Computer Supported Collaborative Work trends on Media Organizations: Mixing Qualitative and Quantitative Approaches

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Abstract

There is a growing concern in the financial world regarding the lack of resources for the sustainability of media related enterprises. The increasing cost of computing resources and data storage have crucially established the deployment of cost-saving and high-effective technologies. The aim of these technologies should be the support of teamworking. The work environments of the media organizations typically remain stable despite the development of internet. Our purpose was to investigate journalists' and media professionals' beliefs regarding Computer Supported Cooperative Work (CSCW) and groupware effectiveness in work routines, based on their experiences. We used a mixed method analysis in the participants' sample. The participants were randomly selected senior and junior journalists/media professionals, head officers, chief editors and assistants, in two groups of 11 and 12 participants each. In conclusion, the need to improve our understanding of groupware in journalism practice has been recognized, not least because of the risk of "technology illiteracy", unemployment and isolation. Simply importing training techniques from non-journalistic disciplines has not resulted in improved news publishing.

Keywords: computer supported collaborative work, groupware, cloud computing, journalism practice

1. Introduction

During the last decade, media organizations have been forced to reconsider and identify their strategies by a combination of economic, technological and market changes. Media industry has been strongly affected by evolving technological aspects in terms of readership rates, distribution chains, publication options, etc. This influences the workflow of media enterprises in all the stages of publishing (pre-production, production, post-production). Traditional systems have been replaced by digital ones, where computerized editorial systems are employed to write texts, process images or report news events. Online journalism and new forms of media communication, such as blogs, Web Radio-TV, social media, mobile multimedia, etc., have dominated the media industry, establishing the 24h per day news production from both ordinary users and journalism professionals (Dimoulas et al., 2014; Lee D. H., 2013; Spyridou et al.,2013; Siapera & Veglis, 2012). Digital news and Internet services lead in the formulation of a new global media environment, both in terms of geographical expansion and of participating users, where displacing and complementing effects of printed media from electronic ones have been observed and thoroughly studied (Veglis et al, 2014; Westlund & Färdigh, 2011). Nowadays, people have many opportunities to instantly access news and other generic-purpose information, but also to produce and share their own content. The exponential growth of the smartphone market and the number of mobile users, along with the new, rapidly evolved, mobile cloud computing and contemporary mobile media capabilities, have led to a large-scale development and deployment of mobile news applications (Dimoulas et al., 2014; Dey, 2012; Dinh, Lee, Niyato & Wang, 2011; Zhu, Luo, Wang & Li, 2011). In this context, a variety of tools is available offering increased flexibility in news creation, content editing and distribution (Dimoulas et al., 2014; Veglis et al., 2014; Westlund, 2013). Obviously, the appearance of such mobile services in the news industry has influenced both the news-producer and consumer view in terms of knowledge flow and information sharing, enabling and/or promoting collaboration possibilities (Westlund, 2012). Indeed, the boundaries between the news production and consumption have been blurred in such a degree that they are not really separable, so that media sharing seems to better describe contemporary news propagation models, favoring the adoption of the cloud computing technologies (and mobile cloud computing) paradigms (Dimoulas et al., 2014; Veglis et al., 2014).

A critical debate regarding the possibility to formulate a 'collaborative environment in media' has recently become pressing, given the increasing social media integration into groupware (Franken et al., 2013), the blurriness between some kinds of media practices (Wright, 2014) and the audience participation in news production (Schmidt et al., 2015). Additionally, the lack of relevant training, the news media change as described above and the recent global economic crisis contribute to an augmentation of the need for a collaborative media environment. At the same time, research has shown that the co-creation of news is explained by the development of participatory and grassroots journalism (Paulussen et al., 2007; Campbell, 2015; Wall, 2017; Gillmor, 2006) as well as the raising of innovative forms of news production (Lăzăroiu, 2014; Hermida, 2013) like mobile news and social networks (Westlund, 2015; Chan-Olmsted et al., 2013). Recent studies show that the interaction between new media teams (Lewis & Westlund, 2015) and the co-creative behavior of the team members (Agarwal & Barthel, 2015) enhances outcomes. For example, "The New York Times", "The Guardian" and other leading newspapers have recruited IT specialists within their newsrooms, specifically to design innovative contents, consisting of online presentations, interactive maps or visualizations, rely on a wide range of computer techniques used to collect, process, analyze and visualize data sets (Parasie, & Dagiral, 2013). In Greece, the data journalism" is closely related to "open data" releases. These emerging kinds of journalism are putting into question the traditional work methods of journalistic investigation and their practices.

Cloud computing provides software and hardware resources of third party users via web-based applications depending on the usage (Qian et al., 2009; Hoefer & Karagiannis, 2010; Dillon, Wu & Chang, 2010). It consists of a network of end user computers, data centers, and web services (Mell, 2009; Jin et al., 2010; Nick et al., 2010; Zhang et al., 2010). The cloud applications support sharing data and computations in this network (Mei at al, 2008; Sultan, 2011; Rittinghouse & Ransome, 2010; Hoefer & Karagiannis, 2010). Given this context, we set ourselves the research goal to assess this technological solution in order to support journalists' actual work practices around their work and information flow. Workflow is the specification and the execution of a set of coordinated activities representing a business process within a company or an organization (Borghoff & Schlichter, 2000). This study would try to exhibit here some work with regard to extending online Journalism with groupware enhancements in the light of the collaborative co-creation processes in a media organization. Efficient co-creation is the key to successful media work and management that requires developing and managing co-creative processes in media environment, in particular in the online context (Malmelin & Villi, 2015). Desire of good outcomes, together with the proliferation of 'Web 2.0' applications (Borger et al., 2016) has made groupware training in journalism practice a priority for media workers (Sidiropoulos & Veglis, 2014). However, there is a lack of evidence to inform the implementation of groupware training. Much of the literature on groupware in journalism draws on assumptions (Sidiropoulos & Veglis, 2013) rather than scientific evaluations. The goal is to investigate media workers' opinions on groupware, teamwork and media training, aiming to determine aspects of groupware working that are perceived as beneficial or detrimental to the effectiveness of teams in media organizations.

A local media organization typically consists of a group of people working in relative tasks. Its workflow is mainly focused on its editorial department. The main characteristic of this group is the need for awareness and collaboration. The use of web-based collaboration work environments (CWEs), such as Google's and Microsoft's relevant applications, which have developed their own cloud applications, could support the workflow using the collaboration and technology as basic components (Avraam et. al, 2004). The contributions of this research are:

• The identification of the need to explore and improve the interrelationships between journalisms' informal work practices and the organizational workflow in a media setting.

• The design and implementation of a CSCW concept, designed to enhance awareness and collaboration as an integral part of the official production process.

• The study and analysis of focus group feedback from journalists and media professionals to evaluate their feedback on the effectiveness of a CSCW approach.

• The presentation of a set of design guidelines for future technology development.

In this paper, we present findings from a qualitative research project on the introduction and use of CSCW in media organizations. Section 2 includes a literature review of the area. More specifically it provides the information concerning cloud computing technologies and CSCW aspects. The workflow of an editorial department is described and significant case studies are presented. Finally, Section 5 includes Results and Discussion and Section 6 Conclusion and Future Work.

2. "Groupware as a Cloud"

2.1 Computer Supported Collaborative Work

Computer Supported Collaborative Work (CSCW) is a multi-disciplinary research field, which focuses on tools and

techniques that support multiple people working on related tasks. A number of research studies have focused on the usability of groupware in supporting collaborative work (Tang et al., 2014). The implementation of a CSCW or groupware system demands a wide range of resources. Within industry, groupware systems are offered as a Software as a Service (SaaS) solution, which may be deployed across various business functions within an organization or a supply chain; these systems often allow workers within an organization to better communicate, collaborate and share information and knowledge with their colleagues (Evans et al., 2015; Kebede, 2010). Consequently, the technology increases collaboration, self-sufficiency, awareness, communication and motivation of the co-workers (Jiang & Yang, 2010). Except for technological parameters, the social factors have also significant influence on the development of an effective CSCW system. We introduce below some dimensions of CSCW. The characteristics of each one of these dimensions have already been described in the CSCW literature. In media industry, this could provide support for group collaboration and task orientation in distributed or networked settings (Veglis, 2005). Emerging business collaborative technologies could be effective for journalists in the ease of employability, teamwork motivation and social awareness.

2.2 Cloud Computing tools and Support of Collaboration Processes

The technological progress of cloud infrastructure has significantly influenced the wide development of such services. To this extent, Google offers its cloud applications supporting collaborative work (i.e. Google Docs, Google Calendar, etc.), Facebook provides users' private groups and Microsoft offers its applications as web-based services (Sidiropoulos, 2010; Hilley, 2009). Among the great number of platforms available, Microsoft365 has been chosen initially to be studied. This platform is currently the most recent commercial solution and has been designed to implement collaborative project-based activities. Microsoft365 integrates tools for a) synchronous communication (chat, web conferencing), asynchronous communications (email), b) file sharing (storage), c) teamwork (team sites), d) publicity (website) etc. A thorough analysis of cloud computing tools and their support of collaboration processes is described below (Miller, 2008):

- **Communication/Negotiation systems:** such email services have replaced the traditional email software applications. Google and Microsoft provide email services that are available to the users from anywhere. Also, both of them offer chat tools for instant messaging between users.

- **Task Schedule Management / Group scheduling systems:** such scheduling applications (i.e web calendars) support co-ordination and improve teamwork in a collaborative environment. Google Calendar (calendar.google.com) has a user-friendly interface for sharing events with other collaborators and provides several functions enabling collaboration between workers. Task monitoring of work teams is available. Workers can create public or private calendars. The invitation access to an event is sent via email. Microsoft Online Calendar also supports users to schedule tasks as well as share them.

- **Group Editing systems:** This kind of systems are tools to improve co-authoring and management of documents which are basic processes of an enterprise. The cooperation among different departments (Financial, Advertising, HR) for the creation of a report often demands the development of specific co-ordination and collaboration mechanisms. Cloud Computing technologies provide these mechanisms through SaaS applications, such as Google docs and Microsoft's online office suite. The key functions of these systems are creation, editing and sharing of documents that are stored on the cloud. In this way, the workers can collaborate and contribute to the creation of a report, by having access in the same document (in real time). Monitoring of the editing procedure (corrections, data entered and confirmation) is also supported.

- **Tools to support mobile workers:** Most applications are available in mobile version for tablets and smartphones. Mobile version tends to have fewer features and it is customized for smaller screens, lower bandwidth and other parameters that concern mobile services. In addition, a synchronization function can often be used for synchronizing the device with calendar, contacts and email services.

Cloud computing technology promises to offer groupware. "This indicates a close relationship with Computer Supported Collaborative Work and creates a socio-technological system" (Jiang & Yang, 2010). However, is Cloud Computing ready to support CSCW?

CSCW demands a wide range of services for users (Ackerman, 2000). Cloud Computing combines existing technologies (such as Web Services and Rich Internet Applications (RIA)) to support collaborative systems. (Lee CP et al., 2006). As a result, the developers focus on the collaborative characteristics and cooperative mechanisms (Jiang & Yang, 2010). Except for the technological parameters, such as usage and processing, CSCW development has also been affected by social factors, such as management and policy decisions. A successful system must respect the users' social habits. This leads a system to be adopted. It is considered that Cloud Computing "respects" the social habits of users. Tools and applications on the cloud are similar to their desktop versions which are familiar to the users. Given that, they are not obliged to learn new technologies and change their habits (Jiang & Yang, 2010).

Finally, motive is offered to users and developers for the adoption of this technology. Users are motivated to participate in collaboration procedure and their contribution will increase (Ackerman, 2000; Grudin, 1988; Mills, 2003). Cloud Computing provides services such as unlimited resources, service on-demand and pay-per-usage. This supports continuous access to information during their work processes (Armbrust et al., 2009).

3. Modeling the workflow in a Media Organization

The structure of a Mass Media organization can be divided into the creative department and administrative department. The structure of the administrative department does not differ from that of other companies. The creative department consists of the advertising, editorial, printing and circulation departments (Veglis, 2005). The structure of an editorial department in a typical daily local newspaper is represented in figure (1). The Publisher is at the top of hierarchy. He collaborates directly with his Director. The Director supervises the Chief Editors of each section in the newspaper (Politics, Social, Culture, Financial, e.t.c.). Chief Editors are responsible for the newspaper's content and they collaborate directly with Area Head officers. The Head officer of each section collaborates with Journalists and Text editors for article creation. Finally, the Content and Material Head officer defines the articles' title, photos and the general content of the newspaper. (Veglis, 2004; Veglis, 2005).
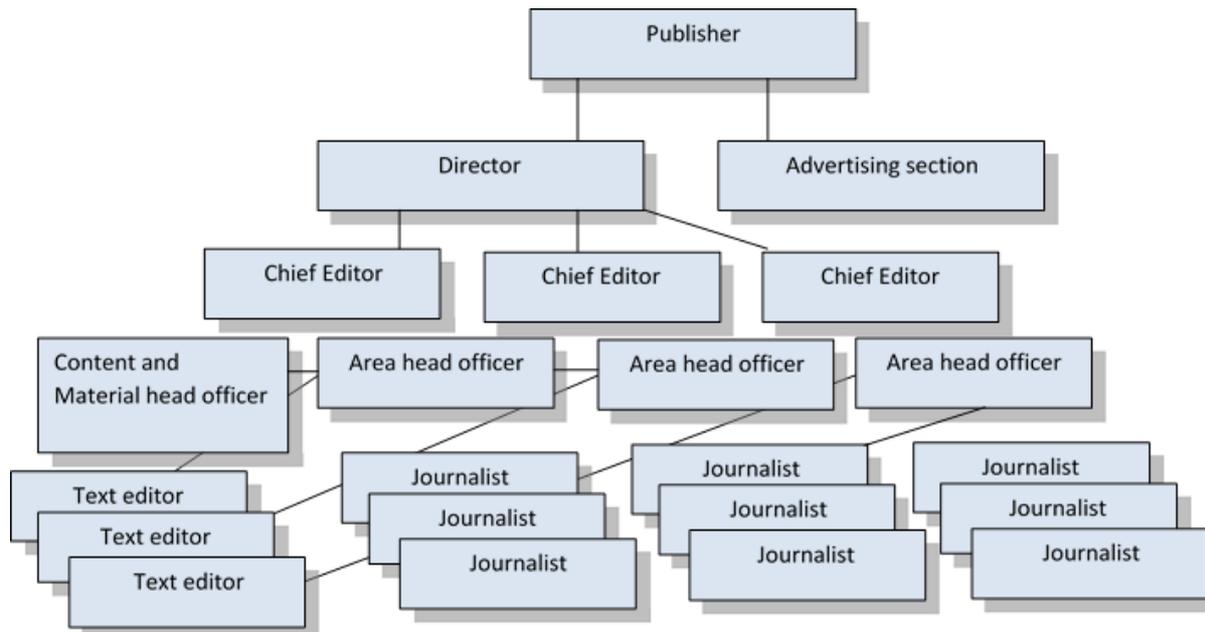
Figure 1. The structure of the editorial department in a Mass Media organization

It becomes obvious that the editorial process in the corresponding department (i.e. of a newspaper) may be consisted of groups, especially at the lower layers (see figure 1). However, groups can also exist at the higher layers. Hence, it seems that the editorial process is based on a teamwork structure. A variety of teams between workers and managers is used as the basic unit of accountability and work. The teams are usually supported by procedures of informal collaboration and organized around processes, products, services or customers (Beyerlein & Harris, 2003).

3.1 CSCW in Media Organizations; Alignment of Scope

Based on the model presented in the previous section, we can describe in detail the four cases of usual or potential collaboration between employees can be considered (Veglis, 2005):

- The Chief editor with the Content and Material head officer

- The Area head officer with Journalists

- The journalist with Text editor and

- The Director with Chief editors

Groupware could support the editorial process in a Mass Media organization, either by co-editing systems or communication tools, especially in the case of breaking news. (Stenberg, 1997). These advances build a new type of workflow in Mass Media. The potential implementation of groupware in the processes of companies could create a cluster of activities that are increasingly interrelated. In this respect, we tried to analyze the attitude of media

professionals regarding the integration of these technologies in their work activities. CSCW activities could be summarized in the following major layers: communication, co-operation, co-ordination, information sharing, and group-oriented processes. Groupware processes can be grouped into the following categories (Van Audenhove et al., 2008):

a)   Coordination mechanisms: The journalist has the ability to assign tasks to the coworkers and send them notifications. The journalist is expected to perform basic functions like scheduling and coordinate the team in information retrieval and the creation of work framework. The journalists search all the necessary data which will contribute to the creation of their article. This task can also be accomplished more easily by using cloud computing applications (like Messaging chat). Communication activities and awareness as well as the task management and decision making could be supported.
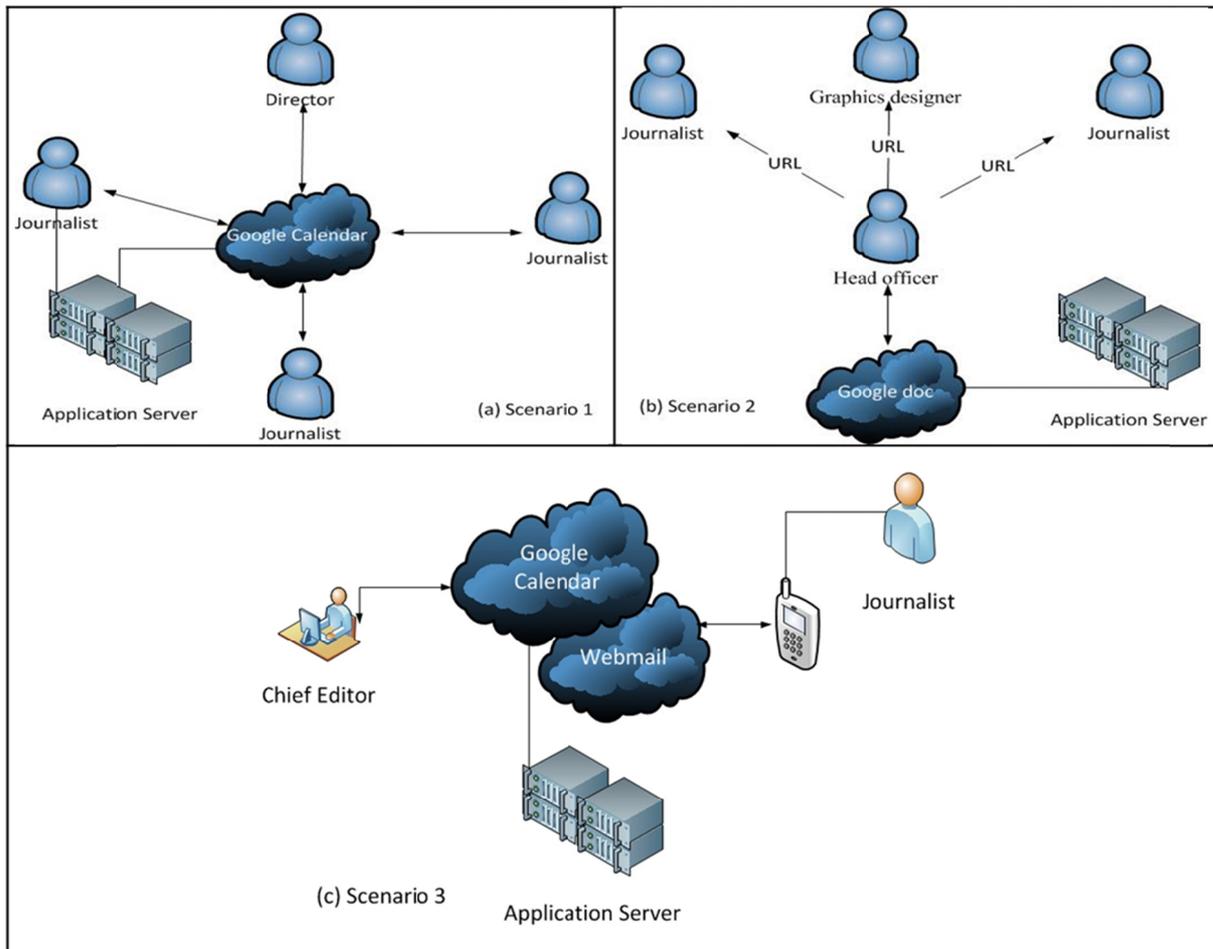

Figure 2. Group scheduling case in a newspaper workflow (b) Group Editing case (c) Mobile groupware case

b)   Knowledge Management and Awareness: This stage involves the processes of article editing and layout. The collaboration and distribution between text editors, graphic designer, journalists and head officers could be coordinated through the support of web-based collaborative editing applications (i.e. Google docs). Document structure and reviews could be accessed by co-workers at any point.

c)   Data Analysis and Decision Making: This layer contains the end–processes of the editorial department (prepress processing). The coordination and collaboration need to be conducted for the final evaluation of the content. All the sectors of the newspaper should be ready to contribute in any case. In this layer, all the cloud services could support the inclusion of direct and simultaneous communication, as well as information and collaboration among end-users.

The proposed CSCW delivery model is one of combining teamwork paradigms for media organizations through a cloud environment. The goal is to build a CSCW web-based environment which should provide information and knowledge on a variety of topics relevant to journalists' tasks, enhancing the users' decision-making skills and thus reinforcing awareness of the members especially of those who are not familiar with new technologies. A thorough analysis of work routines in a newspaper organization using CSCW components through scenarios (Fig. 2) will be examined.

Research Questions

In the previous sections, CSCW mechanisms and groupware were described and discussed. The question that naturally arises is which are the results of a potential groupware integration in the workflow of a media organization and the behaviors of professional journalists with regard to this aspect. Thus, to thoroughly study this matter, certain research questions must be investigated. More precisely,

RQ1: Which types of groupware are thought to enhance effective teamwork in a media organization?

RQ2: Which types of groupware are thought to undermine effective teamwork in a media organization?

RQ3: Which factors could improve teamwork using groupware?

In this paper, we address the above research questions. We used cases in a media organization where previous and new results are presented as responses to a series of questions raised by the idea of CSCW.

4. Method

A pilot study was initiated in March 2014 in order to investigate how media professionals would manage to coordinate their work routines using CSCW technologies. The focus of this study was to understand how journalists collaborate in a traditional work environment including the use of various web-based collaborative services and their engagement in CSCW activities for the news production. A combination of questionnaires and interviews was used. The researchers interviewed 23 media professional participants (journalists, chief editors, and text editors) in traditional and online Media and observed approximately 2 occasions of focus group meetings where CSCW scenarios were presented to the participants (Fig. 2) and examined their feedback on a CSCW system (in our case Microsoft365 service was demonstrated). This qualitative research was conducted in order to highlight journalists' attitudes and the framework of understanding, to identify group norms and cultural values and facilitate the expression of ideas and experiences that might be left underdeveloped in other research methods. Each focus group session was facilitated by an independent coordinator (a journalist) as well as an observer (IT expert). A demonstration of the CSCW platform was conducted, introducing to the participants the platform's sub sections (webmail; group calendar; file sharing and editing) as well as the integrated communication components (Chat, Tele/Videoconferencing etc.). Hands-on sessions introducing some of the work activities were conducted in the demonstration sessions with the help of instructors. The evaluation of the sessions was based on open questions in order to achieve better interaction between the participants. During this session, a general introduction was presented, followed by the broad question "Can you describe yourself and your journalism role?". Field notes were made during the focus group.

4.1 Data Analysis Methods

Researchers used qualitative and quantitative methods to examine different aspects of the overall research questions. Data were collected and analyzed separately for each component to produce two sets of findings. Researchers attempted to combine these findings (triangulation) (O'Cathain et al., 2010). The data analysis methods were:

1.   Focus groups / Framework Analysis

This type of analysis would track the temporal modifications of the journalists' profile regarding their attitude on groupware during an increasing task complexity. The forecasting of future work situation is also a task that is related closely to the identification of past trends and will facilitate the prediction of whether the work attitude of a journalist will be improved or not in the long-term. A set of codes organized into categories that have been jointly developed by researchers involved in analysis was used to manage and organize the data. The framework creates a structure that is helpful in summarizing the data in a way that can support answering the research questions.

2.   Scenario based - simulation

The experimental group underwent a scenario-based simulation session. Observations were recorded by members of the research team for each scenario-based procedure. These focused on practical issues (e.g. chief editor - journalists communication, workflow planning and coordination by the area head officer, decision making of journalists – mobility, performance and engagement).

3.   Frequency-based descriptive analysis/Statistical Significance

Online questionnaires (created using the Google Documents-Forms) were distributed to obtain data on the participant responses and attitudes against the CSCW field. These data were then statistically analyzed using SPSS statistical software. Frequency-based descriptive analyses were conducted to evaluate the participants' collected responses for every item. Moreover, a classification of the questions was made, based on the proportion of the number of answers corresponding to the two most important indices (Impact & Usability).

5. Results and Discussion

5.1 Descriptive Data

The baseline survey revealed that journalists lead busy lives. Nowadays journalists tend to experience unfamiliarity with ICTs and Web2.0 technologies (Blogs, Wikis, Social Media, and Cloud Technologies). Such barriers may further prevent journalists from ease employability or their role in a media environment. Next, we present the results of the focus groups analysis among journalists and media professionals. In total, 17.4% of them were males and 82.6% were females. Most of the participants (39.1%) belonged to the thirty-five to forty-four age group, 26.1% to twenty-five to thirty-four age group and 26.1% to forty-four to fifty-five age group. The participants were relatively computer literate, and were engaging with internet-enabled devices daily. Table 1 shows the codes and themes, and Figure 3 (concept map) details the thematic framework, presenting the interaction between codes and themes. Concept maps are graphical tools for organizing and representing knowledge models. Cmap software[1] was used for representing this knowledge model (Fig. 3).

5.2 Groupware Characteristics Thought to Enhance Effective Teamwork (RQ1)

The clear understanding of the nature of the work, the groupware, and the required tasks (newsreporting procedure), as well as awareness of the team members' hierarchy and abilities (team awareness) and the goal's needs (members focus/involvement) were central in the focus group discussions. Declaring (stating) the work as well as the use of groupware promptly was perceived as a critical step. For most participants, it was considered important to pay attention to the "information flow" and the "hierarchy":

"When I am going to write a news story, I should have access in the available information. I should have access not only in my organization's database but also the other web sources." [P15, Male]

Several issues were raised about the influence of leadership on teamwork (see Table 2). Chief editor should be informed and have access to journalists' stories for better awareness and decision making. A particularly important factor was said to be the presence of a leader who should take the final decision and know team members' roles and responsibilities reassuring news stories publishing.

"I don't have access to my colleagues' data. However, the Chief Editor has access to all our data." [P12]. Others reported about the media organization's reaction to the new technologies and the required training on these systems for journalists.

The value of groupware in communication was identified repeatedly in the focus group discussions. More specifically, email communication is used as asynchronous communication in specific conditions and teleconferencing may help in more than two members' communication: "...*If the workload is increasing, the use of new technologies is demanded...Then an email is better than a phone call*" [P10]. This will help more in distributed conditions and not in an editorial department. The participants explained that the collaborative document editing and data storage could also support effectively teamwork even though these will be difficult to adopt. Group scheduling seems to be a new work practice that supports team worker to be more professionals but verbal reporting of task completion was described as necessary for tasks being completed. Finally, mobile groupware seems to enhance more effectively communication and teamwork because the journalist needs to capture, edit and publish content in this context. New technologies in mobile groupware (speech recognition and file annotation) should be embedded. Attributes and behaviors of the journalists and their focus and involvement in groupware was a common theme in all focus group discussions (see Table 2).

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[1]http://cmap.ihmc.us/

Table 1. Codes, Themes, and the Frequency Count of Relevant Quotes

| Codes	Exemplary Quotes	Frequency	Groups	Themes
Digital journalism and groupware	Integration of online technologies in Journalism	23	2	Overarching principle
Limited Awareness	I do not have full access to the story of my co-workers	12	1	Core elements of workflow in Journalism
Clear defined leadership	You should inform your chief editor	12	1	
Teamwork	Teamwork is limited in phone communication	23	2	
Roles/task delegation	Chief editor has access to journalists' stories	12	1	
Group scheduling	It sounds very professional. It is a new "window" in team scheduling	23	2	Demonstrations of Groupware
Group editing	Group editing for a story seems to be easy	23	2	
Mobile Groupware	Effective email communication using smartphones is feasible	23	2	
Database of media organization	I should have access in the news archive for a story	12	1	Groupware that could promote/support effective teamwork
Social Media	Twitter is very useful for journalists	12	2	
Wikis	Wikipedia	11	1	
Mobile Cloud Computing	Smartphone helps communication and awareness	23	2	
Email	Email communication is used in specific conditions	23	2	
File sharing/storage	File sharing/storage could enhance teamwork	23	2	
Speech Recognition services and annotated content	Groupware would be more efficient if technologies like speech recognition and file annotation are embedded	23	2	
Lack of experience	Unwillingness in the integration of new technologies	11	1	External Factors That Threaten Groupware Performance
Individual characteristics of journalist	The journalist is not familiar with co-editing in his/her story	11	1	
Multitasking	The journalist should be able to capture, edit, publish content	23	2	
Lack of training programs	Media organizations should support their staff training in these technologies	11	1	Limitations in Media Organization towards CSCW
Workflow issues	Groupware will be integrated in sales and administration department of a Media Organization	11	1	
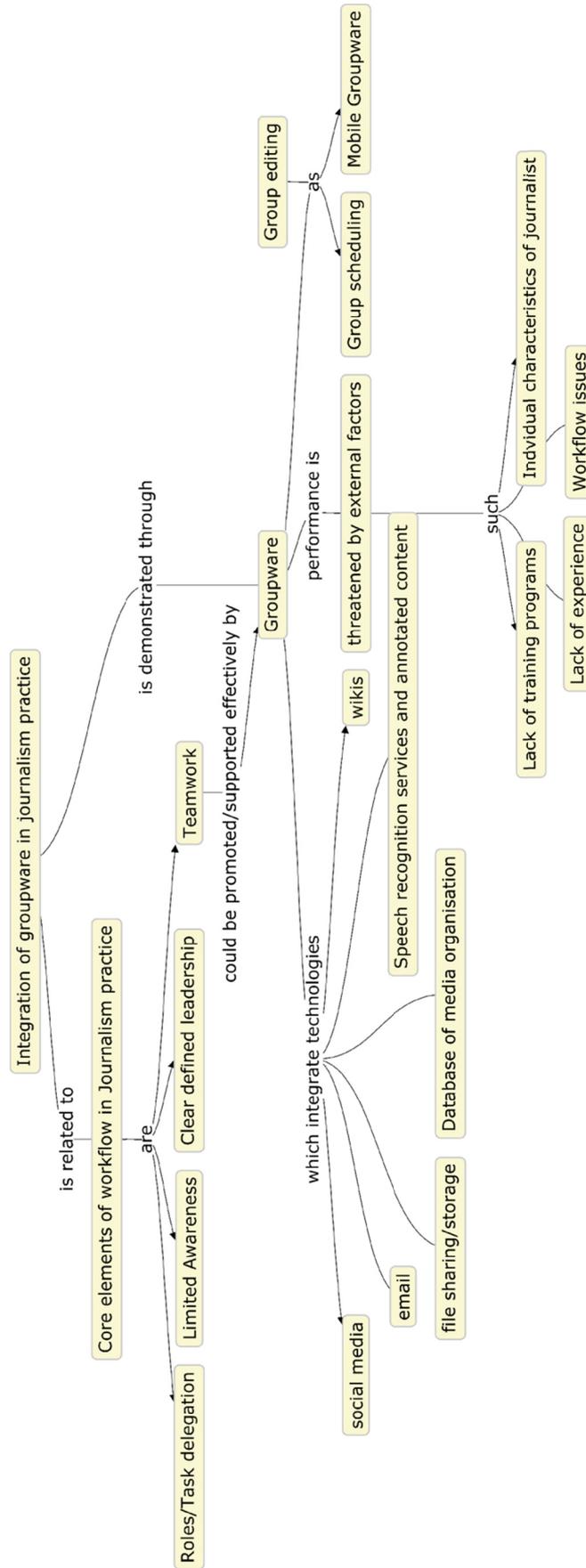
Figure 3. A concept map presenting the relationship between codes and themes

5.3 Groupware Characteristics Thought to Undermine Effective Teamwork (RQ2)

Table 2. Involvement in groupware: Attributes and Behaviors

Issues	Focus Groups[2]	Triangulation[3]	Simulation[4]
Leadership and journalist involvement	Presence/attendance of director can be reassuring for publishing	complementarity	Coordination mechanisms were associated with better awareness and decision making
Journalists focus and involvement in groupware	Group editing seems to be a new practice that includes professionalism	complementarity	Group editing groupware was associated with ease of content supervision and better notification for any changes
	The leader should take the final decision and know team members' roles and responsibilities.	dissonance	Group scheduling groupware was associated with better task management but respondents were concerned about task completion
	Mobile technology has been adopted in practice	complementarity	Mobile groupware behavior was more effective in communication and content sharing.
Non-phone communication	One of the most common comment was that due to the lack of time to assure the task assignment the direct phone calling will be preferred	dissonance	Communication using groupware Better teamwork in distributed locations was associated with using teleconferencing. Further research is necessary

Four interconnected individual and team characteristics emerged that were thought to threaten effective groupware adoption: lack of experience, individual characteristics of journalist, lack of training programs and workflow issues. Lack of experience was said to be the result of daily multitasking, leading to lack of time for training. Individual characteristics of journalists were particularly emphasized and were described as the unwillingness of journalists to interfere and co-edit their news stories. Two external threats to effective adoption of groupware were described: (a) lack of training programs by their media organizations and (b) workflow issues. The participants explained that the variation of different departments of media organizations and newsrooms, in terms of workflow and type of work practices, resulted in unwillingness in integrating new technologies and in delaing their adoption: *"The processes are different in a newspaper, news agency, television and radio."* [P12] Moreover, few stated that "*an integration of CSCW systems using cloud technologies may be more feasible in the administrative or marketing department of a media organization*". With regard to the lack of training programs by the media organizations, the participants described instances in which journalists tried to be trained on their own, whereas media organizations cannot afford to cover such training programs. However, they also described the need of expert staff to support them.

5.4 Group Proposals for Improving Groupware and Team Working (RQ3)

The participants commented on current provision of groupware simulation and suggested ways to improve it. Participants recommended the development of mobile groupware (Tablet or Smartphones) that will support more effectively the teamwork in media organizations. In this way, professionals will be able to receive directly information to their emails, schedule their meetings using web calendars and access their files, stored in the cloud. The participants confirmed that they use "smart" mobile devices for their work daily:

> P1: "… I would never give up my smartphone. A journalist should know everything. Nowadays, a photograph in a protest is a news story. The journalist should be able to shot the picture, edit the picture and write the story"

> P4: "Because our entire day works on the news story and immediacy, everything we do (i.e. when we need to report), we use the smartphone. Many technologies could be integrated in this."

Participants also recommended the integration of new technologies in groupware for image and audio editing and analysis to enhance journalists' skills. Speech recognition and content annotation were viewed as especially important

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[2]Participants' beliefs and experiences in this study.

[3]Framework (O'Cathain et al., 2010): corroboration: convergence = the findings agree; complementarity = the findings offer complementary information; dissonance: findings were contradictory; silence/requires further study: findings from the focus groups were not tested in the scenario-based simulation.

[4]Scenario-based simulation

for these situations. Journalists will easily edit and share their audio material so they can better evaluate and disseminate it, without increasing computational load demands and/or complicating user interfacing and interaction processes. They will be able to report events in real time and process their content simultaneously (i.e. interviews) through automation processes on the cloud. The content will be easily uploaded in distributed databases, therefore network collaboration and cross-platform access will favor the content management and professionals-mobility. They will not have to think about limits such as the audio format, storage capacity, computing resources and continuous Internet connectivity. The automated intelligent processes of such a platform will offer the requisite results, requiring less expertise from the user. In the case where the outcome does not satisfy the end-user, a new process will be re-initiated and the file will be uploaded again for further processing.

Table 3. Opportunities/Threats of groupware

Issues	Focus Groups	Triangulation	Simulation
Threats to effective use of groupware Groupware that could promote/support effective teamwork	Understanding Media and Culture	dissonance	Proposed scenarios seem to be "simplified". Further research with real-life observations is necessary
	Data storage is useful	complementarity	More efficient teams were more likely to have used data storage groupware
	Speech Recognition services and annotated content	complementarity	There seems to be significant effect on team efficiency; its value was difficult to test

Finally, some participants described that they use social media in their work routines providing them access to break news and users' comments. Some participants suggested the potential of social media (i.e. Facebook, Twitter) integration in groupware for better communication and awareness: "The social media is a useful tool." [P9]. Triangulation of the findings from the focus groups with evidence from simulation demonstrated convergence and complementarity for several findings; however, there were also some surprising dissonant findings (see Tables 2,3).

Table 4 demonstrates the results of the participants' self-assessment regarding team work efficiency, groupware efficiency and the effects on their skills. Generally, teamwork seems to be benefited when there is awareness and communication on specific tasks. More work needs to be carried out so that the groupware is adopted by media professionals. Groupware poses benefits for CSCW processes as respondents rated above the average score in most of the cases. Groupware seems to be less effective on group scheduling and communication/negotiation processes in media organizations. On the other hand, group processes such as collaborative text editing/creation and presentation seem to be more benefited by groupware. Finally, respondents thought that groupware also poses benefits for individual and team work skills. Their work skills and team awareness seem to be more benefited according to the rating scale which indicated a positive feedback. The contribution to their business profile and the team's effectiveness follow with a higher score close to the average. It is worth noting that the collaboration skills are also above the average score. More specifically, a Pearson's analysis was also conducted in order to determine which factors influence the participants' perception about CSCW systems utility and improvement of their effectiveness. The collected data presenting the influence value of CSCW systems benefits in all the types of teamwork allow us to investigate the existence of correlations between various parameters of the study. Specifically, it was shown that the participants believe that the use of CSCW systems would benefit (a) the team's awareness ($r=0.640$, $p <0.002$), (b) work skills ($r=0.433$, $p<0.039$) and (c) their business profile ($r=0.433$, $p<0.039$). However, they are concerned about the CSCW benefits on (a) their collaborative skills and (b) the team's effectiveness. The above findings can be explained by the necessity for CSCW education at the early stages of informatics education (Sidiropoulos & Veglis, 2013).

Table 4. Merge Results

Themes	Qualitative Results	Quantitative Results
Teamwork efficiency	More work needs to be carried out so that the groupware is adopted by media professionals	Teamwork efficiency (Likert scale, 1-poor, 5 high): • Teamwork awareness (Mean 4,09) • Communication on a specific task (Mean 4,00) • Groupware is involved in teamwork (3,96)
Groupware efficieny	Respondents thought that groupware poses benefits for CSCW processes	CSCW processes (Likert scale, 1-poor, 5 high): • Communication/Negotiation (Mean 3,35) • Presentation (4,09) • Collaborative text editing/creation (4,09) • Collaborative scheduling (4,00) • Collaborative Task Management (4,04)
Effects of Groupware on their skills	Respondents thought that groupware poses more benefits for individual work skills and team awareness	Individual and team skills (Likert scale, 1-not influenced, 5-very influenced): • Individual work skills (Mean 3,95) • Individual collaboration skills (Mean 3,82) • Individual business profile (Mean 3,86) • Team awareness (Mean 3,95) • Team effectiveness (Mean 3,86)

The results both negate and support some of the initial research questions, concerning the effectiveness of groupware on media workflow, as it was stated. During the focus group meetings, participants often used the term *online technologies* (see Table 1). Cloud Computing (CC) and Mobile Cloud Computing (MCC) are considered key factors in the development and maintenance of effective groupware and teamwork. In this study, we were able to analyze the concept of *groupware* and identify the important components (see Figure 2) and elicit factors of enhancing/threatening each one. The development of information and communication technology is leading media experts (Journalists, IT experts, etc.) to transform themselves into broader knowledge creators rather than simple authors. The basic processes of information gathering, journalistic and literacy writing, editing, design and advertising have value in forms other than traditional publishing (Picard, 2002).

In this study, findings from the focus groups were corroborated by data from scenario-based simulation and questionnaires indicating that teamwork efficiency is likely associated with groupware but further research is also necessary into journalists and media professionals' interaction and technologies adoption. Groupware framework during news publishing is interesting because both teamwork and online technologies are important, but it should not get in the way of breaking news (immediacy). It is not surprising that experience was reported as a valuable asset in the focus groups improving both groupware and teamwork outcomes. The participants described how media organizations could enhance their workers' skills to reduce lack of experience. Equally, participants recalling their own experiences noted the difficult problem of multitasking and lack of time. In such situations, clear leadership and effective team communication were seen as particularly valuable. Directive leadership was associated with better awareness and decision making. One might argue that the proposed scenarios seem to be simplified. Nonetheless, this can be justified by the fact that they must be described and understood by the participants of the focus group. (More complicated scenarios are expected to be implemented in future extensions of this work).

The means of inculcating positive teamwork and groupware attributes might not be immediately evident or straightforward. Mobile Groupware for instance, has been specifically developed to benefit teams in using teamwork skills but has not shown yet any extra benefit over news publishing, perhaps because mobile groupware was originally developed for informatics rather than for journalism. Although lessons regarding groupware from other scientific areas are undeniably useful, improvement in outcomes of groupware in journalism might require customized training based on evidence from experiences of real-life news publishing. It is possible that the improvement of groupware requires approaches that are oriented in journalism practices. Finally, more effective groupware would have to address different work styles and needs, using several different teamwork methods rather than a one-size-fits-all approach. It might also have to address other technological aspects, often ignored, such as the social media (i.e. twitter) or multimedia editing and analysis (i.e. speech recognition technologies/annotated content).

6. Conclusions and Future Work

The main goal of the study was to identify strengths and weaknesses of the design and implementation of CSCW systems simulating a media work environment. Specifically, we tried to investigate whether CSCW systems facilitate or impede journalists' practices around their work and information flow and gather suggestions for improving them. We

elaborated scenarios that describe possible types of collaborative work in an editorial department towards a cloud-oriented model for media organizations. For doing this, two fundamental fields were examined, 1) the Computer Supported Collaboration Work from the perspective of a media work environment, and 2) the Cloud Computing technology as groupware through SaaS model. To contextualize the scenarios, we focused on the organizational structure of a newspaper's editorial department and its daily activities. Furthermore, we complemented the analysis with information based on the collaborative work routines that could be computer supported. Besides the crucial role of the technological parameters used in this study, too many sociological variables also exist — hence the methodology is based on the hierarchical organization of an editorial department. The potential effectiveness of these scenarios is related with the workers' volition for collaboration and awareness.

The novelty of the present study relies on the fact that it is the first one to describe the perspective of groupware in relation to media organization workflow. It includes a media and communication experienced diverse sample. Respondents were asked about a variety of work practices. A further strength is that the study includes responses from journalists/media professionals as well as participants who are also chief editors or area head officers. The analysis was rigorous and involved multiple researchers to enhance the trustworthiness of the findings. A possible limitation could be that the findings represent opinions based on recounted experience rather than direct observation. Due to the nature of the survey there was a lack of probing questions for the examples that participants provided by their experiences. Experiences are inherently subjective and may not fully reflect actual events or practice. However, we could triangulate the findings with observations from simulated cases in media practices (Bristowe et al., 2012). The use of mixed methods by multiprofessional researchers does not necessarily guarantee the validity of conclusions because the same biases might affect all the data sets (O'Cathain et al., 2010), but the similar composition of groups in the two studies (focus groups —questionnaires) made comparisons easier and relevant. Further study is required for all the findings using data sets from observed real-life journalistic practices.

In conclusion, the need to improve our understanding of groupware in journalism practice has been recognized, not least because of the risk of "technology illiteracy", unemployment and isolation. Simply importing training techniques from non-journalistic disciplines has not resulted in improved news publishing. In this study of interprofessional focus groups, we identified some weaknesses of effective groupware, as perceived by media staff, while forming identifiable elements suitable for educational training programs. Further research should address issues described in this study and ideally obtain evidence from the direct observation of real-life news publishing, to improve teamwork with better groupware training.

Acknowledgements

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Notes

Note 1. Code: A descriptive or conceptual label that is assigned to excerpts of raw data in a process called 'coding'.

Note 2. Themes: Interpretive concepts or propositions that describe or explain aspects of the data, which are the final output of the analysis of the whole dataset.