# Mobile Newsmaking

**Kerstin Forsberg**

Department of Informatics,
Göteborg University, Sweden

kerstin.forsberg@viktoria.se, www.informatics.gu.se

Licentiate Thesis

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# Abstract

The research reported in this thesis concerns the design of new and innovative IT support for mobile news journalism. News journalists often have to report events on topics that they do not know very well and with little time for preparation. News reporting is often conducted in the field, away from the stationary IT support.

The scope of this research is limited to the early phase of newsmaking when journalists transform everyday occurrences and happenings into newsworthy stories, discuss news events and formulate news tasks, do background research and frame news stories. The research question addressed is: *How to provide reporters with contextual information relevant for news tasks in mobile situations?* Contextual information reminds the reporter of the context for the task at hand. Helps the reporter to ask relevant and interesting questions and to properly frame the news story.

The thesis contains field studies, design implications and applications of mobile technologies. The following theoretical and practical results are described: 1) NewsSpace, a design model describing new ways of using IT in news journalism, 2) NewsMate, a prototype of an IT service for mobile reporters, 3) FieldWise, a generalised architecture for mobile knowledge management, 4) A description of the newsmaking process focusing on the early phase of articulation and contextualisation of news tasks, and 5) A news task structure, called Localising News, and proposals of how the utilisation of task structures could improve the IT support for mobile news journalism.

# Preface

The thesis is a collection of four papers and an introduction. This forms the result of a collaboration effort between academia and industry that started in 1997 when the Viktoria institute was established and a Ph.D. programme for people in industry was launched. The work reported in the thesis has been done as part of the Mobile Informatics programme. Mobile Informatics is an applied research area exploring and realising new and innovative IT services for the "nomadic networker" of the future.

The overall task for the research is the *design of new and innovative IT services supporting mobile news journalism.* The specific research question is: *How to provide reporters with contextual information for news tasks in mobile situations?*

## Sponsor Acknowledgements

## Acknowledgements

There are four groups of people who in their special way have contributed to the completion of my thesis. Firstly, research supervisors and colleagues, secondly, my professional mentors, fellow workers and employers, thirdly, speaking partners in several Swedish news organisations, and fourthly, my family. Please forgive me if I have forgotten to mention any of you.

I am very happy that I have had the opportunity to join the research network that Professor Bo Dahlbom has established at the Viktoria Institute. I am deeply grateful to my supervisors Fredrik Ljungberg and Urban Nuldén. Both of them have inspired and

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**Note:** a digital version of the thesis is available at http://www.viktoria.se/~kerstinf/thesis/
This web page also includes errata and links to additional material.

Introduction

# Mobile Newsmaking

"News is a window on the world." (Tuchman 1978, p. 1)

We expect our morning newspaper, the hourly news radio broadcasts, and the evening TV news programs, as well as continuously updated news websites, to provide us with such a window on the world everyday. However, we seldom reflect upon the work behind it.

In the sixties and seventies, sociologists like Herbert Gans (1979) and Gaye Tuchman (1978) wandered into American newsrooms to ask a simple question: How is news made? Their ethnographic studies offer detailed descriptions of the work behind "the window on the world". They also highlight the complex relationship between the organisation of news production and the technology in use.

In the nineties, Internet and World Wide Web gave us new types of windows on the world. Not only has the news medium changed, Internet has also improved the technology used in the newsroom, changed the organisation of news production, and provided new ways to send and receive news material for reporters in the field. Many argue that this is just the beginning:

> "Ultimately, despite the attention being given to how the Internet is influencing the future of newsrooms and news coverage, a much greater impact on how reporters do their jobs will likely result from continued advances in electronics miniaturization and the development of easier to use and innovative multiple-media news-gathering tools."

This was written by Kerry J Northrup (2000a) in a series of reports on NewsGear, an initiative of the IFRA Center for Advanced News Operations. NewsGear compress the technologies a mobile reporter would need into a regulation-size airline travel case (see figure 1).

Figure 1: NewsGear, 2001 "special edition" (Cole, 2001)

In this thesis I argue that easy to use mobile devices with innovative IT services will have great impact not only on how reporters gather news items, send and retrieve news material, but also on how reporters *make news stories*. That is, how they transform everyday occurrences and happenings into newsworthy stories, discuss news events and formulate news tasks, do background research and frame news stories.

For many journalists it is a way of life to file news stories from hotel rooms, airports, catastrophe spots and chaotic press conferences far from their newsrooms. Reporters get the job done at just about any time there is a pause in the schedule and in any space large enough to set up a portable computer. There is also a type of mobile reporting that does not have the same spectacular characteristics as that of journalists moving from one big event to another big event. Many reporters never leave their neighbourhood, but still work much of their time out of the newsroom.

In the late nineties, we wandered into Swedish newsrooms and followed news reporters when they left the newsroom to cover assignments in their hometown or in the nearest region (cf., Fagrell and Ljungberg, 2000). We asked two questions: How is news made? How to design IT support for mobile news journalism?

Not only mobile news reporters, but also all of us who are part of the information society are exploiting emerging information technologies such as Internet. The rapid diffusion of mobile communication technologies such as cell phones and personal digital

assistants (PDAs) have made it possible for many people to become 'digital nomads' (Makimoto and Manners, 1997). However, these technologies also takes the general problems of designing user interface from stationary settings out to more demanding environments (cf., Kristoffersen and Ljungberg, 1999). The lack of time, silence and focus in mobile situations means that mobile IT services must provide users with *timely knowledge for the task at hand* (Fagrell, 2000). In my research I have focused upon one specific aspect of this, i.e. how to provide mobile reporters with *contextual information relevant for the task at hand*.

Contextual information reminds the user of the context for the task at hand, helps the user to understand, make decisions and act. For example, a mobile reporter should be provided with an overview of internal and external information related to the current news tasks and get suggestions of knowledgeable and available colleagues to contact. Such a PDA-based (see figure 2) application keeps reporters updated also when they leave the newsroom. It will help the reporters to ask relevant and interesting questions and to properly frame the news stories. This kind of design concept and IT service exemplify the results from the research reported in this thesis.



Figure 2: FieldWise (see *Paper 3* and *4*) in use

# 1. The thesis

The research reported in this thesis has been part of the CSCW (*Computer Supported Cooperative Work*) research area. The research approach that has been used is *Informatics*. Informatics, as it has been applied in the Mobile Informatics programme at the Viktoria institute, is a design-oriented study of information technology use.

The first paper deals with the overall task of *designing new and innovative IT services for mobile news journalism*. The next three papers address the specific research question: *How to provide reporters with contextual information for news tasks in mobile situations?*

In the following, I will introduce these papers by first describing the research background using four keywords: *news* and *newsmaking*, *mobility* and *context*. Firstly, I will depict the general concept of "news" and the domain of work studied, i.e. work conducted by journalists to make news. Secondly, I will give a background to the issue of "mobility", especially the contextual dimension of mobile work and interaction. In addition, the introduction offers an overview of the research process, an outline of the papers, a summary of the contributions and how they respond to the research question. Finally, the first chapter concludes with a discussion on contractions revealed throughout the research in the borderline between academia and industry.

The four individual papers of the thesis are:

1. Forsberg, K. (1999) "Navigating in NewsSpace," In *Proceedings of Computer Supported Cooperative Work on Design*, CSCWD99, pp. 329-336, Compiègne, France.

2. Fagrell, H., K. Forsberg, E. Johannesson and F. Ljungberg (2000) "NewsMate: Providing Timely Information to Mobile and Distributed News Journalists," In *Extended Abstract of the ACM 2000 Conference on Human Factors in Computing Systems*, pp. 121-122, The Hauge, The Netherlands: ACM Press.

3. Fagrell, H., K. Forsberg and J. Sanneblad (2000) "FieldWise: a Mobile Knowledge Management Architecture," In *Proceedings of ACM 2000 Conference on Computer Supported Cooperative Work*, pp. 211-220, Philadelphia, PA: ACM Press.

4. Forsberg, K. (2001) "Localising News: Task Articulation and Contextualisation in Mobile News Journalism,"[1] Submitted to *Journal of Graphic Technology*.

Other publications of mine that are related to the thesis:

1. Börjesson, M., I. Bruce, K. Forsberg, (2000) "Academia, Industry and Consulting firms in Collaboration, An value-based analysis of different institutions," In *Proceedings of the 23rd Information Systems Research in Scandinavia (IRIS 23)*, Vol. 1, pp. 333-340, Uddevalla, Sweden.

2. Forsberg, K. and L. Dannstedt (2000) "Extensible use of RDF in a business context," *Computer Networks*, Vol. 33, Issues 1-6, June 2000, pp. 347-364. Presented at the *9th International World Wide Web Conference*, Amsterdam, Netherlands.

3. Fagrell, H., K. Forsberg, E. Johannesson and E. Wollerfjord (1999) "NewsMate: Expertise Management for Journalists," Presented at the workshop *Beyond Knowledge Management: Managing Expertise* at the 6th European Conference on Computer Supported Cooperative Work, Copenhagen, Denmark

4. Forsberg, K. and H. Fagrell (1999) "Let's talk about News," In *Proceedings of the 22nd Information Systems Research in Scandinavia (IRIS 22)*, Vol. I, pp. 341-350, Keuruu, Finland.

5. Forsberg, K. and Ljungberg, F. (1998) "The Organising of Editorial Work: Eliciting Implications for New IT use," In *Proceedings of the 21st Information Systems Research in Scandinavia (IRIS 21)*, Vol. 1, pp. 223-236, Sæby, Denmark.

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[1] Originally accepted for presentation at the TAGA (Technical Association of the Graphic Arts) 2001 conference in Stockholm, The future of Information and Printed Technologies, October 2001. However, the conference was cancelled.

## 2. News and newsmaking

The notion of news is ambiguous. Dijk (1988) identifies three different ways 'news' is being used in everyday conversations:

- We talk about new information about events, things or persons ("What is the latest news from your son?").
- We refer to a type of media in which news items are presented ("Did you watch the news?").
- We denote a news story delivered through a news channel, on the web, in the newspaper or on TV ("The story reporting the world record in the World Swimming Championships.")

The concept of news as it has been explored in the present thesis is the last one – news as stories. Bell (1991) pinpoints: "Journalists do not write articles. They write stories. A story has structure, direction, point and viewpoint. An article may lack these." (p. 147)

Traditionally, news stories have been packaged and delivered as news products such as the daily newspaper. The last couple of years, new digital news services have emerged from the conventional news products. News channels have moved from the kitchen tables and living rooms to our desktops and into our pockets (Antikainen et al., 1999). The consumption of news has also changed from being fairly static and often geographically limited to more dynamic and diverse (Eriksen et al., 2000).

Several studies report on how these news services have changed not only the way news stories are presented, but also challenged the way news stories are made:

- The explosion in interactive media forms and changing online journalists roles (Singer, 1998).
- The different production and publishing rhythms (Sabelström-Möller, 2001).
- The customisations of news content (Turpeinen, 2000).

In our interviews and field studies of newsmaking in the MobiNews project we have captured the work practice of journalists in the newsroom and out in the field. The answers we received and the

observations we did made it clear that journalists often have to report events on topics that they do not know very well, with little time for preparation and that reporting is often conducted in the field away from the stationary IT support.

We also found that the newsmaking process, transforming occurrences and happenings of the everyday world into news products and services, can be described in the following way (see figure 3):
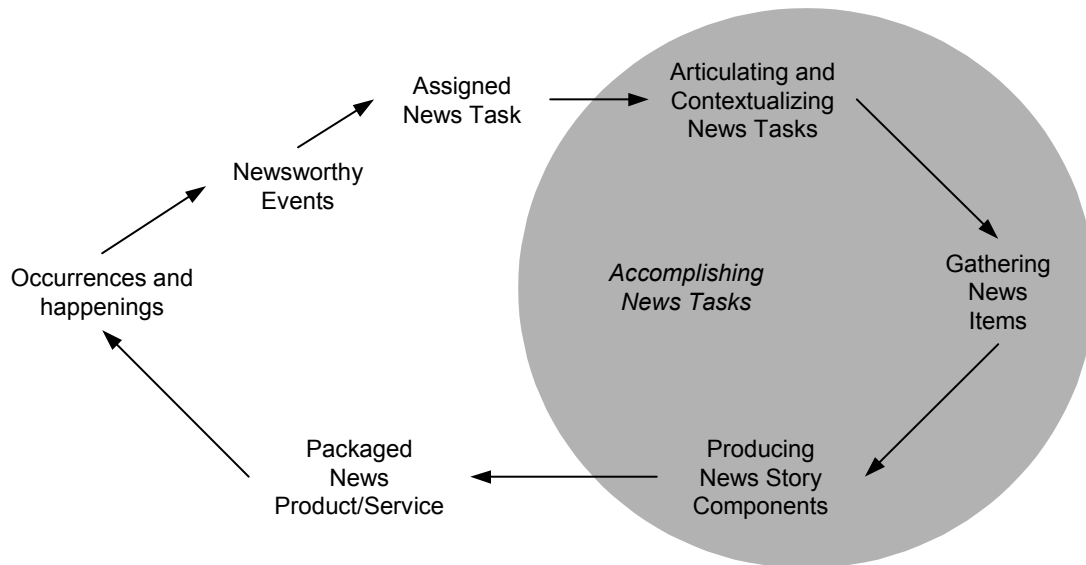
Figure 3: The newsmaking process (see *Paper 4*).

In the broad domain of newsmaking we have focused on the early phase of newsmaking when journalists *articulate news task* (i.e. how they talk about, and more seldom write down, the assigned work) and *contextualise these news tasks* (i.e. how they do background research and frame the news story). This early phase sets the conditions for the gathering of news items, and for the production of news story components. The results are newsworthy stories, covering the selected occurrences or happenings, delivered as packages of content for different media.

In the domain of news research different aspects of newsmaking have been labelled and penetrated in detail by others throughout the years:

- *Gatekeeping*, which is described as a process of reconstructing an event and turning it into news (White, 1950).

- News typification (*hard news* and *soft news*) and *routinization of the unexpected* (Tuchman, 1978).
- *News highlighting* to shape the story content (Gans, 1979).
- *Generating newsworthiness* (Lester, 1980).
- Organisation of time with key events such as the deliverance meeting and *scenic coordination* through cultural means (Kärreman, 1996).
- Local and *global production management systems in newspaper production* and news *product structure* (Nordqvist, 1996).

Newsmaking is definitely cooperative and newsrooms are highly computerised work settings. Nevertheless, Bellotti and Rogers (1997) found a surprising lack of CSCW (Computer Supported Cooperative Work) research on how newsmaking actually gets done and how technology is used in the news and publishing industry. Partly they fill the gap when they describe the cooperative work in newsrooms using the following characteristics: the fast pace of work, the diversity of work, continuous switching between different kinds of representations, the complexity of the collaborative editorial process, constant mobility of workers and the routinisation of work. In this demanding environment they identified the growing diversity of representations, such as dummies of pages, yesterday's newspaper, schedules, news budgets and news assignment lists, for planning, creating and reviewing content (Bellotti and Rogers, 1997).

In recent years, two other CSCW projects have studied work in the news domain, i.e. a study of a Danish radio station (Kensing et al., 1997) and a study of a Finnish newspaper (Helle, 2000).

Kensing et al. (1997) describes the ethnographic and participatory design approaches used in a design project resulting in a computerised Event Calendar and a Program Manager. These two IT services enable a dynamic programming planning process in two dimensions vertical between editorial units and the editorial board and horizontal among the editorial units. They also describe how editorial units, and individual reporters, were reluctant to share information about events to be covered. This was solved through a "make public-

button" to be able to keep a news event or news task private, or local available within the editorial unit.

Helle (2000) presents a systematic analysis of the disturbances in the work practices looking at journalism as part of an activity system including negotiations between different actors, owners, managers, journalists, advertisers etc. Helle (2000) also states "developing computer based support for the integration of tasks needed to produce the daily newspaper could be the next challenge for computer systems design."

None of these studies focus on how journalists continuously access information resources and colleagues to identify, assess, validate, frame and research news tasks on which they are working. Furthermore, previous design-oriented studies do not concern another central topic in newsmaking: mobility.

## 3. Mobility and context

In our field studies we have focused on the constant mobility of journalists (Bellotti and Rogers, 1997), i.e. the *local mobility* (Bellotti and Bly, 1996) in the newsroom and the *regional mobility*. Reporters leaving the newsroom to localise news in their hometown or in the region covered by their news organisation, developing relationships with sources and participating in external meeting, exemplifies the regional mobility of journalists.

Recently, the issue of mobility has received much attention in the CSCW literature (cf., Luff and Heath, 1998; Kristoffersen and Ljungberg, 2000; Kakihara and Sørensen, 2001).

Luff and Heath (1998) investigated mobility in three different settings: in a medical consultation, at a construction site and in the London Underground. In the case of medical consultation, they identified *micro-mobility* as "the way in which an artefact can be mobilized and manipulated for various purposes around a relatively circumscribed, or "at hand", domain". In the construction site, they recognised *remote mobility*: "individuals that move around different physical locations who require access to information and colleagues".

The London Underground they considered a remote and *local mobility* case.

Kristoffersen and Ljungberg (2000) present three "modalities" of mobile work; visiting, travelling, and wandering. *Visiting* is working in different places for a coherent but limited period, e.g. a journalist leaving the newsroom meeting people in their workplace to do an interview. *Travelling* is working while travelling in a vehicle, such as a bus or a taxi. *Wandering* is working while being mobile locally, i.e. local, physical mobility of users, e.g. a journalist walking away from the morning meeting to participate in a project meeting planning a series of news stories and then stop by a colleague to discuss the framing of a news story.

Kakihara and Sørensen (2001) argue that in addition to the *spatiality* and *temporality* dimensions of mobility, the *contextuality dimension* of mobility is important. The context "... in which the action occurs is of equal importance in organising human interaction; aspects such as "in what way," "in what particular circumstance," and "towards which actor(s)" the action is performed constitute the critical disposition of interaction just as the aspects "where" and "when" do." (Kakihara and Sørensen, 2001)

Nowadays, context in mobile situations often means *context-aware computing* and *context-sensitive applications* in which the concept of context is used to refer to the physical environment in which computational devices are embedded. The classical example of this type of contextualisation, or rather localisation-based feature, is the cell phone that will always vibrate and never beep in a concert, if the system can know the location of the cell phone and the concert schedule. (Moran and Dourish, 2001). However, as Kakihara and Sørensen (2001) argue the contextuality dimension of mobility includes several other aspects than the physical location.

The contextual dimension in general, without taking mobility into consideration, have been explored by others:

Alavi and Leidner (2001) include the *episodic memory* of individuals and groups referring to context-specific and situated knowledge, as one key component in a general model describing knowledge transformation among individuals in a group.

Ackerman and Mandel (1995) use the term *memory in the small* to describe how to combine collective memory and task support. Based

on this design rationale they have developed a small-scale task-based system supporting a scientific community. The stationary system called ASSIST built upon Answer Garden (Ackerman and Malone, 1990), a system designed to facilitate the collection and disseminations of organisational memory. They argue that providing such a task context is more valuable and understandable to users in their everyday work than general efforts to gather entire memory of organisations.

Dahlbom and Mathiassen (1993, p. 25) state, "We want information to be relevant. The information we use should address matters we are concerned with and preferably help us to understand, make decisions, or act."

Fischer (2001) talks about *contextual information* and proposes the following definition of the term: "Information is relevant to the task at hand if it (1) helps someone to understand a specific problem, and (2) is made available when the need for it arises" (Fischer, 2001).

Throughout my research process, I have focused on the contextuality dimension of mobility and in particular on how to provide mobile news reporters with contextual information.

## 4. Research process

The research question has been addressed using Informatics as the research approach. In particular, I have been influenced by the way Informatics has been applied and described by Dahlbom and Ljungberg (1999) for new and innovative mobile IT services. Mobile Informatics is an application of what has been called the New Informatics. According to Dahlbom (1997, p. 29) the New Informatics is "… a theory and design oriented study of information technology use, an artificial science with the intertwined complex of people and information technology as its subject matter."

The landscape of theories and methods that Informatics covers take us from the initial phase of ethnographic studies, to the final phase including implementation, evaluation and generalisation of new applications. The creative idea generation phase in the middle opens up for scenarios describing desired situations, prototyping and experimenting with ideas for new and innovative IT services realising

the desired situations. The outputs of research efforts that conduct these three phases are (Ljungberg, 1999):

- *Concepts* describing generalisation of the desired situations.
- *Services* programmed to realise desired situations.
- *Documentation* of services and change projects.

A more general discussion of the Mobile Informatics approach can be found in Ljungberg et al. (1998) and Dahlbom and Ljungberg (1999).

I will now describe how I have used Informatics in the newsmaking domain throughout my research process. A process that can be divided into three stages, described in the following sections:

1. The MobiNews research project.
2. Product development in a commercial environment.
3. Revisiting the qualitative research approach.

## 4.1    The MobiNews research project

The first stage in the research process was conducted as a research project called MobiNews, part of the Mobile Informatics programme. Our overall task was to design new and innovative IT services for mobile news journalism.

The initial phase of ethnographic studies of everyday work were conducted in two Swedish news organisations, one newspaper and one public service radio station.

The first study was initiated from a consultant assignment applying conventional system and process development methods in order to develop and implement an editorial system. However, we felt that these methods, based on the assumption that *what we say we do is what we do,* were not appropriate. We used process-maps but failed to capture the subtle aspects of work practice and collaboration in the newsroom. Therefore, we increased our traditional toolbox with new methods of analysis. We used observations, transcriptions and sociological analysis methods with a primary focus on social interaction to observe and analyse *what we do*, in order to explain the ordinary and obvious everyday actions. We observed everyday work (Hammersley

and Atkinson, 1993) in the newsroom at one of the largest Swedish newspaper (approximately 50 hours).

In 1998 three members of the MobiNews project conducted an extensive field study at a public service radio station during the Swedish election. Three groups of journalist were selected and shadowed both in the newsroom and in the field during three weeks (approximately 300 hours).

All together 350 hours of fieldwork gave us a substantial amount of material; transcriptions of meetings and discussions, copies of documents, photographs of groups and individuals, screenshots and data files from existing applications. A couple of characteristic news events, evolving into news tasks and further on into news stories were selected. We elaborated on these and described the "desired situation" for each one. These situations gave us a starting point for the creative idea generation phase in which we developed services programmed to visualise desired situations. In the phase of implementation and evaluation we have been testing the ideas, re-designed and developed general concepts and architectures.

Informed by the fieldwork an initial prototype system, the NewsPilot, was constructed (Dahlberg et al., 1999) and a generalised design concept, the NewsSpace, was developed (see *Paper 1*). A more ambitious prototype, the NewsMate, was developed (see *Paper 2*) and evaluated in use at Sveriges Radio, Göteborg (Fagrell, 2001). Based on the results a generalised architecture for mobile knowledge management, the FieldWise (see *Paper 3*), was constructed.

## 4.2      Product development in a commercial environment

A commercial version of FieldWise, adopted for the news domain, has been developed as an add-on product to be integrated with editorial systems. One year of development and marketing in our start-up company forms the second stage in the research process.

As part of the marketing process we demonstrated and discussed FieldWise with a large number of journalists, developers of editorial systems, newspaper managers and investors at several different types of events:

- Presentations at conferences and exhibitions for managers in news and publishing organisations: Dagsvara 2000 Stockholm, IFRA 2000 Amsterdam, Interactive Newspaper 2001 in Dallas, Nordic IFRA 2001 Stockholm.
- Discussions with gurus in the domain of news and publishing technology resulting in journal articles written by Kerry Northrup, IFRA Centre for Advanced News Operations (Northrup, 2000b), Laurel Brunner, European Editor of Seybold (Brunner, 2000) and Gunnar Fahlström, Pressens Tidning (Fahlström, 2000).
- Meetings with groups of journalists and managers in different news organisations such as Svenska Dagbladet, Dagens Nyheter, Norrköpingstidningar, GöteborgsPosten, Mediearkivet, Sveriges Television and Sveriges Radio.
- Technical discussions with developers of different editorial systems.
- Workshops with an advisory board including four persons with substantial knowledge of news work in radio, TV, web and traditional newspaper.

Often we used focus group technique (Nielsen, 1993), where a group of about five to ten people are brought together to discuss issues and concerns about the features of a system. Data from this work was collected as comments, ideas, and proposals. We analysed and evaluated them. We transformed them into requirements and specifications for enhancements of the user interface of FieldWise, technical improvements of the system architecture and businesslike considerations. There were also issues related to the work practice that FieldWise supports.

## 4.3      Revisiting the qualitative research approach

We found that two of the identified issues once more challenged our traditional methods of capturing the work practice. Together with representatives from two Swedish news organisations, which had found the FieldWise concept interesting, I therefore initiated a field study to derive design improvements (see *Paper 4*). I wanted to explore:

- The ambiguity of 'task' as a term and the articulation of news tasks.
- Sources and type of information gathered during the contextualisation of news tasks.

The field study and the analysis of the observations formed the basis for the proposed improvements of FieldWise. It focused on how the news items evolve and become articulated and contextualised news tasks.

The previously MobiNews studies have positioned the findings in the domain of CSCW and knowledge management (KM) research. This study complemented previous studies since it also relates the findings to theories in the research domain of journalism.

# 5. Results

In this section, I outline the four papers, highlight the contributions and describe how they together respond to the research question.

## 5.1 The papers

The first three papers are results from the first stage in the research process conducted in an academic environment. The fourth paper is a result from the last stage of revisiting the academic environment using qualitative research methods.

### 5.1.1 Navigating in NewsSpace

In the first paper we elicit implications for new ways of using IT when organising editorial work. The empirical studies of editorial staff in a newspaper and in a radio station are summarised in the paper. These studies were done as part of the MobiNews project. For a detailed report from the study of editorial staff at the radio station, including empirical results and implications for design, see Fagrell and Ljungberg (2000).

We also suggest the *NewsCube*; a conceptual model consisting of the three important editorial dimensions; time, content and context. These dimensions summarise our understanding of important factors influencing the organising of editorial work. The news events, news tasks and also the news stories could be positioned in the coordinate system build up by these three dimensions.

As the title of this paper implies, the use of IT supporting the organising of editorial work should offer natural ways of navigating in *NewsSpace*. The design model, or metaphor, of NewsSpace is based on the dimensions covered by the NewsCube. The paper includes ideas for new IT devices and innovative IT services to be used for navigation in NewsSpace;

- *NewsPilot*, a PDA based application investigating how location awareness can support local mobility in a newsroom.
- *NewsBoard*, a NewsSpace device making an 'electronic white-board' part of the editorial system
- *NewsMate*, a PDA based application for knowledge sharing and expertise location among the journalists in both office and field situations

### 5.1.2   *NewsMate: Providing Timely Information to Mobile and Distributed News Journalists*

In the second paper we elaborate on the ideas of an application for knowledge sharing and expertise location among journalists. We do so by suggesting NewsMate, a CSCW system that provides mobile and distributed news journalist with timely information such as previous records from internal and external sources, available expertise and plans.

The paper describes a complete use scenario based on a real situation occurring during our field study. The scenario is complemented by a tour through the user interface. The interface was developed using a Windows CE based PDA. For a detailed description of the design and evaluation of NewsMate, see Fagrell (2001).

### 5.1.3 FieldWise: a Mobile Management Architecture

The third paper describes a generalised architecture for mobile knowledge management, called FieldWise. FieldWise provides mobile access for five client platforms i.e. Pocket PC, Windows CE 2.11 (Palm-sized and Handheld), EPOC, and PalmOS. The requirements that FieldWise is based on are derived from field studies and experiments with the NewsMate prototype. We also describe how Fieldwise is implemented in the news journalism domain.

The empirically grounded requirements for a mobile knowledge management architecture that FieldWise meets are;

- Support evolving and interdependent tasks
- Overview of persistent records
- Support the location of available expertise
- Filtering based on the task and long-term interests
- Dynamic configuration of mobile service

The kind of typical work organisation that can benefit from a FieldWise implementation is one where:

- People's tasks are time critical and driven by deadlines.
- The result relies on the creativity of autonomous, but interrelated people.
- There is a culture of co-operation and sharing of knowledge amongst people.
- People are mobile and distributed.

The domain of work may be, for example, news journalism, sales and real estate brokering. However, every installation requires integration and adaptation to the local work practice of the organisation.

### 5.1.4 Localising News: Task Articulation and Contextualisation in Mobile News Journalism

The final paper reports from a complementary study conducted to propose improvement of FieldWise. The field study captures the practice of journalists throughout the accomplishment of their news task, in the newsroom and in the field. The observations and analysis elaborate on the following aspects of newsmaking:

- Observing how editors and reporters jointly articulate news tasks in everyday work.

- Analysing specific instances of news tasks captured in the field study.
- Searching for potential categories of news tasks.
- Looking for specifics regarding mobile news tasks.
- Drawing conclusions of how to improve the articulation of news tasks in order to enhance the information gathering for the task-at-hand.

The empirical results reported in the paper include:

- A description of the newsmaking process focusing on the early phase of articulation and contextualisation of news tasks.
- A news task structure, called Localising News, as an example of a newsworthiness strategy that includes activities to find a local reaction, or impact of, national or international event.

Based on the empirical analysis the following improvements of FieldWise are being proposed in the paper:

- Making the newsworthiness strategy explicit, as a structure to define the news task, could improve the way news tasks are being articulated.
- Using the news task structure to organise sources, search queries and information gathered could improve the way the news tasks are contextualised.
- Organising information in such a way that facts about the particular place, time and people are prioritised could improve the way reporters act in mobile situations.

## 5.2 Contributions

The outputs of the research efforts can be divided into two different types described earlier in this thesis, i.e. theoretical concepts and practical services. The following contributions comprise my answer to the research question describing *how we can provide reporters with contextual information*:

- *Services*, or practical design results, visualising new and innovative IT use:

- o The design and implementation of the *NewsMate prototype*, the first attempt to visualise how to provide mobile news reporters with a task context.

- *Concepts*, or theoretical design implications and general architectures, that bridge the gap from studies of everyday work practice, to design of new and innovative IT services:
  - o A *design model,* or *metaphor,* of navigating in the *NewsSpace* using interconnected IT devices to navigate in the interrelated dimensions of time, content and context, both in stationary and mobile settings.
  - o *FieldWise, an architecture for mobile knowledge management.* The aim of FieldWise is to support mobile and distributed people conducting tasks that are time critical and driven by deadlines
  - o A description of the *newsmaking process* (see figure 2). The early phase of articulation and contextualisation of news tasks has been studied and described in detail.
  - o A *news task structure* called *Localising News*, as an example of a newsworthiness strategy, including activates to find a local reaction, or impact, of a national or international news event. Such a task structure could be used to improve the articulation and contextualisation of news tasks.

- *Improved services*, or practical design improvements, enhancing IT services:
  - o Proposed *improvements of FieldWise* adopted for the news domain to enhance the IT support of the early phase of the newsmaking process where journalists articulate their news tasks and gather information to be able to deliver newsworthy stories.

# 6. Discussion

During the process of initiating and formulating the overall design task, elaborating and answering the research question, and verifying and exploiting the results, I have faced a "network of related and dynamically changing contradictions" (Dahlbom and Mathiassen, 1993 p. 60). The following list forms my network of such dialectic contractions:

1. Local work practice vs. business processes.
2. Novel research vs. commercial interesting.
3. Time frames and nature of competition in an academic environment vs. an industrial environment.

Below, I describe the background for these contradictions as my reflections on the research process in the borderline between academia and industry.

*1. Local work practice vs. general business processes*

In 1997, I wandered into one of the largest newsrooms in Sweden and became fascinated by the frenetic collaborative work. My task as a consultant was to specify new functionality in the editorial system and to define and to facilitate changes in the editorial process. Our objective was to design IT support *optimising for general defined business processes.*

In the research community of CSCW, as well as among advocates of the research approach of Informatics, it is a common understanding that IT support must be designed *anticipating the local practice of work.* As consultants and practitioners, we decided to empirically ground the requirements by conducting a field study of local work practice.

However, such ethnographic studies (cf., Hammersley and Atkinson, 1993) and qualitative evaluation and research methods (cf., Patton, 1990) are seldom used outside the academic community and therefore it is difficult to get acceptance for applying them in a commercial environment.

*2. Novel research results vs. commercial products*

During our field study it became natural to consider the mobility dimension of peoples work and interaction. We took questions and issues related to mobility in the knowledge intensive environment of news organisations and elaborated on them in a research context. We initiated the MobiNews project. The objective for the project was to design novel and commercially interesting IT support for knowledge management in mobile work.

From an academic perspective, the results from our research are documented as *novel*, due to our publications in the research communities of CSCW and Informatics. From an industrial perspective, the results were recognised as *commercially interesting*, as people spontaneously came up with new professional areas and different situations where the FieldWise concept could be useful.

However, there are many critical steps required to make novel research prototypes become sellable products. The following two contractions exemplifies this:

- The difference between *general potentials* enabled by design concepts and a generic architecture, and the *particular requirements* needed for domain specific adoptions and implementation of it.
- The chasm between the *innovators and early adopters*, and the *early majority* (see Moore, 1991). The diversity between discussing the *technology potentials and competitive advanta*ges appreciated by innovators and early adopters, and providing the *solid references and safety measures* that the early majority ask for to actually buy high-tech products.

*3. Time frames and nature of competition in an academic environment vs. in an industrial environment*

During four years in the borderline between academia and industry I become aware of the difficulties to define, and follow, a research plan with a time frame of at least one to two years. While the time frames in consultant assignments and product launch plans are most often expressed in months.

It has also been interesting, and sometimes frustrating, to gradually understand the different driving forces and to become aware of the differences in the natures of competition. In an academic environment contributions to the research community are valued, i.e. being reviewed, published and referred. In a commercial environment characterised by consulting and facilitating, other qualities are important such as customer relations, earned money, timeliness, agility and intellectual flexibility. This could also be contrasted with what are seen as key in a commercial environment characterised by development and production. Here the focus is on the collective effort resulting in products or services with sufficient quality, time-to-market, price/performance etc. (See Börjesson et al. (2000) for our discussion on the topic of different values in academia, industry and consulting firms.)

In this thesis, I have described contributions, both on a theoretical and a practical level. Together they comprise my answer to the research question of *how to provide mobile reporters with contextual information.* In addition, I have reflected upon contractions revealed throughout the research conducted in the borderline between academia and industry.

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First paper[2]

# Navigating in NewsSpace

## Abstract

With an objective to elicit implications for new ways of using IT in "the organising" of editorial work, the empirical studies reported in the paper investigates: How do newspaper and radio station staff, in their daily organising of editorial work, know what to do next? The answer to the question is "the news cube," a conceptual model covering three dimensions: time, content and context. A design metaphor, the NewsSpace, inter-connected IT devices to navigate in the interrelated dimensions, is introduced.

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[2] Forsberg, K. (1999) "Navigating in NewsSpace," In Proceedings of Computer Supported Cooperative Work on Design, CSCWD99, pp. 329-336, Compiègne, France.

# 1. Introduction

The news industry has changed dramatically over the last couple of years. New news media have emerged from the conventional ones. News channels have moved from the kitchen tables and living room corners to our desktops and mobile devices. The consumption of news has also changed from being fairly static and often geographically limited to a more dynamic and diverse. As the consumer move between places and situations – accompanied with IT – doors are opened for exploration of what the news services of the future would be like.

Inside the newsrooms, the use of new technologies to exploit these news channels and news services has increased dramatically. Other matters have not changed in the same way: journalists are still confronted with deadlines and conventional media formats. The organising of editorial work and the sharing of resources, ideas, and knowledge have not been issues for new IT-support. Instead the focus has been on building IT for standardised production processes[3].

Editorial work is a highly complex work task, which does not only rely on the unpredictable and seemingly chaotic courses of events in the world, but also the genre, style, etc., of the news provider in question, the organisational resources available, deadlines, and so on. This fosters a work situation where decisions about who is going to what, when, etc., are made on a frequent and continuous basis. The term organising has been used to capture the frequent and continuous nature of such decisions.

News providers have spent much resource on rendering editorial work more efficient. The majority of efforts have been focusing on the product and not so much on the organising activities. At the same time, if editorial work to a considerable extent is about organising, which has been documented empirically (Kärreman, 1996), then it would be unfortunate not to explore ways in which it could be improved. This is

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[3] Workflow has been identified as one of ten key technologies important for the publishing industry for the next years according to An-drew Tribute, Beyond the Printed Word, The World Electronic Publishing Conference, 1997 and 1998, arranged by IFRA (INCA FIEJ Research Association) and WAN (World Association of Newspapers)

the rationale for the choice of study object for the research project reported in this paper: the organising of editorial work.

The studies presented here adopt a constructive knowledge interest. Their objective is innovation of new IT use, i.e., to explore, design, and evaluate new ways of using IT in the organising of editorial work. The re-search projects on editorial work that have adopted constructive knowledge interests are very few. Two examples are the project by Kensing (1997), which aim to design CSCW support for a Danish radio station and the study by Bellotti and Rogers (1997), which explores the work in US multimedia industries.

In this paper, we wish to summarize the observations from empirical investigations conducted in two news sites; a Swedish newspaper and a Swedish public service radio station. The research question asked was: *How does newspaper and radio station staff, in their daily organising of editorial work, know what to do next?* We add to the exiting body of research by dealing with a novel class of work, namely journalism, and by offering principles for how IT for this kind of work should be de-signed.

The rest of the paper is structured as follows. The next section introduces a theoretical background. Section three summarizes the research sites and approach and section four describes the observations. In section five we describe the eliciting implications for new IT use and in the next section we discuss these based on the research question. In section five, we also introduce related work and points out key design questions.

## 2. 1. Theoretical Background

In this section we wish to consider editorial work and organising complex work in more detail. The objective is to provide a brief theoretical background to the empirical studies.

## 2.1      Editorial work

"News is a window on the world." (Tuchman, 1978).

We expect our morning newspaper and hourly news radio broadcast to everyday provide us with such a window and do very seldom reflect upon the work behind it. Editorial work is the range of activities involved in organising, forming, and planning news services and the production of these. It is a repetitive process where a new product has to be produced and delivered over and over again. But it is also a continuous process in that each day's production depends on past issues and is influenced by other news providers. Editorial work is also characterized by unpredictability. The unpredictable and seemingly chaotic courses of events in the world news are often difficult to calculate in advance.

The trend from single-media to multi-channel and multi-media news providing has, amongst other, made editorial work increasingly multi-disciplinary, as collaboration between staff is assumed to be crucial to assure high quality. It is furthermore, generally agreed upon in the news industry that globalisation, the Internet, new kinds of news providers, etc., has increased the competition in the business in a radical way.

## 2.2      Organising complex work

Increasingly, organising is used to describe the day-to-day activities in organisations; organising as an ongoing activity rather than a pre-defined organisation. Barbara Czarniawska-Joerges (1996) describes organising as making right things happen at the right time and right people to be in right places at the right time. New ways of organising is often based on an organic approach assuming that the task uncertainty of the organisation is high; unpredictable activities rather than pre-defined and predictable circumstances. Organisations that relies on the informal and direct interactions to achieve co-ordination between individuals and groups. "All actors are supposed to engage actively in

decisions making and planning as the activities are performed." (Dahlbom and Mathiassen, 1993)

Editorial work fulfils the main characteristics of what could be described as complex work. Often the complex is used to describe activities that require people to take action in new and unknown situations rather than following pre-defined instructions (see Drucker, 1993).

# 3. Research site and approach

In this section we describe the research sites and approach involved in the empirical studies.

## 3.1 The newspaper

The first empirical work investigated the organising of editorial work at one of the major Swedish newspaper with approximately 450 employees. Roughly half of these are editorial staff. It has a profile of being both a national newspaper, and a local newspaper for the capital city. The policy is to depict what is "relevant and interesting".

Editorial work is separated from the departments handling printing and advertisements. The editorial staffs are located mainly in a large, open-plan office space called the newsroom. There are also a meeting room, called the long-room, and private offices for special reporters. The newsroom populates a half dozen of editorial units. Each desk is a hub for editorial work.

The editorial staff used Quark Xpress, a "WYSIWYG based" application for desktop publishing. The hardware infrastructure consisted of Macintosh and PC clients, and UNIX, Windows NT and Macintosh servers. Recently, a new editorial system supporting "the pre-press" process was implemented. The system, called IMpress, provides a pre-page tool for page planning and layout, a reporter editor for content creation, a Xtension typographic control to Quark Xpress, and a common editorial database.

## 3.2 The local radio station

We conducted the second study at a public service radio station during Swedish election 1998. The stations employ about 100 people where 75% are journalists and the rest is technical and administrative personnel. It does national broadcasts, but our investigation was concentrated at the local channel. A resent survey reports that 63.6% of the population in the region (approx. 650,000 people) listens to the channel every week. In this aspect and in the number of local reports the channel is the biggest in the region.

Most of our work at the station took place in an open plan office surrounded by several studios. In the middle is a table where the journalists join together in daily morning meetings. Only some of the journalists use the same work desks all the time. Instead, the area of where to work is determined by which program they are currently on. Our focus has mainly been on three programs. There is the News update – a program that runs repeatedly during the day – and the program Direct that gives longer reports, e.g. on the air interviews from the field. There was also a program especially dedicated to monitor the Swedish election named Election Extra.

The record keeping systems used by most of the journalists is in an old, but widely used, text-based document management system named MANUS. It is used for several different purposes:

- Broadcast reports
- Program manuscripts
- Diaries, a paper-based shared calendar, documenting scheduled events that are to come up in the future, for example, be the date of a press conference or the court verdict in a trail.
- "Issues-to-watch", questions that may become news given the right circumstances

The studios and the work desks have personal computers sharing disks and printers over a local area network. All of the personal computer has Internet access and every desk have a stationary telephone.

The personnel have also got beepers that are connected to the phone system and are used to locate people that are away from their phone. This makes it possible for a person who receives a call to redirect it to a phone nearby. The journalists that do reports in the field have cellular phones. If they are broadcasting from the field the

equipment can also be used for communication with the studio. Today, no mobile computer equipment is in use.

## 3.3      Research approach

Initially, the first study was part of a project using traditional system and process development methods. After some time, however, we felt that the traditional methods failed to capture the subtle and ever ongoing organising of editorial work. They simply seemed to focus on wrong aspects of work.

Traditional information systems analysis methods are based on the assumption that what we say we do is what we do. Process-maps, dataflow-diagrams and object-hierarchies are all examples of how we try to conceptualise, visualize and detail results from interviews, seminars and workshops. Users participating in such sessions thus leave their everyday work and workplace, and we ask them to describe for us what, how, etc., they act in different situations. We try to take a photo of the operations from without, using a typical hard system approach, applying hard system thinking to system development (Dahlbom and Mathiassen, 1993).

Because we felt that traditional methods failed to capture and describe the organising of editorial work, we made the decision to look for alternative approaches. We found that ethnography with its commitment to investigate work practice while being performed was suitable for our purposes. Observing and analysing what we do, to explain the ordinary and obvious day-to-day actions on a very detailed level of analysis.

The research was conducted according to what Dahlbom (1997) describes as "the new informatics" and we included the sort of participatory design approach described in a previous paper (Ljungberg et al., 1998)

In the second study we used observation (Hammersley and Atkinson, 1993), which consisted of approximately 200 hours of observation. Three groups of journalist were selected and shadowed both at the radio station and in the field. The empirical material was transcribed and analysed to "attach significance to what was found" (Patton, 1990).

In the study of newspaper staff our observations are based on insights about the organising of editorial work in a newspaper sites doing interviews and seminars during a period of three months, as part of a system implementation and process development project. We complemented this traditionally approach with 20 hours of observations of the Business section editorial staff.

# 4. Observations

The research question was: *How do newspaper and radio station staff, in their daily organising of editorial work, know what to do next?* In this section, we describe some of the observations from the empirical work. We do so by introducing the three dimensions that structures issues considered in the organising of editorial work that we have summarised in a conceptual model. We have named it "the News cube".

## 4.1 Organising editorial work

A newsroom in a daily morning newspaper is a deserted and silent landscape in the morning with an almost lazy atmosphere. In the afternoon this change and the newsroom becomes a crowded and boiling place, with an intensive and almost exciting feeling in the air. In the radio station we experienced the same change in the atmosphere due to broadcast schedules.

The editorial staff we observed participated in a number of formal meetings and plenty of more or less informal briefings giving the editorial work a daily rhythm. These meetings and briefings seemed to be important centers of coordination in the organising of editorial work.

We observed the ongoing discussions in the newsroom, in the meeting room, in coffee rooms, and in staircases and how newspaper staff came to important decisions during these discussions. Discussions on how to classify and value the unpredictable and seemingly chaotic courses of events in the world. How prioritise the resources available, and in the end? How to squeeze the "window on the world" into tomorrow's newspaper or into the next broadcast?

Consider this figure capturing the space of events: What is a "relevant and interesting" event? What courses of events influence the world or our view of the world?
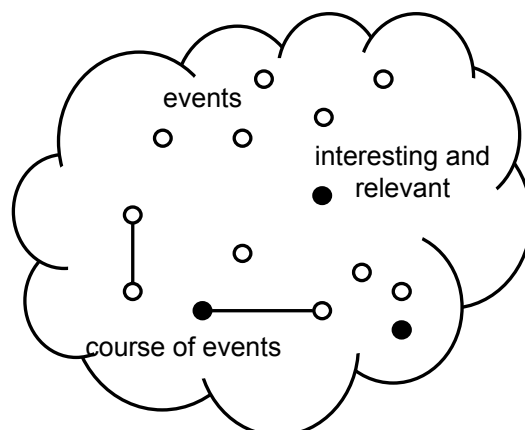


Figure 1: What is happening? The unpredictable and seemingly chaotic courses of events in the world. What to seize? Decide what is 'relevant and interesting'.

It was also interesting to observe how many of the decisions taken based upon an intensive discussion on which events other news providers did chose to describe and how this influenced which events to seize in their own news channels.

We also noticed that the main part of the newspaper was made up by feature material, produced several days before it was published. News stories represented a minor part of the studied newspaper. Even so, news stories still dominated the discussions and general perception of a daily morning newspaper, and they also give the main characteristics of an ordinary day in the newsroom.

Another key observation was that the editorial staff spent a lot of time wandering around looking for each other and for pieces of material. They walked between the desk, colleagues, meeting room, fax machine and the Reuter screen. The most intensive discussions took place in the coffee room and in the staircase. In the afternoon then the newsroom become a crowded and boiling place people did not have the time to "walk more than 20 steps" (quotation from one newspaper reporter) and in several internal projects they discussed how to optimise the open-plan office to be able to keep up-to-date with things going on, to maintain awareness.

## 4.2        Dimensions in organising editorial work

According to our observations time, content and context are the three dimensions around which the ongoing discussions in the studied formal meetings, informal briefings and chats, did spin around.

The first and most critical dimension is, of course, time. The time window in a newsroom is small, but extremely sharp and clear. The critical balance between external, or real time when events occurred, and the internal time due to deadlines and the formal meetings in the morning and in the afternoon. The following examples illustrate how the time dimension is discussed in a newsroom.

*When do the press conference occur? When will we decide if we should cover it? When can we cover it? When can it be published? Will that article be ready before deadline? Can we cover the press conference in the late broadcast?*

The second dimension is content. Including the media types available, often complemented with policies for each media, outspoken or unspoken, and also the production of content; writing, photographing, recording interviews, doing on the air interviews, illustrating and editing. The content production done by the editorial staff and other resource inside, or outside, the organisational structure of the news provider. The following example captures some examples from discussions regarding content types and content production.

*How will we cover it; text, photographs, graphics? How will we publish it; in print, or only on the web? What is our ambition with photographic material? Can we have an on the air interview on that? Which reporters are available? Which editorial unit should cover that press conference? Do we have resources to cover it? Can we use a wire instead?*

The third dimension we identified was context. A newspaper or news radio program represent in it self a context, the readership or listeners values what they read or hear partly depending on which newspaper or which radio program they read or hear it from. Context, both in a logical perspective; what basic values, domains, and policies, and physically; expressed in the newspaper structure, type of radio

program, related radio programs, form and layout rules etc. Here are a few examples of discussions concerning context related issues.

*What should be covered in this section of the newspaper? Is this 'relevant and interesting'? What can we relate this to, to make it understandable for the readers? Is this realty part of our specialist domains and the geographic area we cover? We do need something to lighten up first page of the section!*

Together these three dimensions, time, content and context, summarizes our empirical findings, capturing the important factors influencing the organising of editorial work.

# 5. Eliciting implications for IT use

In this section we make some suggestions of new IT use based on the empirical investigations. We do so by introducing a conceptual model; "the news cube" with interrelated dimensions, identified in our studies. Based upon this a design metaphor is introduced; "the NewsSpace" of interconnected IT devices, to enable navigation in all interrelated dimensions.

## 5.1     The conceptual model: News cube

During the analysis of our observations a simple three-dimensional model has evolved. Three dimensions; *time*, *content* and *context*, and six axis, forms our conceptual model of a News cube.

Here we have included a physical representation of the News cube, which we will take a deeper look into later on to see how issues in the organisation of editorial work could be structured into these three dimensions.
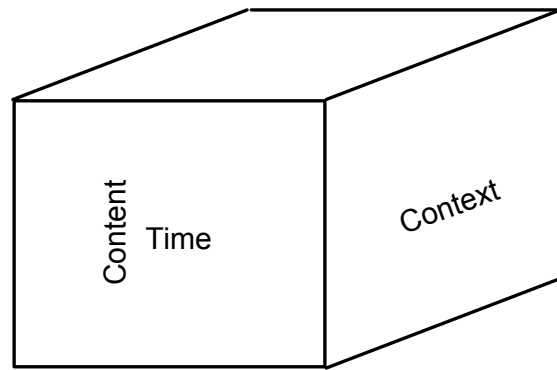
Figure 2: The news cube: Time, Content and Context: the basic dimensions in organising of editorial work

*Time*

The time dimension has two parallel axis; *external time* or *real time*, and internal time, due to daily deadlines and meeting-cycle.
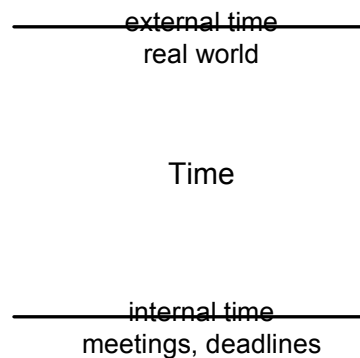


Figure 3: The time dimension in the news cube including both an external and an internal time axis

*Content*

Content have a media type axis depicting which *media types* are available and a parallel axis symbolizing the content production or *backbone of resources and organisation.*
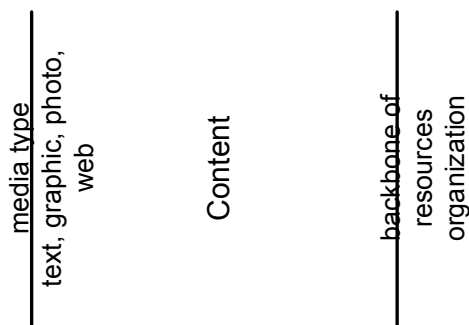
Figure 4: The content dimension in the news cube including a media type and a resource/organisation axis

*Context*

Context have a *logical structure* axis, representing basic values, domains, and policies, and a *physical structure* axis, expressed in the available media physical form, parts, rules, constrains etc.
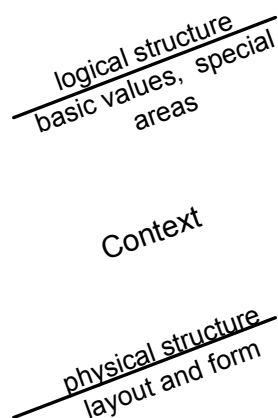


Figure 5: The context dimension in the news cube including both a logical and a physical axis

This summarizes our understanding of the important factors influencing the organising of editorial work, which we discovered in our two empirical studies. The unpredictable and seemingly chaotic courses of events in the world could be positioned in the coordinate system build up by the six axis. Here we have assembled all dimensions and axis presenting the complete conceptual model of the News cube.
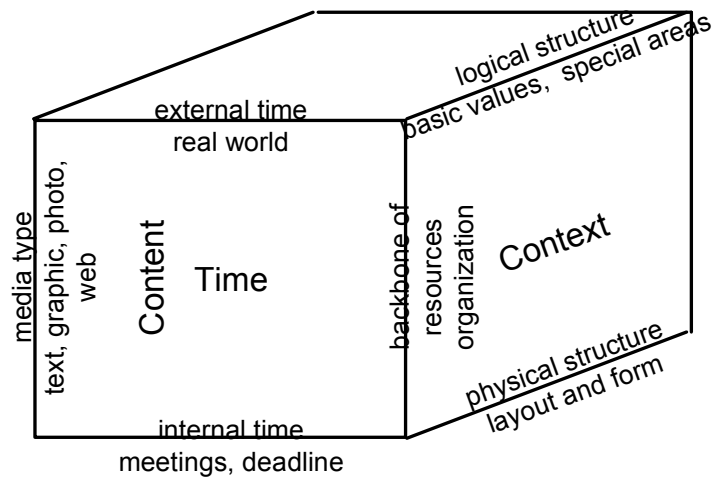
Figure 6: The complete news cube

Each event happens at a given external or real time, it could be decided upon, published or broadcasted due to internal deadlines and meetings. An event could be classified as part of one of the special areas covered, and evaluated as relevant and interesting based upon the basic values in the policy. To depict and explain events an important decision is to decide how it should be covered, in which media types; just a short telegram or a more extensive article, perhaps also including a photograph. To produce content in the decided media types, resources must be allocated in the organisation. In this last figure we have connected an "interesting and relevant event" to the six axis: external time, internal time, media type, resources, logical special area and physical part in the media.

Figure 7: The unpredictable and seemingly chaotic courses of events in the world captured in the news cube.
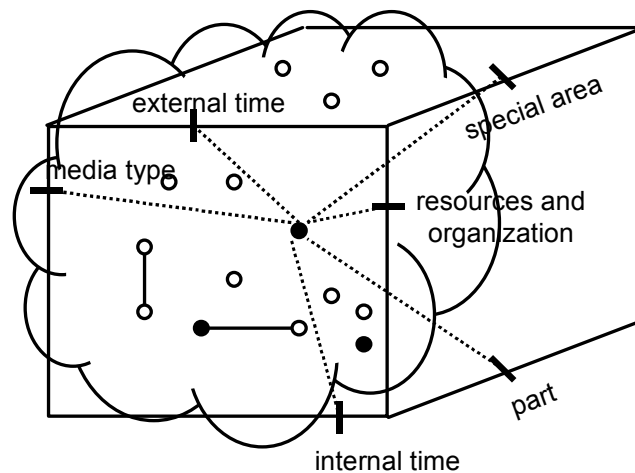
## 5.2 Design metaphor: NewsSpace

New IT use, supporting the organising of editorial work, should offer natural ways of navigation in NewsSpace based on the dimensions covered by the News cube. In this section we introduce two scenarios describing how new IT use could include intelligent and dynamic views. First a scenario, based on a case from our observations, to describe how new IT use could offer proactive opportunities in organising editorial work:

*President Jeltisin is visiting Stockholm next week. This has been included as a future event that we should depict, indeed, being 'relevant and interesting' in several of the aspects that are our main domains: Foreign Affairs, Security Politics, and Domestic etc. In the morning meeting, this event was marked with a to-be-decided-icon on the NewsBoard (a NewsSpace device included in an 'electronic white-board'). We discussed how to cover this event and we decided that Robert, working at the Domestic desk, should coordinate this assignment and we directly linked that event to these dates and to the Domestic desk by drag-and-drop and marked Robert's name as responsible and added a new follow-up date.*
        *Next day Robert, reading his 'to-do-list' on his NewsPilot (another NewsSpace device included in a personal digital assistant or*

*PDA), writes down a couple of ideas on how to cover this event. Including a big illustration of President Jeltsin's travelling around Stockholm during the visit. He discusses it with one of the illustrators and they decide to include this illustration in a two-page spread. When connecting his NewsPilot to the editorial system, Robert ask if it is OK to allocate two pages in the planned paper that date, connect this illustration to the illustrators 'to-do-list' with a defined deadline and with a few notes on the idea.*

Robert continues his work, but we leave him and change the time axis several months ahead to se how new IT use could offer also reactive support using the NewsSpace metaphor.

*President Jeltsin is operated for his heart problems and a Reuter wire says that he is having serious problems after the operation. The wire arrives half an hour after the deadline. Peter who is working that evening is typing in a simple search for Jeltsin, finds a photograph on a tired Jeltsin from his Stockholm visit and writes a headline for the website with this photograph. After a discussion with a colleague he also add a link to the illustration of Jeltsin's travelling program that he found. When Peter says OK-publish he confirms that this is an event classified as news concerning the domains; Foreign Affair and Security Politics, but exclude Domestic from the list. One day later a freelance reporter writes a background article describing the consequences for the balance in the world and the editor decide that this is article should be classified as feature-material-having-a-news-connection and as part of the Security Politics domain. He also allocates space for the article on the Foreign Affairs first page next Sunday. Next Friday this article is one item on the list on the NewsBoard in the morning meeting with a question-mark-icon. Since President Jeltsin seems to recover, this is not a 'relevant and interesting' topic anymore. It is deleted from the list but is still stored in the database, marked as unpublished.*

# 6. Discussion

These two scenarios describe how the design metaphor of a NewsSpace could offer different actors relevant and dynamic perspective, or their own views "into the news cube" using different kinds of IT devices. In the introduction we formulated the following research question: How do newspaper and radio station, in their daily organising of editorial work, know what to do next? In this section we use this question to discuss the observations from the empirical investigations and the elicited implications for new IT use. We introduce related work and points out key questions on how to develop new IT use based on the design metaphor of a NewsSpace.

## 6.1       How is the news made?

In the seventies, sociologists like Herbert Gans (1979) and Gaye Tuchman (1978) wandered into U.S. newsrooms to ask a simple question: How is the news made? Nowadays, when the traditional daily newspaper is just one of several media for news publishing, when mass-media publications evolves to personalized services, and when newsrooms have become highly computerized work settings, we wanted to know who has asked the same question: How is the news made, now in the nineties?

Belotti and Rogers have in a study (1997) identified a lack of literature and studies focusing on current work practices and how technology is used for collaboration in settings such as a newspaper. Their study fills that gap to some extends and it reports on an extensive field study of a traditional daily newspaper, a high-tech monthly magazine and a number of web sites. Our observations from a ordinary day in a newsroom can very well be summarized in the same way as Belotti and Rogers (1997) give a broad picture of the multimedia production workplace; the fast pace of work, the diversity of work, continuous switching between different kinds of representations, the complexity of the collaborative editorial process, constant mobility of workers and the routinization of work.

Media  publishing,  paper-and-ink  and  electronically,  and broadcasting, radio and television, all includes a dynamic time-critical

editorial process. In a study of a Danish radio station (Kensing, 1997) describes a design project for the planning, production, broadcasting, and administrative follow up of radio programs, discussing the coordination within and among the editorial units and the editorial boards. Our studies confirm that coordination is a main theme during the formal meetings and informal briefings.

Coordination is also the main theme in a study of a Swedish evening newspaper (Kärreman, 1996) focusing the relationship between coordination and culture. The study "draws heavily from anthropological and ethnographic traditions, participating in and observing everyday organisational activities." The deliverance meeting, or as the author describe it, change of guards, the daily meeting between day shift and night shift, is penetrated in detail. Kärreman (1996) argues that coordination is achieved through cultural means, and he labels this form of coordination; Scenic coordination. "It operates through shared sets of ideas, assumptions, interpretations and value." The Swedish title of the study is a direct translation of the phrase 'the routinization of the unexpected', a phrase coined by Tuchman (1978), one of the inquisitive sociologists in the seventies.

Our conclusion is that editorial staff knows what to do next based upon an ongoing discussion covering issues we have structured into the three dimensions in the news cube; time, content and context, but also on "a shared set of ideas, assumptions, interpretations and value".

## 6.2      Implications for new IT use

Belotti and Rogers (1997) focuses on the diversity of representations for planning, creating and reviewing content in their study. One of the main observations in the study was that paper persists; "physical representations are essential even when it is possible to do much of the creative work in the production process online". In the implications for future technologies they (Belotti and Rogers, 1997) discusses "solutions that move beyond the desktop into the workplace". For example a combination of small, wireless devices and notice board style, public displays, to be able to remotely view paper-based schedules or

whiteboards and to update information on a wireless device in the field to be projected onto a paper schedule or a whiteboard.

Our scenario includes ideas on how to use such IT devices (the *NewsPilot* and the *NewsBoard*) that move beyond the desktop into the workplace. We also propose the idea of navigating in the NewsSpace, an IT design metaphor that move beyond the computers into the conceptual model of a News cube.

Belotti and Rogers (1997) identified the "constant mobility of workers" in their study. In our study of radio journalist we did focus upon the mobility aspect of the editorial work. We have investigated how location awareness can support local mobility (Dahlberg et al., 1999) and we are developing a prototype, called *NewsMate*, for knowledge sharing and expertise location among the journalists in both office and field situations (Forsberg and Fagrell, 1999)

In the study by Kensing (1997), the overall proposed design included an Event Calendar and a Program Manager: They enable a dynamic program planning process in two dimensions; vertical (among editorial units) and horizontal (between editorial units and the editorial board). Their study reports on the tension between the editorial units and the editorial board when designing such computational coordination mechanisms. We have observed similar tendencies, and this is an overall problem, which must be taken in consideration in future development of IT use supporting organising of editorial work.

## 6.3      Computer-supported co-operative meetings

In a newsroom the daily, and also weekly, rhythm is reflected in a strict meeting cycle with formal meetings but also plenty of more or less informal briefings on-the-fly In our scenarios we included a scene from the meeting-room furnished with an electronic white-board (the NewsBoard).

In the description of a new ecology of meetings Schrage (1995) uses the concept computer-augmented meeting or computer-enhanced meeting. But he also pinpoints the fact that: "People don't say they're in the middle of a white-board-enhance meeting or an overhead-project-augmented meeting." Computer system and media are in many cases designed to facilitate individual decision-making and communications.

Instead we need 'shared spaces' enabled by collaborative architectures and "formal tools for informal collaborations and informal tools for formal collaboration". (Schrage, 1995)

The NewsSpace could be the base for establishing such a 'shared space' capturing the events, and courses of events, using the conceptual News cube to relate events to external and internal structures and vocabularies, as well as to connect them to logical considerations and physical constrains.

## 6.4        Experiences of CSCW techniques and concepts

The empirical studies reported in this paper had a complementary objective to experience techniques and concepts from the CSCW-field. We described it as using a soft approach and observing from within (Bowers et al., 1995) instead of the traditional view from without.

"Interviewing people is never as productive as watching what they do." (Gans, 1979) We have found it very valuable to extend our traditional toolbox with new analysis approaches. Using observations, transcriptions and sociological analysis methods with a primary focus on interaction between individuals and groups has been very useful. When trying to capture an intensive process – such as the editorial process, in a frenetic collaborative environment – such as a newsroom, together with highly professional and demanding people – such as the editorial staff.

# 7. Acknowledgments

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Second paper[4]

# NewsMate: Providing Timely Information to Mobile and Distributed News Journalists

## Abstract

We describe a PDA (Personal Digital Assistant) based CSCW system called NewsMate, which provides mobile and distributed news journalists with timely information.

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[4] Fagrell, H., K. Forsberg, E. Johannesson and F. Ljungberg (2000) "NewsMate: Providing Timely Information to Mobile and Distributed News Journalists," In Extended Abstract of the ACM 2000 Conference on Human Factors in Computing Systems, pp. 121-122, The Hauge, The Netherlands: ACM Press.

# 1. Introduction

News journalists work "on the move" and cannot easily adopt traditional, desktop-based CSCW systems (cf., Bellotti and Bly, 1997). The main objective of NewsMate is to provide mobile and distributed news journalists with easy access to timely information, that is:

- Previous reports: What have been done on the topic? In what contexts have the topic been discussed?
- Colleagues: Who knows anything about the topic? Are they available?
- External sources: What have others done?
- Plans: Is someone else working on the topic? Is there a risk of cross reporting?

It is important to note that information about these issues is distributed between systems and people. In order to illustrate the features and use of NewsMate let us start with a use scenario. The scenario is based on an observational study of journalist at a radio station.

# 2. Use scenario

John has been reporting from a place outside the city. While driving his car back to the radio station the mobile phone rings. It is the producer who asks him to go to a press conference. The local ice hockey team is suspected to have paid salaries via a company in the Caribbean to reduce tax. The issue has been reported in the local newspapers this morning. "Now the club wants to tell the truth," the producer says. John agrees to go there. He makes a new to-do item in his NewsMate: "Frölunda Indians [the ice hockey club] are giving a press conference at Scandinavium [the arena] about the accusations of tax avoidance. Try to interview the chairman live at 12.30." John hangs up. He formats

the notes, connects the NewsMate to the mobile phone, and uploads the to-do list.

John arrives at the arena and has some time for preparation. He browses what the NewsMate has compiled from external sources, i.e., what other actors in the news industry have reported on the topic. He only finds a newspaper article, which makes him confident: "it definitively seems to be newsworthy stuff." According to the internal archives, economical crimes are frequent in the restaurant business. "So the ice hockey club is in good company… restaurants, real estate, and the ice hockey club," he thinks.

Five minutes before the press conference is going to start the chairman shows up. He states immediately: "I will not give any interviews. We're giving the press conference. That's all." John thinks: "OK, what to do now? I need to have something interesting to report. Let's consult the NewsMate." The NewsMate lists colleagues on duty, highlighting those who have been working on the issues of concern: ice hockey, tax avoidance, etc. "Peter, of course," John thinks when the list appears on the screen. "Let's give him a ring." Peter is an ice hockey expert at the radio station. John calls him and asks for advice. Peter says: "Ask Karl Pettersson. He's going to be the next chairman of the club." After the call Johns approaches Karl Pettersson asking him about a live interview after the press conference. He accepts the invitation and John calls the studio to inform his colleagues. It is now 12.00 and the press conference begins.

After the press conference John approaches Karl. He uses the advice from Peter and the information from the internal and external archives to ask the right questions. He starts the interview by framing the case: "What used to be frequent in the restaurant business now seems to be part of the business of professional sports. I'm thinking about the ice hockey club and the accusation of tax avoidance. Karl Pettersson, the next chairman of the club. How could this happen?…" The interview goes along well and the producer is satisfied with the result.

On the way to his car after the interview, John receives a text message (SMS) on his mobile phone saying there is a risk of cross reporting. This means that he plans to do a similar job as someone else at the radio station. He connects the NewsMate to the mobile phone to find out more. The NewsMate tells him that the overlap concerns a to-

do item about "interviewing a political scientist…" and that Sue seems to have similar plans. John calls Sue to explore the issue. Sue tells him she is going to involve a political scientist in her program about the upcoming election. Clearly, they agree, this would be "too much political science" for the repertoire of the channel. Since political science seems to have a more obvious connection to Sue's program, they pretty soon come to the conclusion that John should drop the political scientist in his program. John hangs up and drives back to the radio station.

## 3. A tour through the user interface
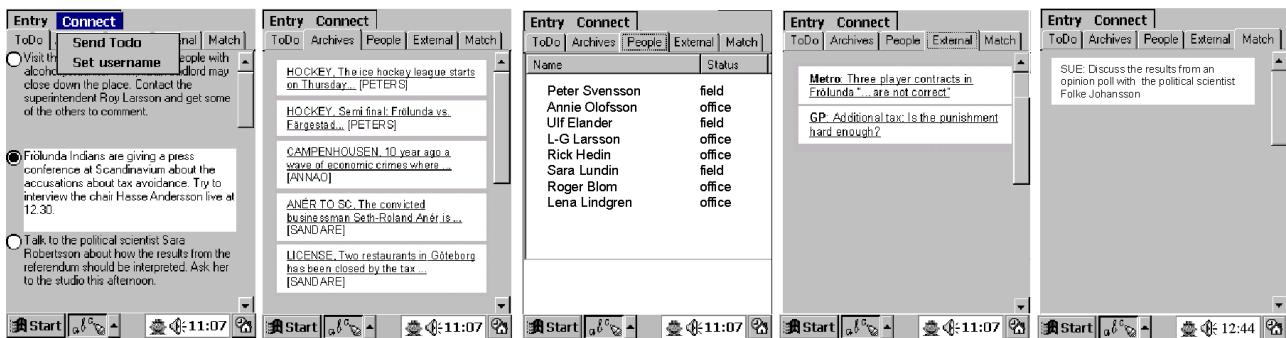


Figure 1: Five screenshots from the NewsMate's user interface.

The user interface of the mobile client comprises five tabs (see fig. 1).

1. The ToDo tab lists the to-do items of the user. It lets the user add, edit and remove entries. The user updates the text with the pen. The Send ToDo option in the menu synchronizes the local ToDo list with the server.

2. The Archives tab lists the "top ten" matches between a ToDo item and the internal archives. The user can click on the archive items to browse the full text information. The titles provide the user with an overview.

3. The People tab displays the names of journalists who have been involved in similar tasks and are currently on duty.

4. The External tab lists matches from predefined external sources, in our case two local newspapers. By clicking on the entries the user can browse the full text articles.

5. The Match tab shows ToDo items that seem to overlap (highlighted with a "bell icon"). Users who are not online receive an SMS when an overlap occurs.

# 4. Architecture and implementation

NewsMate is a mobile client-server system that involves a pen based PDA and a Windows NT 4 server. The software comprises of Perl scripts and a Berkley database. The PDA is implemented in MS Visual Basic and runs on a Windows CE based Cassiopeia E-105. The server keeps track of all events in the system. It uses text data structures to store user states and term vectors to manage ToDo items. To notify users that have ToDo items that match other users ToDo items, the server sends an SMS (Short Message Server) to their mobile phones. In order to compile pointers to relevant information in archives, the server indexes program reports, program proposals, and other internal information systems, as well as external resources like the web services of the local newspapers.

# 5. Discussion

The design of NewsMate was based on a field study at a radio station (300 hours altogether). In addition, we organised focus group sessions where the journalists tried out the system, and commented on its features and user interface. Unfortunately, we do not have space to describe these results here.

NewsMate starts out from the plan (ToDo list). Based on the plan, it helps users to frame, define, formulate and explore problems and tasks by listing information and recommending people. This is very different from the traditional approach of these types of CSCW systems (e.g, Ackerman and McDonald, 1996), which typically ask users to formulate problems or specify with whom they want to communicate. Our aim has been to not make such an explicit distinction between problem solving and other work activities. The reason why is simple:

empirical research suggests that the distinction in many ways is artificial and does not correspond to the ways in which people do their work (Randall et al., 1996). Accordingly, we need to integrate the IT support for problem solving with the overall work activities. This was the main guiding principle in the design of NewsMate.

Further work involves evaluating NewsMate in real use as well as turning NewsMate into a commercial product, which will be done by Adera, the industrial partner in the MobiNews project, part of the Mobile Informatics programme at the Viktoria Institute.

## 6. Acknowledgments

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Third paper[5]

# FieldWise: A Mobile Knowledge Management Architecture

## Abstract

The paper presents results of a research project that has aimed at developing a knowledge management architecture for mobile work domains. The architecture developed, called FieldWise, was based on fieldwork in two organisations and feedback from users of prototype systems. This paper describes the empirically grounded requirements of FieldWise, how these have been realised in the architecture, and how the architecture has been implemented in the news journalism domain. FieldWise adds to the field of CSCW by offering an empirically grounded architecture with a set of novel features that have not been previously reported in the literature.

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[5] Fagrell, H., K. Forsberg and J. Sanneblad (2000) "FieldWise: a Mobile Knowledge Management Architecture," In Proceedings of ACM 2000 Conference on Computer Supported Cooperative Work, pp. 211-220, Philadelphia, PA: ACM Press.

# 1. Introduction

Recently, the issues of "knowledge management" (Fagrell et al., 1999; Ackerman and Halverson 1998) and "mobility" (Luff and Heath, 1998; Bellotti and Bly, 1996; Bellotti and Rogers, 1997) have received much attention in the CSCW literature. The interest in these issues is often motivated by the fact that work in many organisations is "knowledge intensive" and "mobile." These issues have been explored separately. However, so far few researchers have explored the topic of knowledge management in mobile work domains.

This paper reports the final step of a research project with the objective to design novel and commercially interesting IT support for knowledge management in mobile work. The design has been informed by:

- an empirical study of mobile and distributed service electricians, i.e., observation of work and workshops (Fagrell et al., 1999).

- a field study of mobile news journalists at a radio station, i.e., observation of work (Fagrell and Ljungberg, 1999).

- experiences with a prototype system for mobile news journalists, i.e., observation of work under real working conditions with the prototype and design workshops (Fagrell, 2000).

Based on the results a novel mobile knowledge management architecture, called FieldWise, was constructed.

The kind of typical work organisation that can benefit from a FieldWise implementation is one where:

- people's tasks are time critical and driven by deadlines

- the result relies on the creativity of autonomous, but interrelated people

- there is a culture of co-operation and sharing of knowledge amongst people

- people are mobile and distributed

Typical work of this sort is, for example, news journalism, sales and real estate brokering. The first implementation of FieldWise is adapted for news journalism. Each new work domain and installation of FieldWise requires a definition of the informational context (cf., Forsberg and Dannstedt, 2000) of the organisation, e.g., integration with existing personnel- and record-keeping systems.

FieldWise provides mobile access for five client platforms, i.e., Pocket PC, Windows CE 2.11 (Palm-sized and Handheld), EPOC, and PalmOS. But just offering access to stationary systems cannot solve the knowledge management problems, in mobile work. Several novel requirements must be met.

## 2. Requirements

This section describes the requirements derived from the empirical work and experiences with prototypes in mobile settings.

### 2.1 Evolving and interdependent tasks

When people produce material with the objective to accomplish a coherent result there is a need for co-ordination. On the other hand, the autonomous nature of mobile work makes central control unsuitable. The local and unique circumstances that people confront give them knowledge that is situated and local. Also, the actions of people give rise to new local knowledge and situated actions, thus the tasks evolve (cf., Tsoukas, 1996; Fagrell and Ljungberg, 1999). In situations when the tasks of co-workers are overlapping, it is useful to interrelate the knowledge that each person possesses (Tsoukas, 1996). In a mobile and distributed organisation it is never possible for anyone to have complete overview at any point. On the other hand, planning of potentially interesting tasks can be done by a common resource, e.g., an editor at a newspaper.

Empirical research implies that people take notes to reduce the complexity of their tasks (cf., Kidd 1994). Our empirical results suggest that task-related notes are useful in mobile situations to facilitate

remembering (Fagrell et al., 1999; Fagrell, 2000). In this respect, the notes are a representation of a "prospective memory" (cf., Brown et al., 2000).

This suggests that a mobile knowledge management architecture should support the user's tasks, as they evolve. It should also notify the users of interdependencies between tasks, and provide access to tasks that are potentially interesting.

## 2.2 Overview of records

Having accurate records is not always desirable in an organisational sense. It is often more expensive to store and retrieve than to re-discover (Bowker. 1997). Finding out what to do in a situation is a matter of recognising similarities with previous situations, i.e., to remember matching cases and creatively find a category of what needs to be done (Randall et al., 2000). Our empirical observations suggest that in mobile situations an overview of what has been done previously can facilitate remembering and ease the rediscovering of relevant details (Fagrell and Ljungberg, 2000). Also, feedback annotations that are made in the context of a persistent record can point out ways of taking a task further (cf., Fagrell et al., 1999; Fagrell and Ljungberg, 2000). For example, it is common that the editorial staff evaluate news reports and discusses improvements at daily meetings. Such annotations can contain suggestions on how to follow-up on a task or how to improve quality in a more general sense.

This suggests that a mobile knowledge management architecture should give an overview of records rather than an exhaustive collection. Annotations to records should also be displayed.

## 2.3 Location of available expertise

Mobile users often confront situations that they are not totally familiar with. The most efficient way to get help is often to talk to co-workers who have relevant expertise. Knowing who knows has been highlighted as important (Randall et al., 1996; McDonald and Ackerman, 1998). It

is often a question of getting a "second opinion" on how to solve the task (cf., Ehrlich and Cash 1999).

It is, however, especially problematic for mobile workers to know whom to contact, since they are often away from their co-workers. Accordingly, knowing whom to contact is not enough, they need to be available for interaction as well (Fagrell and Ljungberg, 2000).

The expertise does not have to fit exactly, i.e., an expert does not need to be a specialist in the specific topic, but rather knowledgeable on the general genre of the task.

This suggests that a mobile knowledge management architecture should suggest experts and present their accessibility.

## 2.4        Filtering based on task and long-term interests

Mobile workers are often interested in the latest information that is related to the current task (Fagrell and Ljungberg, 2000; Fagrell, 2000). For example, a person who is travelling to visit a customer may want to be notified about the customer's latest press releases. After the visit, however, the person is less interested in getting this kind of information. We call this task-based interests.

Task-based interests are different from both short-term and long-term interests. A short-term interest is, for example, to retrieve a phone number based on a query, and long-term interests is to filter email from a specific sender based on a profile (Belkin and Croft, 1992). Task-based interests are similar to long-term interests, but are only active for the duration of a task.

This suggests that a mobile knowledge management architecture should have filters based on task-based interests. A task-based interest should easily convert into a long-term interest.

## 2.5        Dynamic configuration of mobile services

The capabilities of mobile devices change rapidly. What once were simple calendar replacements are now expected to have both Internet and Wireless LAN features. Due to limitations in hardware design most of these devices are not upgradeable, which means that an

organisation must invest in new devices to get all the latest services. This has led to a wide range of handheld devices from different manufacturers with different revisions of the same operating system. Therefore, implementing a mobile system in an organisation requires the support for several mobile devices and their specific capabilities.

Handheld devices are also expensive, which in some organisations has led to device sharing among the employees. A shared device is not usable as standard personal calendar or phone register since the applications can only store data from one user at a time. Custom built applications may work, however, if they are designed with this in mind.

Organisations may want to provide unique content and services specifically tailored for each co-worker based on their personal preferences and work environment, for instance restricting access for freelancers.

This suggests that a mobile knowledge management architecture should allow dynamic configuration of the mobile knowledge support according to current user preferences and mobile device capabilities.
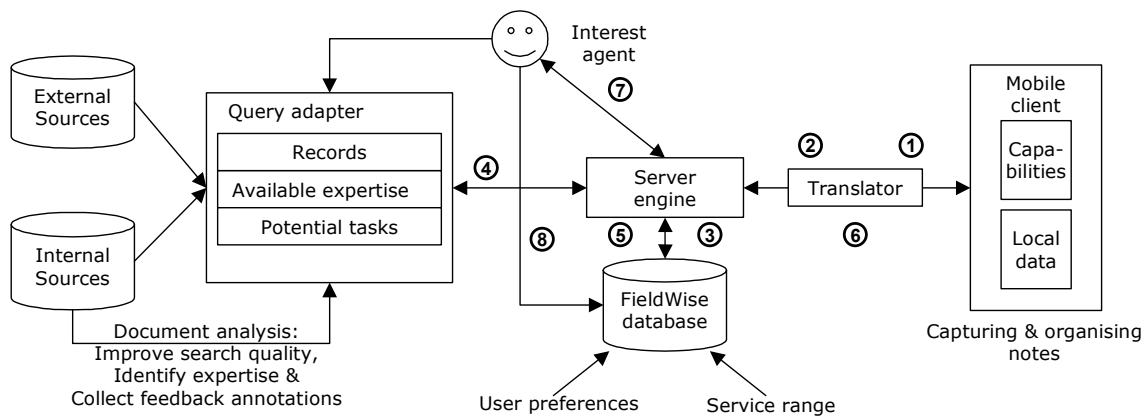


Figure 1: The FieldWise architecture.

## 2.6 Summing up the requirements

Based on our empirical work and experiences with prototypes, we propose the following main requirements for a mobile knowledge management architecture. It should:

1. Support evolving tasks and notify users of interdependencies.

2. Offer an overview of records, including annotations.

3. Suggest available expertise.

4. Filter information based on task and long-term interest.

5. Enable adaptation to user preferences and mobile device capabilities.

There are of course more general requirements for a CSCW architecture, but our focus is on the specifics of mobile knowledge management.

## 3. The Fieldwise Architecture

Based on the requirements above, this section describes the general architecture of FieldWise. The following listing describes a use case that illustrates how large parts of the architecture works (figure 1).

1. The mobile client connects and the user's notes are sent to the server engine.

2. The server engine analyses the capabilities of the client and selects the appropriate translator to adapt its response.

3. The server engine creates an interest profile based on the notes and stores it in the FieldWise database.

4. The interest profile is sent to the query adapter, which performs a search in internal and external sources. The server engine receives the results.

5. The server engine looks in the FieldWise database for overlaps with the interest profiles of other co-workers. If there is an overlap, the server engine notifies the co-workers. The response to the user is also adapted according to the user's preferences stored in the FieldWise database.

6. The results are translated and returned to the mobile client, which presents and stores the results locally.

7. The server engine configures the interest agent to continuously monitor for updates that match the user's interest profile.

8. If the interest agent identifies an update, the FieldWise database is modified and the user is notified.

There are, of course, other use cases that are important, e.g., accessing the common resource of potential tasks and feedback annotations, but they are described in of the next section.

## 3.1        How the architecture meets the requirements

*Evolving and interdependent tasks*

The mobile client captures and organises the users' task related notes. Based on the notes, as well as the forthcoming query results, a profile is created, which makes it possible to compare users' tasks to identify interdependencies. As the task evolves, due to situated and local circumstances, the user updates the notes and the profile is updated. If two tasks are significantly similar the concerned users are notified, letting them decide if it is necessary to take action.

A commonly shared list of potentially interesting tasks is accessible to all mobile clients. The user can copy a task from the list and develop it further, i.e., adapt it to local circumstances. This also reduces the extra work that is required for note taking.

*Overview of records*

The query adapter uses the interest profile to search sources that are within the informational context for the organisation, e.g., internal and external archives. The search result is then processed by the server engine. The purpose is to provide the mobile clients with extracts of records. The extracts are displayed as summarised lists to provide the user with an overview of what has previously been done on the topic. The complete record can also be accessed, but the idea is that the overview, in itself, should remind the user of the context for the task.

Furthermore, if feedback annotations are available they are presented as a part of the result.

*Location of available expertise*

Based on the profile, people with related expertise, are displayed on the mobile client. The availability of the people is also presented.

Expertise is automatically identified through analysis of records, e.g., authorship and mentioning of internal documents, using the query adapter. This approach is more suitable than to ask people to explicitly state their area of expertise and knowledge level (cf., Kautz et al., 1997).

To find out if someone is available is an adaptation for each installation, but typically organisations have back-end security systems for entering the office. Another alternative is to use work schedules or shared calendars. The server engine keeps track of this information by using the query adapter.

*Filtering based on task and long-term interests*

As tasks evolve throughout the day, new information becomes available. Also, new or evolved tasks may overlap. The interest agent filters out this information for each task, based on the interest profile stored in the FieldWise database.

As long as a task is active the interest agent notifies its user of relevant updates. When a task is deleted or de-activated the interest agent stops the monitoring. Another alternative is that a task-based interest grows into a long-term interest that does not necessarily represent a current work task, but rather an area of expertise. In this case the interest agents remain active.

*Dynamic configuration of mobile services*

Each mobile client has unique capabilities. The server engine investigates the capabilities of the mobile client, as well as the current network capacity, and translates its response. For example, less information is sent if the mobile client has a slow network connection.

The organisation can adapt the range of services for specific users by updating the user's preferences, which are stored in the FieldWise database. This also affects the responses of the server engine. The services are distributed as components, making it easy for the organisation to add new services.

Maintaining data (user preferences and tasks) on a mobile device is always a problem. The mobile devices may crash, shared between people, or data may be corrupted over time. For this reason, all client data is replicated in the FieldWise database. A user can roam between different FieldWise installations and thus, the user authentication must be handled by another system. The user can rewind to the latest state of the mobile client. The mobile client can also be the host for transporting the user's preferences to another FieldWise installation.

# 4. A Fieldwise Implementation

In this section we describe an implementation of FieldWise adapted for the news journalism domain. In this case, FieldWise is integrated with an editorial system, called IMpress, which is running at a Swedish newspaper. The overall implementation is illustrated in figure 2. We use the latest mobile devices and (wireless) network technologies that are available. Let us go into the technical details and then see how the implementation meets the requirements.

## 4.1      Technical details

### 4.1.1   Network access

The communication is done with TCP/IP sockets through a server on an internal structure. The clients use GSM (Global System for Mobile communication) and Point-to-Point Protocol (PPP) to communicate in wireless mode. GSM is the largest digital wireless communications standard in the world with its 284 million subscribers (EMC 2000). The clients are connected to a GSM phone with cable or infrared (IrDA 1.0). Today, the bandwidth for GSM is 9600 bits per second and the time to get online is about 20 seconds. Users that are not online are notified using the Short Message Service (SMS). SMS is a part of GSM and

makes it possible to send and receive text messages with the mobile phone.

The clients with PCMCIA slot can use wireless LAN (IEEE 802.11b). The client is then connected instantly with a bandwidth of about 11 megabits per second.

The clients can be connected in a stationary mode with a network card or via a serial cable to a networked PC.

## 4.1.2  Mark-up languages

The internal structure is encoded in XML (eXstensible Mark-up Language) and we use XSLT (eXtensible Stylesheet Language Transformations) for transformations (Clark, 1999). In the implementation the query adapter uses XMLNews. In the news industry there are two emerging XML-compliant mark-up languages: XMLNews (Megginson, 1999) and News Information Text Format (NITF). The reason we choose XMLNews, is that it is more extensible as the data is separated from the meta-data, allowing multiple meta-data schemas. To describe user preferences and device capabilities we use an XML application called Composite Capability/Preference Profiles (CC/PP) (Reynolds et al., 1999).

## 4.1.3  Operating systems and development platforms

The server is implemented in Java on the Microsoft Windows 2000 platform using an Oracle database manager, which is also the database manager for the editorial system IMpress. To find out the availability of people we use the shared electronic calendar in Microsoft Exchange.
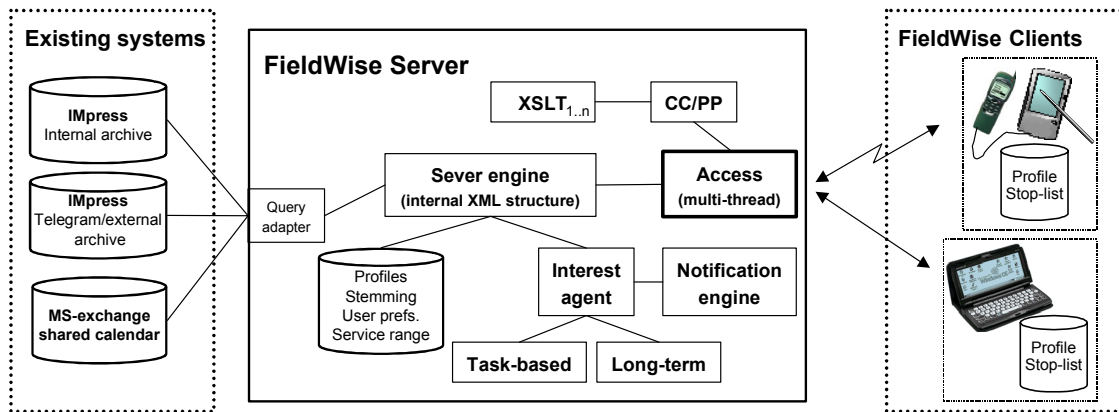
Figure 2: The detail architecture of a FieldWise implementation in the news journalism domain.

### 4.1.4 Algorithm of the interest profiles

The interest profile is represented with keywords and a blueprint of its search results.

The keywords are filtered out of the task notes through a stop-list, which takes away common words, e.g., he, she and it. For each work domain the stop-list is adapted to filter out high frequency words with low content value. In the news domain the word "interview" is filtered out because it is to common to be a part of interest profile. The stop-list is about 1,500 words (10 kilobytes) and stored on the client. The stop-list is also refined for the informational context for the organisation.

A stemming dictionary is also used to improve the interest profile. It is used to put the keywords on their basic form and manage mis-spellings. For example, the word "Ericsson" will match on different spelling, e.g., "Ericson," "Erikson," "Eriksson," and plural version. The stemming dictionary is generated from two years of text from the internal archive. The dictionary is about 300,000 words (4 megabytes) and is placed on the server because of its size.

Each keyword is weighted with TF-IDF (Salton, 1971). Also, a blueprint of the search result is added to the interest profile, giving the algorithm a collaborative filtering aspect, i.e., overlaps between interest profiles can be detected, even if they do not contain the same keywords.

The interest profile is used in conjunction with the database manager's free text functionality. This enables a suitable quality of the search results.

## 4.2        How the requirements were implemented

Our focus in this section is on the user interface and the specifics of the adaptation for the news journalism domain.

*Evolving and interdependent tasks*

The application lets the user add, edit and remove tasks and organise the tasks in folders.
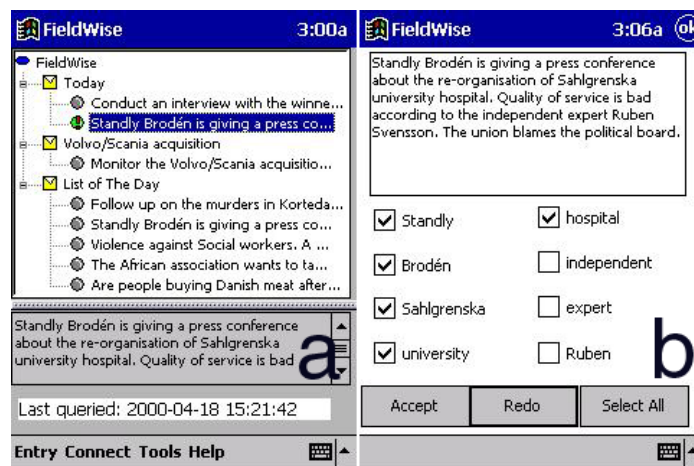


Figure 3: The tree view of tasks and folder (a) and (b) generate keywords. The illustration is on Pocket PC.

All of the folders are personal to the user except the "list of the day," which contains potentially interesting tasks that are shared (figure 3a). The "list of the day" is timely tasks stored in the editorial system, which are suggested by the news editor or by other colleagues. A task can be copied from the "list of the day" folder into another folder of the tree view. The sharing also reduces the amount of input required to construct a new task.

Keywords are automatically generated from the text of the task (figure 3b). The user can choose the keywords that represent what the task is about. Pressing the Redo button generates new keywords. The user does not have to write complete sentences; adding keywords at the end of the text is enough.

If the user is satisfied the Accept button is pressed. After this, the user chooses if the task should be activated. The reason for this is that the users may be interrupted while editing and wants to continue the note taking later on. When the user is online the tasks can be registered by choosing Send task in the Connect menu.

If the task of another co-worker overlaps, the co-workers name and task text is displayed on the Match tab (figure 4d). The co-worker is also be notified (via e.g., SMS).
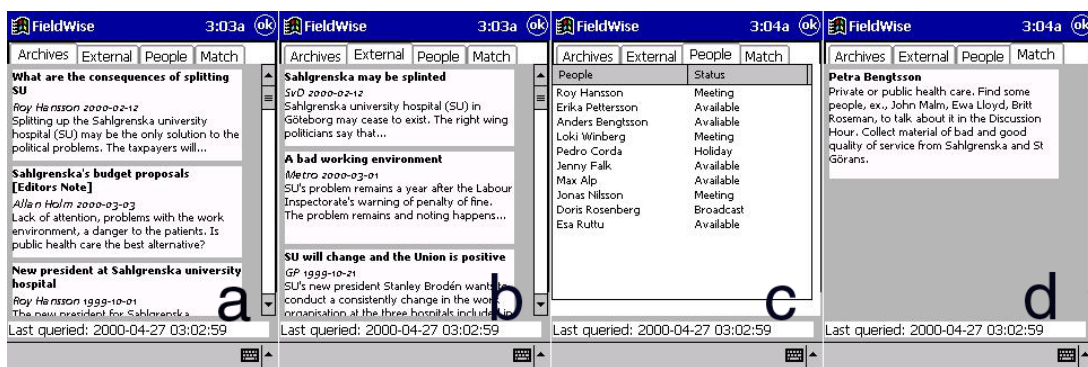


Figure 4: The Archive (a), External (b), People (c), and Match (d) tabs. The illustration is on Pocket PC.

As the task evolves during the day the user updates the notes, re-sends it and receives new information.

*Overview of records*

All the information on the tabs in figure 4 depends on the active and sent task. The tabs are displayed when a task is registered or Result is chosen in the Entry menu.

The Archive tab displays a list of stories from the internal archives (figure 4a) where each item contains: title, author, publication date and ingress. The External tab displays a list of stories from predefined external sources, e.g., newspaper articles and telegrams (figure 4b). The items on the external list contain title, source, publication date and ingress. Approximately ten items are displayed on each tab.

The intended use of the listed stories is to give the user an overview, i.e., a reminder of what has been done previously. The user can click on a title and get the full text of the story. This is, however, accomplished through a separate system, e.g., a web browser, when the mobile client is online.

Editors evaluate, comment and annotate published stories. This coaching is captured by the editorial system IMpress, and we display this with the article entry on the Archive tab (figure 4a [Editors Note]). By clicking on the Editors Note the user gets the comment (like a Post-it note). Usually these are suggestions of how to follow-up on a story or, on a more general level, how the genre of reporting can be improved.

*Location of available expertise*

People tab displays a list of co-workers and their availability who have previously been working on a topic related to the current task (figure 4c).

The expertise is identified through the authorship of published articles from the internal archive. We also include documents of the category "issues to watch," that are common in the news domain.

The availability of people is found in the shared electronic calendars system (Microsoft Exchange).

*Filtering based on task and long-term interests*

As long as a task is active the user is notified about the latest information, e.g., press releases and overlapping tasks of other users.

Today, the notifications are done via SMS (figure 5b), but we also support email. The implementation sends the SMS through a gateway that converts emails into SMS.

A task can be converted into a long-term interest by selecting it and choosing Item options in the Tools menu (figure 5a).
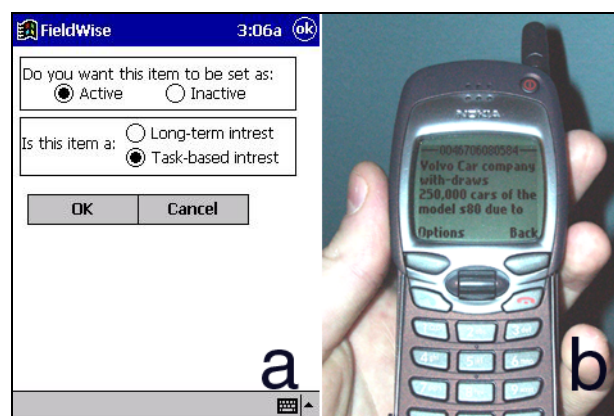


Figure 5: The item options (a) and a GSM phone showing an SMS message (b).

In the case of an overlap between two task-based profiles, both parties are notified.

The functionality of the filter for task-based and long-term interests differs a bit in this implementation. A long-term interest only notifies new information. It does not notify overlaps with a task-based interest. A user with a long-term interest should not take the initiative to approach a colleague that has not asked for help. Instead, if the colleague wants help, the list of expertise can be consulted.

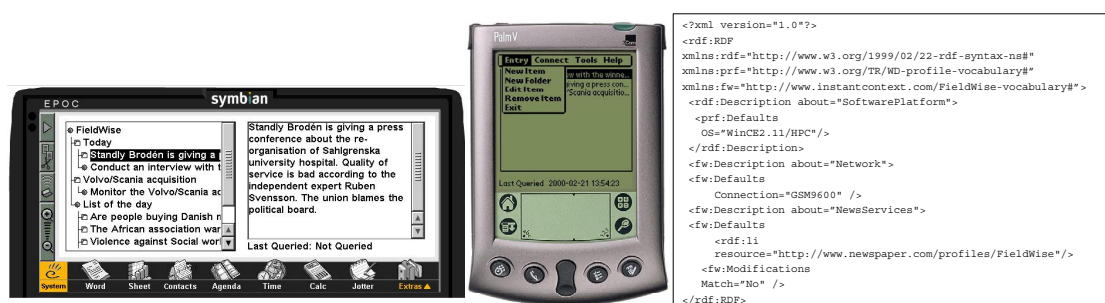Eventually the colleague's task results in an article that becomes available.



Figure 6: The implementation on EPOC ER5 and Palm OS. The textbox is an extract of a CC/PP identification of a client.

*Dynamic configuration of mobile services*

The mobile client platforms supported are Pocket PC, Windows CE 2.11 (Palm-sized and Handheld), EPOC ER5, and PalmOS 3.5 (see figure 6).

The mobile devices have different capabilities, e.g., software platform versions, size of display and storage capacity. Also, each device can be connected to the network in a number of ways, e.g., GSM, Wireless LAN and serial cable. Accordingly, the server engine adapts its responses to the capabilities of the device and its network connection. This is done through the selection of a device specific translator (encoded in XSLT), that adapt the responses.

An organisation can define its range of mobile services. For a specific role, or for a unique user, a set of services can be provided. For example, a freelance journalist can be offered a different set of services then the editor. We choose to see each tab on the mobile client as a service, which is dynamically configured.

In order for the server engine to adapt its responses and dynamically configure its services, the clients must be identified.

Figure 6 shows an extract of the information needed by the server engine to adapt its responses and dynamically configure its services for the mobile client. The identification is encoded using CC/PP, extended with a FieldWise-specific namespace. It also exemplifies how a default profile, for the range of services, is modified.

The appropriate translator and service configuration is selected depending on:

- **Platform**. Different platforms have different capabilities. For example, the display capacity of the device affects the length of the title and ingress for each article.

- **Connection speed**. If there is a slow connection, less information is transferred to the client. Figure 6 illustrate an identification of a connection with 9,600 bit per second over GSM. For a client with instant access, the notification method is affected as well, i.e., there is no need for SMS.

- **Software version**. Different versions of the client need information in different formats.

- **Services**. The server needs to know the services of the client. Each tab (figure 3) is considered to be a service. Figure 6 illustrate an identification where the Match tab is cancelled.


## 5. Discussion

The FieldWise architecture as it is described here is especially useful for work organisation where:

- people's tasks are time critical and driven by deadlines

- the result relies on the creativity of autonomous, but interrelated people

- there is a culture of co-operation and sharing of knowledge amongst people

- people are mobile and distributed

The domain of work may be, for example, news journalism, sales and real estate brokering. However, every installation requires integration and adaptation to the local work practice of the organisation. For example, the implementation for the news journalism described here has a special filtering policies for task and long-term interests. The informational context for organisation must be considered, e.g., what are the relevant external sources and how is the information structured?

Since we have not been able to identify any similar architectures for mobile knowledge management the related research is discussed on a feature level.

The features include (1) support for evolving tasks with notifications of interdependencies; (2) overview of records and annotations; (3) suggestions of available expertise; (4) filtering based on task and long-term interest; (5) adaptation to user preferences and mobile devices.

*Evolving and interdependent tasks*

A foundation for the architecture is that the users evolving task is captured. The representation of the task makes it possible to continuously provide notifications of interdependencies.

Shared task lists has been used by, e.g., Kreifeldt et al. (1993), but they display the lists in a common information space, whereas our approach is notify if there is an overlap. Similar to FieldWise, the Yenta system notifies its user of others' with similar interests (Foner, 1997). The difference is however that FieldWise match the users based on their current tasks. Also, Cadiz et al. (2000) show the importance of matching the awareness tool with the task support in a recent study.

*Overview of records*

FieldWise use text analysis algorithms to improve search quality. The principle for the visualisation mechanism is to provide overview of records rather than an exhaustive collection.

The quality of the result is based on how well the index works. It needs to be tuned in for the local circumstances. In some cases there is a need to incorporate a separate index to get good quality of the search result. The index does not need to be very advanced to solve the problem (see, e.g., the NewsMate prototype (Fagrell 2000)). Another

app-roach is to use a commercially available product for information filtering, e.g., Autonomy (www.autonomy.com).

In knowledge management systems, e.g., Answer Garden 1-2 (Ackerman 1994; Ackerman and McDonald 1996), Bubble-up (El Sawy and Bowles, 1997), and Project memory (Weiser and Morrison, 1998) there are search features. The ways in which users can survey search results are very limited. Clearly, these systems are much more oriented towards finding "the matching record" rather than providing the user with an associative overview. There are some exceptions, however, as represented by gIBIS (Conklin and Begeman, 1988), Designer assistant (Terveen et al., 1995) and RepTool (Jordan et al., 1998). These systems offer features to get overview of complex design problems using graphics and hypertext. However, the stationary nature of these systems makes them less useful in the mobile work supported by FieldWise.

*Location of available expertise*

FieldWise determines if someone is knowledgeable on a topic through the analysis of internal documents. If a person is the author of a document we assume that they have expertise on the topic. The availability of the expertise is an adaptation for each specific FieldWise installation. Emerging technologies that can identify the position of a mobile device can be used. For example, the Ericsson Mobile Positioning System can locate a GSM phone with the accuracy of about 300 meters.

There are PC based applications like ICQ (www.icq.com) that help people to find out if colleagues are available (or busy, etc.). The system is not very sophisticated when it comes to expert location. The Answer Garden 2 (Ackerman and McDonald 1996) and TeamBuilder (Karduck 1994) supports the location of predefined experts. Referral Web helps people to find experts based their relationship in a social network, assuming that topical exercise among co-authors, i.e., an expert can be identified by their participation in co-author relationships or Web page listing (Kautz et al., 1997). The Expert Finder (Lieberman and Vivacqua, 2000) is tailored for Java programmers and supports the location of expertise by automatically analysing the programmers source code. None of the systems considers if the expertise is available for interaction.

*Filtering based on task and long-term interests*

FieldWise use agents to monitor the users task and long-term interests. Notifications are issued about the latest information and task overlaps as long as the interest is active.

Support for long-term interests can be found in several systems, e.g., Bubble-up (El Sawy and Bowles, 1997), Fab (Balabanovic and Shoham, 1997), IntraNews (Fagrell, 1999), Knowledge Pump (Glance et al., 1998) and Soap (Voss and Kreifelts, 1997) and Yenta (Foner, 1997), but neither of them supports task-based interests in combination with notifications.

*Dynamic configuration of mobile services*

The FieldWise architecture adapt to user preferences and several mobile devices. The users preferences can also be transported between different installations of FieldWise. The architecture is developed to easily deploy future mobile devices and wireless communication technologies.

The only system that we have found that supports knowledge management on mobile devices is Darwin (Kristoffersen and Ljungberg, 1998). Darwin supports the distribution and exchange of lessons learned within a dispersed IT-support group.


# 6. Concluding remarks

In this paper we describe an architecture for mobile knowledge management that can easily be adapted for new mobile work domains, mobile devices and wireless communication technologies. As opposed to similar design efforts the requirements are derived from empirical studies of mobile work.

The research adds to the field of CSCW by offering a set of novel features that have not been reported in the literature previously.

The architecture has been applied in a commercial implementation, which may assure its relevance and usefulness (www.instantcontext.com).

The next implementation of FieldWise focuses on the work domain of mobile sales personnel.

## Acknowledgement

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Fourth paper[6]

# Localising News: Task Articulation and Contextualisation in Mobile News Journalism

## Abstract

The field study reported in this paper explores the way in which journalists articulate news tasks and gather information to be able to deliver newsworthy stories. The objective is to improve mobile IT-support for this early phase of newsmaking. The field study captures the practice of journalists throughout their accomplishment of mobile news task – in the newsroom and in the field.

Reporters leave the newsroom, and their stationary IT support, to be able to localise news in the region covered by their news organisations. This strategy is often used to generate newsworthiness, i.e. to make news events more understandable and interesting.

Based on the empirical results I propose the following improvement of a previously developed PDA-based (Personal Digital Assistant) application for mobile reporters: (1) Making the newsworthiness strategy explicit, as a structure to define the news task, could improve the way news tasks are being articulated. (2) Using the news task structure to organise sources, search queries and information gathered could improve the way the news tasks are contextualised. (3) Organising information in such a way that facts about the particular place, time and people are prioritised could improve the way reporters act in mobile situations.

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[6] Forsberg, K. (2001) "Localising News: Task Articulation and Contextualisation in Mobile News Journalism," Submitted to Journal of Graphic Technology. (Originally accepted for presentation at the TAGA (Technical Association of the Graphic Arts) 2001 conference in Stockholm, The future of Information and Printed Technologies, October 2001. However, the conference was cancelled.)

# 1. Introduction

This paper focus on the everyday work of journalists leaving the newsroom to localise news in their own town or in the region covered by their news organisation. That is, find a local reaction to, or impact of, national or international news events. This strategy to generate newsworthiness is often used to make news events more understandable and interesting for the readership. To be able to produce such news story the journalist has to be knowledgeable about the news event itself, and about the local connection of it. However, journalists often have to report events on topics that they do not know very well, with little time for preparation.

I have studied this type of local news tasks in order to propose improvements of a mobile application called FieldWise (see Fagrell et al., 2000). The aim of FieldWise is to support mobile and distributed people conducting *tasks* that are time critical and driven by deadlines. The design of FieldWise has been informed by earlier field studies of newsmaking.

The articulation and contextualisation of news tasks have been identified as two vital activates in the early phase of journalists' work to become familiar with the assigned task. However, besides FieldWise, few other IT tools are aimed at supporting this early phase of newsmaking. FieldWise runs on handy PDAs making it possible for reporters to be updated also when they leave the newsroom, and their stationary IT support. Therefore, the research question addressed in this paper is: *How to improve IT support for task articulation and contextualisation in mobile news journalism?*

In the research area of CSCW (Computer Supported Cooperative Work), I have conducted a field study in two Swedish news organisations. The objective was to capture the work practice of journalists in the newsroom and in the field.

The next section describes the research background. Section 3 introduces news research theories. In section 4 the FieldWise system is described. Section 5 sets the research context and section 6 introduces the studied news organisations. In section 7 and 8 I present and discuss the findings. Section 9 outlines the propose improvements of FieldWise. Finally, in section 10, this paper is summarised.

## 2. Research background

The current study is a continuation of previously work in a project, called MobiNews. The project has applied a research approach that includes ethnographic studies of IT use, develops prototypes and applications, exemplifying new sorts of services. The objective has been to design novel and commercially interesting IT support for knowledge management in mobile work. FieldWise is one of the results from the MobiNews project.

A commercial version of FieldWise, adopted for the news domain, has been developed. During one year, we have demonstrated and discussed FieldWise with a large number of journalists, developers of editorial systems and newspaper managers. Amongst others, we identified issues related to the work practice that FieldWise supports. In the field study of everyday work in two news organisations, reported in this paper, I have been observing and analysing work practice related to two of these issues:

- The ambiguity of 'task' as a term and *articulation of news tasks*.
- Type of information gathered to *contextualise news tasks*.

The first issue concerns 'tasks'. Taking notes describing the news task is the starting point in FieldWise. The existing implementation of FieldWise uses text analysis algorithms to filter out the most valuable keywords from the task description. However, when asked to write down an example of a task to demonstrate the functionality of FieldWise, people hesitate: – Not quite sure that I understand what you mean when you say: write down 'a task'. – What do I write in the task field, if not just only a few keywords, people asked.

The second issue concerns contextualisation of tasks. FieldWise provide mobile reporters with a task context consisting of: an overview of relevant records, knowledgeable colleagues and overlapping tasks. The existing implementation uses news archives as the primarily source. However, setting the informational context for news tasks involve a range of sources for information gathering such as wire services, phone lists, websites etc.

# 3. Newsmaking

This section introduces the domain of work studied, i.e. work conducted by journalists to make news. Outlining two areas of news research relevant for the analysis and highlighting the following theories and key concepts: *news stories as narratives*, *the routinization of the unexpected*, *hard news* and *soft news*, *gatekeeping*, *generating newsworthiness* and *news values*.

One area of research approaching *news stories as narratives*, investigate the language in news media (Bell, 1991) and analysing news as a discourse (Dijk, 1988). Dijk introduce news schemata, a textual superstructure featuring the categories that provide the different functions of information in news stories. Studying a news story from this point of view – as a story to be told – we can most often identify the following categories: a summary (head and lead), a situation, consisting of an episode and a background, and also some kind of comment.

Another area of news research approach journalists and study how they make the news stories. Several ethnographic studies (c.f. Tuchman, 1978; Gans, 1979; Kärreman, 1996) provide us with detailed descriptions of newsmaking in traditional news organisations. Tuchman posed the following question: "how do newsmen *routinize the processing of unexpected events*?" (p. 111, emphasis added). She found that although journalists do not have clear definitions of what counts as news, they tend to typify events on how the organisation handled them and the way things happened. She proposes these categories: hard, soft, spot, developing, continuing. These differentiate "kinds of news content" from "subject of events", e.g. *hard news* denotes breaking stories about current events and *soft news* feature stories not bound by time.

Other theories provide explanations of what happenings and occurrences journalists select to cover – how they define what is newsworthy. A dominant theory has for a long time been the one of *gatekeeping*, which is described as a process of reconstructing an event and turning it into news (White, 1950). Accounts of newsworthiness are a dominant part of the interaction in a news organisation and that it is central to the explanation of the organising of the newsmaking as well as the classifications of news stories (Lester, 1980). Lester (1980) uses

the phrase *generating newsworthiness*. Furthermore, it has been argued (c.f. Galtung and Ruge, 1965; Bell, 1991) that newsworthiness of news stories is enhanced through different aspects of the *news values*, among them: relevance, proximity and personalisation.

In recent years, several studies report on how new online channels (c.f. Singer 1998, Eriksen et al., 2000), different production and publishing rhythms (Sabelström-Möller, 2001) and customisations of news content (Turpeinen, 2000) have changed not only the way news stories are presented, but also challenge the way news stories are made.

## 4. FieldWise

FieldWise is a mobile knowledge management application (Fagrell et al., 2000) including the following features; (1) Support for the evolving and interdepending tasks of mobile professionals in distributed organisations. (2) Providing an overview of records and annotations. (3) Suggestions of available expertise to contact. (4) Information gathering based on tasks and long-term interests. (5) Adaptation to user preferences and mobile device capabilities.



Figure 1. (a) FieldWise News, Pocket PC version, using (b and c) Wireless GSM connection for Compaq iPAQ

Taking notes describing the news task is the starting point in FieldWise. This is done through a single free-text field. The idea is to use text analysis algorithms to filter out keywords from the task notes to be able to gather information. In Appendix I we can see two screen

shoots from the PDA interface (A. Task Notes and B. Generating keywords) from a FieldWise demo to illustrate this.

After selecting the keywords, the user connects the FieldWise client to the FieldWise server using a wireless connection. This starts a search in relevant sources using the keywords that provide the mobile reporter with a task context: an overview of relevant records, knowledgeable colleagues and overlapping tasks.

In Appendix I, we can see how this overview is implemented in the PDA interface. The overview is provided through a file-metaphor (the extensible list, see C. Get information in context). We can see how different icons are being used to identify the different types of information (i.e. a document icon, a task icon and a people icon). In addition, a tab-metaphor is being used to navigate between different parts in the provided context of the task (see D. External tab). In the current implementation the tabs are used to organise the information gathered from different sources: Archive (internal archive), External (relevant external archives), People (internal archives identifying authors of previously published news stories) and Match (task lists identifying overlapping tasks).

## 5. Related research

Newsmaking is by all means 'cooperative work' and it is highly 'computer supported'. Combining those give us CSCW, which is shorthand for "Computer Supported Cooperative Work". Since the late 80s, CSCW is a research area that has been defined as computer assisted coordinated activity, such as communication and problem solving, carried out by a group of collaborating individuals (Greif, 1988).

### 5.1 CSCW studies and theories

The MobiNews project conducted two field studies; an introductory study at Svenska Dagbladet (see, Forsberg and Ljungberg, 1998), and an extensive field study at Sveriges Radio, Göteborg. (see Fagrell and

Ljungberg, 2000). Design implications from these field studies have informed the design of FieldWise.

Beside the MobiNews studies a few other CSCW studies have covered different aspects of IT support for work in the news industry, i.e. a study of multimedia publishing industry (Bellotti and Rogers, 1997), a study of a Danish radio station (Kensing et al., 1997) and a study of a Finnish newspaper (Helle, 2000). These studies have touched upon the issues of news assignments, event planning and the need for IT support of the integration of tasks. However, none of them has studied the task itself and how news tasks evolve. Instead, they have considered the list-of-tasks-items as an organisational representation.

The 'task' as a general term is ambiguous. In the same way as for many other generic terms such as process, activity, and object, a generic definition of task is senseless. However, when making use of it in everyday practice as part of a work domain, such as newsmaking, it makes sense to capture instances of 'news tasks' and analyse how they are described.

In the domain of CSCW it as a common understanding of the situated nature (Suchman, 1987) of work activities, and of how tasks shape themselves as they evolve. It has also been highlighted how our understanding of and ability to articulate the work depends of the degree of uncertainty about the task at hand (Kaplan et al., 1992). The term articulation work refers to putting together tasks and task sequences in order to accomplish the work (Strauss, 1988). In this paper I have used the term task articulation to depict what reporters and editors talk about, and more seldom write down, when they assign tasks to each other and accept to accomplish these tasks.

Finally, I would like to pay attention to a study of another group of professional, namely librarians (Erlich and Cash, 1999), in order to give complementary view of how background research is conducted. Intermediaries who "find, filter, sort and interpret existing information" include professionals as journalists, reviewers, librarians and editors.

In this paper, I explore news tasks and analyse how journalists do background research to be able to go mobile.

## 5.2 Mobility and Context

Increasingly, journalists do not congregate in one central newsroom, instead they are spread among different organisations, work out of the home, take assignment on the move, and stay in contact with editors via cell phones (Northrup, 1996). A broad range of newsgathering devices with online access enables journalists to report on the road (Bruce, 1996) and deliver news items long before they get back to the newsroom.

Not only journalists, but also all of us as part of a nomadic society become 'digital nomads' (Makimoto and Manners, 1997). The phrase has been used to describe how people will be "geographically independent" (p. 2). However, in many situations work is dependent of the geographical location, and for many types of jobs mobility is temporal, either compulsory or voluntary (Lindgren and Wiberg, 2000). Examples of compulsory temporary mobility with a defined particular place, and particular time, include businessmen travelling to negotiations with customers and politicians travelling to meetings.

It has also been argued that in addition to the spatiality and temporality dimensions of mobility, the contextuality dimension is important. The context "... in which the action occurs is of equal importance in organising human interaction; aspects such as "in what way," "in what particular circumstance," and "towards which actor(s)" the action is performed constitute the critical disposition of interaction just as the aspects "where" and "when" do." (Kakihara and Sørensen, 2001).

In the analysis conducted here, the context dimension of mobility is delimited to the *contextual information*. In the same way as I have focused on information gathering to establish a task context in the newsmaking domain, Fischer (2001) addresses the following question in the domain of design work: "How can contextual information empower users to work, learn, and collaborate more easily and more productively?"

# 6. Settings and Methods

The field study was carried out in two Swedish news organisations: Dagens Nyheter (DN), a national newspaper, and Norrköpings Tidningar (NT), a local newspaper that also cover national and international news.

With a circulation of 350.000 copies, DN is the largest morning newspaper in Sweden, and half of all Stockholm inhabitants read DN. The news organisation employs about 800 people and approximately 300 are journalists. A set of Notes applications provides journalists at DN with an word editor, email functionality, wire feeds etc. Many of the reporters have laptops, almost all journalists have mobile phones, but few have yet starting to use other mobile devices such as PDAs.

NT employs 380 people. In the central newsroom in Norrköping, where I conducted the study, around 60 journalists are employed. There are also four local newsrooms in the same region. Journalists at NT use Quark Copydesk as their word editor. The use of mobile technologies is similar as at DN.

Both news organisations have extensive websites and one have ambitious plans for producing local broadcast media. However, I have observed journalists primarily working with news stories produced for the traditionally newspaper. I have focused on the early phase of the newsmaking process, setting a process scope for the data collection. The data collection is also delimited to cover only news task that takes a reporter out in the field.

The study includes observational studies of everyday work (Hammersley and Atkinson, 1993) in the newsroom and out in the news field (approximately 40 hours) and teen semi structured interviews (Easterby Smith et al., 1991) with reporters, editors and managers. The interviews lasted for 30 to 60 minutes. The field notes were transcribed and linked to related documents, copies of notes, articles etc. and complemented with clarifications from the interviews.

# 7. Empirical results

This section presents the following results from the field study and the analysis:

1. The newsmaking process, as a synthesis of the observations.
2. Articulating of news tasks, findings related to the articulation.
3. Contextualising the news task, findings related to the contextualisation.
4. Gathering of news items at place, observation and analyse of work practice in the field.

## 7.1 The newsmaking process

The synthesised newsmaking process, simplified in order to introduce the following analysis, goes as follows (see figure 2).
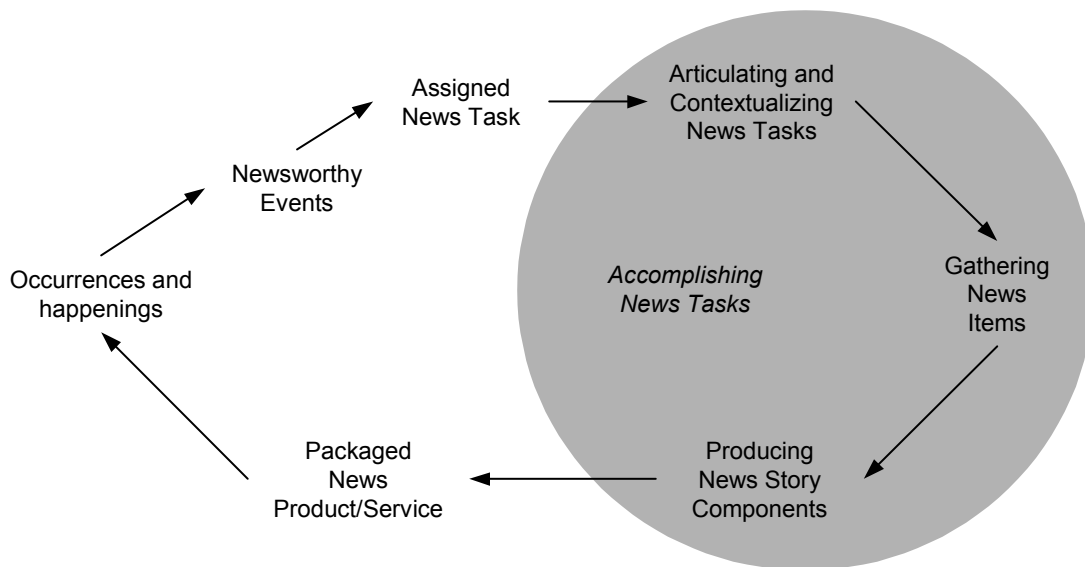


Figure 2: The newsmaking process

The ideas for news stories are discussed at the morning meeting. The ideas for new stories is the result of a how people together in the news organisation interpret the occurrences and happenings of the everyday world. Although, being a collective achievement, the editor keeps a list

of newsworthy events. The list could be a tangible list, shared within the news organisation or being kept as a personal agenda.

The editor assigns the work tasks to reporters. Together the editor and the reporter, in collaboration with colleagues, develop the news idea, frame the potential news story, and articulate the news task. The reporter use a wide range of sources; colleagues, archives, databases, websites etc. to become familiar with the news task at hand. This background research provides the reporter with a context that is needed to be able to accomplish the news task.

Accomplishing the news task means gathering the news items, i.e. to go out and do interviews, take photographs and video clips from an event and so on. It also includes the production of news story components, e.g. write a story, image handling, editing the text and write a summary text for the web edition. These are examples of the production of news components that can be packaged and delivered as part of the news product or news service covering the selected occurrence or happening.

Throughout the day, the editor gets more or less clear hints of how the work proceeds and discusses the news task and the planned news stories with the reporters. The editor also follows the news wire services for new story ideas and breaking events.

In the field study I have elaborated on the following subjects in the newsmaking process:

- Observing how editors and reporters jointly articulate news tasks.
- Analysing specific instances of news tasks.
- Searching for potential categories of news tasks.
- Looking for specifics regarding mobile news tasks.
- Drawing conclusions of how to improve the articulation of news tasks in order to enhance the information gathering for the task at hand.

## 7.2    Articulating news tasks

In the observations from *Norrköpings Tidningar* (NT), several cases show how tasks from the commonly shared assignment list were

discussed at the morning meeting and how the editor assigned tasks to reporters. In the following excerpt, we can see an example of this:

```
• Reporter Maria Andersson:
  "How well do the pre-schools work?" Pc in Stockholm,
  we visit a pre-school class in Norrköping.
  Photograph Anne Svensson at 10 p.m.
```

In this fragment taken from the news task list, we can see how the editor had copied the headline ("How well do the pre-schools work?") from the announcement of the press conference. (Pc is the shorthand for press conference.). Furthermore, he has articulated the story angle, i.e. visiting a local pre-school to give the event a local connection. In this case, the editor had already allocated a photographer for the assignment. This was done due to two accounts of newsworthiness, firstly that the event needed a local connection to make it newsworthy, and secondly that the assignment is "worth" a photographer.

At *Dagens Nyheter* (DN), the editorial staff I studied is located in an open plan office. People from the department of Domestic news and Local news (Stockholm) are gathered for the regular morning meeting at 9 am. They sit down for half an hour to discuss today's newspaper, to talk about the occurrences and happenings of today and coordinate their work for tomorrow's edition. The local practice does not include a tangible list of task descriptions. However, the morning meeting is lead by an editor, who in a very informal and tactful way goes through a number of issues, which covers "the list of the day".

I observed how the editor, together with the other journalists, decided upon the story framing. Although the newspaper is described as a national newspaper, it is also a regional newspaper for the neighbourhood of Stockholm. In one case they discussed the framing of a story regarding "the dramatic reduction and transition of the Swedish Armed Forces", and decided that one reporter and a photographer should travel to Vaxholm and talk to soldiers and officers directly affected. Vaxholm is localised just half an hour travel by car from Stockholm. Therefore, Vaxholm and the military installations out there are definitely well known for the readers and easy to visit for the reporter.

Journalists share commonly used strategies to generate newsworthiness. One such strategy observed in several cases is:

Localising news. That is, find a local reaction to, or impact of, national or international news events.

*Finding #1; Articulating news tasks using task structures based on newsworthiness strategies*

Making the newsworthiness strategy explicit, as a structure to define the news task, could improve the way news tasks are being articulated. Below, in figure 3, I describe 'localising news', a category of such a news task resulting in a news story category called 'localised news'.

Common phenomenon, general processes, contemporary course of events ...

*Relate the news event to, describe and explain*

*Identify, evaluate and report*

**News event**

*Locate and get access to*

Local instance

*Let them express their reaction of what is happening*

*Meet and talk with*
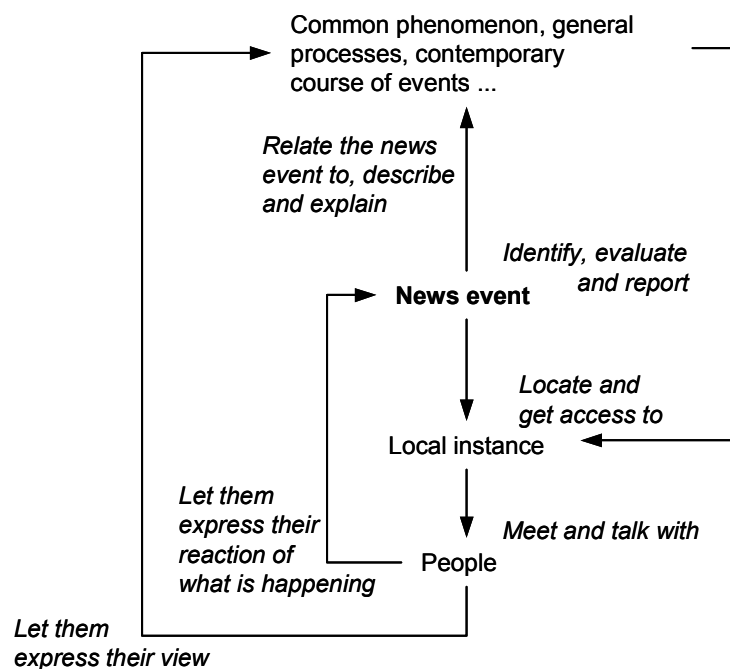
People

*Let them express their view*

Figure 3. News Task Structure; Localising News

The proposed news task structure consist of the following activities:
- Identify, evaluate and report the newsworthy **news event**.
- Relate the news event to clusters that could be perceived in the occurrences and happenings in everyday life. Clusters that could be: a **common phenomenon**, a general process, or a contemporary course of events etc.. That is, 'something' which the particular news event draw our attention upon. Describe and explain it in order to make the news event understandable.

- Locate and get access to a **local instance** of the common phenomenon etc., i.e. something that feels close to the reader.
- Meet and talk with **people**, directly, or indirectly, affected by the news event and let them express their reaction of what is happening, and also their view of the common phenomenon etc.

## 7.3  Contextualising news tasks

I observed how reporters did background research to establish the informational context relevant for the news task using colleagues, websites, archives, taxi drivers etc. To be able to produce a localised news story the reporters have to gather information about the news event itself. The reporters also gather information about the common phenomenon that the news event draw our attention upon. Before leaving the newsroom, the reporters have to find a local instance and get access to the people to meet and interview. Often the identification of a suitable local instance is depending on criteria such as proximity and accessibility. Finding and get access to the right people to interview is important.

The reporters articulated, or unconsciously had to ask, a large number of questions, to be able to accomplish the assigned news task. The journalists I studied knew what type of sources to use for the different type of questions. For example news archives, both internal and external, are regarded as relevant sources for establishing the context around the common phenomenon or general process. In addition, news wires and press releases are relevant sources to establish the context around the particular news event.

When it comes to finding a local instance and to get access to relevant people, other types of information such as phone lists and municipality directories are valuable. In one case, I could also see that a combination of geographically information and the municipality list of preschools would have helped to locate a suitable pre-school near the newsroom.

*Finding #2; Contextualising news task using news task structures to gather and organise the information*

Therefore, using the news task structure to organise sources and the information gathered could improve the way news task are being contextualised. This means that relevant sources should be connected to each parts of the task structure. Moreover, specific instances of sources such as a particular archive or a local directory could also be linked to specific parts of the task structure e.g. 'Localising a local instance'. It is also a requirement to be able to make explicit links to specific instances of information from an instance of a news task.

## 7.4　　　Gathering news items

Reporters leave the newsroom, and their stationary IT support, to be able to gather the news items, such as interview notes and photographs of the people interviewed. In the study I observed how reporters and photographers used the time they travel to update each other and how they use the local knowledge provided by for example a taxi driver.

　　　Reporters visit a particular place for a particular period. The notebook, a few papers and maybe some notes are the tangible thing they bring with them. However, through the contextualisation the reporters have become familiar with the news task and the essential surroundings of it. Characteristic for newsmaking is that the period is often delimited and sometimes the work to be done is impossible to repeat or redo.

*Finding #3; Gathering of news items at a particular place and time in interaction with particular people*

The reporters are highly focused on the interaction with the people they interview. They base the interview questions on a range of questions they have complied during their background research. However, the tangible notes from the background research that they use in the mobile situation are few and mainly facts such as phone numbers, addresses etc.

　　　Consequently, information should be organised in such a way that facts about place, time and people are prioritised in mobile

situations. This means that this kind of information should gradually be highlighted as the contextualisation of the task proceeds.

## 8. Discussion

This section relates the findings from the field study to research theories in CSCW and in the news research domain.

*Finding #1; Articulating news tasks using task structures based on newsworthiness strategies*

In the same way as I have come to focus upon task articulation using task structures in the domain of newsmaking, Fisher (2001) have acknowledge the problems of capturing and articulating the task at hand to be able to gather information relevant to it. In the domain of design, he suggests a domain-oriented approach by making assumptions about "classes of users and *sets of tasks* in which they want to engage, and by building specialised support for the target domain." (Fischer, 2001, emphasis added).

The news task structure that I propose, called Localising News, as an example of a newsworthiness strategy that uses the following news values (Bell, 1991; Galtung & Ruge, 1965) to frame a story: Relevance: effect on the audience's own lives or closeness to their life. Proximity: geographical closeness. Personalization: something that can be pictured in personal terms is more newsworthy than a concept, process, or phenomena. Story framing is one form of generating newsworthiness. Lester (1980) also describes organisational framing of the event and framing news norms, as two other forms of the collaborative process of generating newsworthiness.

In the news research approaching news stories as narratives van Dijk (1988) introduces the notion of news schemata, a textual superstructure, that define news discourse forms. He claims "beside a mental representation of the various texts, journalists also build a so-called model of the situation, that is, an episodic (subjective) knowledge structure … The construction of such models is also fed by more general knowledge scripts, as well as by general attitudes and ideologies." (van Dijk, 1988, p. 180). Following that line of reasoning,

the proposal to make the newsworthiness strategy explicit, as a structure to define the news task, could develop the institutional practice of newsmaking.

Furthermore, I claim that the proposed news category of 'localised news' could well complement Tuchman's (1978) categorization of e.g. hard news and soft news. Furthermore, it would add the place dimension into the typification process since the previous set of categories is primarily related to the time dimension. Furthermore, other studies (c.f. Lester, 1980; Kärreman, 1996) have reported that Tuchman's categories are not used in newsroom jargon and one reason is that they do not include the newsworthiness dimension (Lester, 1980).

*Finding #2; Contextualising news task using news task structures to gather and organise the information*

The contextualised news task is the result from the process of gathering information through asking questions. Journalists, as well as librarians, are intermediaries. Erlich and Cash (1999) claims that their often invisible experiences are highly valuable then it comes to "... convert ill-defined request into a sharply query that is a recipe for action" (p. 151). To paraphrase that for the news domain: Journalists convert occurrences and happenings of the everyday world into a sharply set of questions that is a recipe for accomplishing their news tasks.

The knowledge of what type of information to retrieve from each source is a critical part of the invisible expertise and experience of intermediaries (Erlich and Cash, 1999). Erlich and Cash also acknowledges how the librarians they studied "… were not only aware of what types of information they could expect to find in a given source, but they knew what value they could attribute to each source." (p. 153). In the study, I observed how the reporters used different types of sources to establish the context related to the news event and the common phenomenon or general process, compared to what sources they used to localise and get access to people.

*Finding #3; Gathering of news items at a particular place and time in interaction with particular people*

This kind of compulsory temporal mobility has also been identified by Lindgren and Wiberg (2000) in their study of service technicians. The mobile reporters I studied spend a considerable amount of time to find the particular place. Furthermore, they also had to get in contact with the particular people to meet.

As has been described by Kakihara and Sørensen, (2001) the human interaction in mobile situation is organised around aspects such as "where" and "when" but also around "in what way," "in what particular circumstance," and "towards which actor(s)". One of the findings is that the last aspect "towards which actor(s)", whom to meet and interact with is the, perhaps, most important aspect.

## 9. Proposed improvements

Drawing on the findings from the field study the following design improvements of FieldWise are proposed:

1. *Making the newsworthiness strategy explicit, as a structure to define the news task, could improve the way news tasks are being articulated*
   o FieldWise should include functionality to let the news organisation define their set of news task categories. Use 'Localise news' as a starting point.
   o The proposal is to extend the current task entering in the FieldWise PDA client (see Appendix I, figure A and B) by using a dialogue based form, which depending on the selected category of news task opens up relevant text fields for task notes.
2. *Using the news task structure to organise sources, search queries and information gathered could improve the way the news tasks are contextualised.*
   o The proposal is to use the different parts in the task structure to organise the information gathered. A complement to the existing overview of the gathered information in the PDA client (see Appendix I, figure C and D), could be a view that labels the files

and tabs to reflect relevant parts in the selected category of news task.

- o Add functionality in the configuration of FieldWise to let the news organisation define relevant sources and instances of sources to each part in the structure of their own set of news task types. Include the possibility to link a specific document e.g. an attached document in a e-mail, a web page, a calendar or a contact item in shared electronic calendar systems, to a specific task and tab.

3. *Organising information in such a way that facts about the particular place, time and people are prioritised could improve the way reporters act in mobile situations.*

- o Add functionality in FieldWise to highlight information about place, time and people in the task notes and in the gathered information.

# 10.    Summary

The research addressed in this paper is: *How to improve IT support for task articulation and contextualisation in mobile news journalism?* A field study has been conducted to capture the practice of journalists throughout their accomplishment of news task – in the newsroom and in the field. The observations and analysis elaborate on the following aspects of newsmaking:

- Observing how editors and reporters jointly articulate news tasks in everyday work.
- Analysing specific instances of news tasks captured in the field study.
- Searching for potential categories of news tasks.
- Looking for specifics regarding mobile news tasks.
- Drawing conclusions of how to improve the articulation of news tasks in order to enhance the information gathering for the task-at-hand.

Findings from the field study have been presented and discussed using to theories from the domain of news research as well as from research in the domain of CSCW (Computer Supported Cooperative Work). The empirical results include:

- A description of the newsmaking process focusing on the early phase of articulation and contextualisation of news tasks.
- A news task structure, called Localising News, as an example of a newsworthiness strategy that includes activities to find a local reaction, or impact of, national or international event.

The answer to the research question is that the early phase of newsmaking could be supported using a mobile knowledge management application for PDAs (Personal Digital Assistants) called FieldWise, which could be improved through:

1. Making the newsworthiness strategy explicit, as a structure to define the news task, could improve the way news tasks are being articulated.
2. Using the news task structure to organise sources, search queries and information gathered could improve the way the news tasks are contextualised.
3. Organising information in such a way that facts about the particular place, time and people are prioritised could improve the way reporters act in mobile situations.

## 11. Acknowledgements

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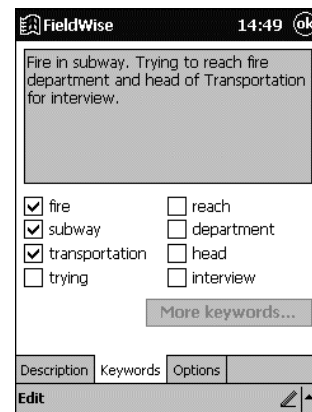
# Appendix I (Paper 4)
## Screen shoots from a demo of the existing FieldWise News
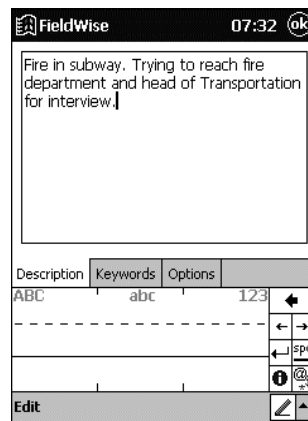


### A. Task Notes

Enter your task with its notes using the character recognition as input method, or the internal keyboard. An external keyboard could also be used for creating tasks. There is also a possibility to include texts from other sources, such as e-mail, calendars or shared task lists.
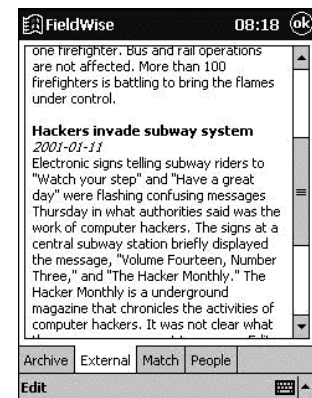


### B. Generate keywords

FieldWise sort out the crucial information and generate the most important keywords automatically. You can choose the most relevant keywords by clicking on them. You can always generate new keywords by pressing the Redo-button.
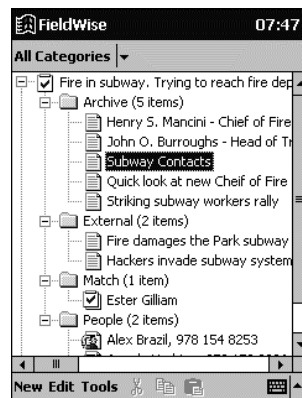


### C. Get information in context

Within moments the latest information on the task is available.



### D. External tab

Search other media and sources of information directly, in the field. Is anything relevant to your task mentioned and in what context?