in a newspaper editorial process

In the traditional newspapers of the past century, all the transactions of data among the involved people were done using hard copies. In other words, the data was delivered manually by hand from one person to the other.

The majority of the newspapers today, employ some kind of information retrieval system, which effectively supports the editorial process. This system is also able to provide the appropriate information technology infrastructure for a newspaper online service. In such a system all information are being stored in digital format. The central repository structure includes all the different kinds of information (text, image, video). 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 the central repository [14, 16]. This information technology



Fig 3: Article control in a newspaper editorial process.

infrastructure is the basis where a CSCW system can be implemented.

Most editorial systems in greek newspapers employ several stand alone computers or small local area networks (most of the times not interconnected) in various departments. Thus they do not fully exploit the potentials offered by the existing infrastructure.

The document flow is done through shared folders, and there is no procedure that defines the changing control of the article. All collaboration is done through face to face meetings. Users usually work in standard word processors applications. The articles are not formatted and they are delivered to the page layout department in simple text format. This solution may be suitable for local weekly newspapers that do not produce editions on the strict deadlines of a daily edition.

Some major newspapers employ custom made information retrieval systems that offer to some

extent a CSCW environment. This is caused by the fact that there are always some older computer systems installed that are not compatible with the introduced CSCW system, but are still in use.

An ideal CSCW system would be able not only to support the workflow in the editorial process but also to support collaboration among users. The system must be asynchronous because in each time instance only one user has edit rights to an article (see fig 3) and must support relay article control.

Based on the workflow model described above we can define four cases of regular or possible collaboration between users:

- The Chief Editor and the Content and Material Head Officer,
- > The Area Head Officer and the Desk Officers,
- > The Text Editor and the Desk Officer, and
- > The Director and the Chief Editors.

Although all the users of an editorial system are usually located on the same floor or building, the

computer supported collaboration can speed up the editorial process. This is especially crucial in the case of breaking news. Another interesting possibility offered by the introduction of a CSCW system, is the joint authoring of an article.

As a consequence of the globalization, actual views and perspectives at many, widely distributed locations, would have to be composed into an indepth article as a group effort for which even the focus (or main thrust) would grow out of cooperative work [14]. That means that some users of the editorial process may be located in different geographical locations. In this case a distributed CSCW system is needed [14].

#### 6 Conclusion

We have defined and discussed the modeling of the workflow in a newspaper editorial process. Based on this modeling we have proposed the implementation of a CSCW system to facilitate the workflow as well as the collaboration between the participants of the process.

During the past years newspaper publishers are increasingly distributing their editorial and advertising material over several delivery channels, primarily a combination of print and World Wide Web [17]. To meet the new production and publishing demands the implementation of a CSCW system is crucial. The CSCW system will be able to create and publish content, well adapted to the different publishing channels, in an effective way.

Future extension of this work may include modeling the editorial process in the case of several delivering channels.

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