

# IT in Home Health Care – A Case Study

## Advantages and Disadvantages with Mobile Information Support

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**Abstract**—We present a case study of an application for supporting home health care practitioners in their work. Groups of practitioners have been interviewed as well as representatives for the sales organization. Below the application is presented as well as work practices before and after the introduction of the system and perceived benefits of the system.

**Keywords**—component; mobile IT, home health care, information management, user-centered design, technology in work places

### I. INTRODUCTION

Information systems for home health care are emerging on the market, supporting the traditional work of helping elderly people in their homes. The main reason for introducing information systems in the home health care is to improve information management and to facilitate the documentation of the field work. Today, a number of mobile IT support systems for home health care are available on the Swedish market. However, they are all sparsely used in different locations and none of them are deployed to a larger extent.

We present a case study of such a system, Joliv Mobil Omsorg (Joliv Mobile Care). The study is informed by both interviews with the commercial system provider and interviews with home health care practitioners from two workplaces using the system. The system is focused on documentation and information access and has no functionality for telemedicine. Rather than detailed usability issues such as menu design, we will in this paper focus on broader issues such as the match between work practices and functionality provided by the system.

Our findings include interesting discrepancies between on one hand what the service provider considered was the strength of the system and on the other hand how the practitioners used the system and what they considered its strengths. It also turned out that the system provided excellent solutions for handling certain kinds of information while the field documentation remained a problem.

### II. BACKGROUND: HOME HEALTH CARE IN SWEDEN

Home health care in Sweden is available to elderly people with special needs, people with functional disabilities and other

categories of people that need assistance in their daily lives. The purpose is to allow them to lead a rich life and make it possible for them to stay at home for as long as possible instead of being institutionalized. The provided help mostly consists of basic health care and assistance with everyday needs like personal hygiene, house cleaning, and grocery shopping.

The work of home care practitioners is two folded and carried out in different environments: planning the work and reporting its outcome which is carried out in office-like environment and the home care work that is carried out in the homes of the patients. The work is highly mobile since practitioners move between patients' homes by car, by bike, or by foot.

We have studied three different groups of home health care practitioners, and they all described their practices for planning and documenting their work prior to the introduction of Joliv Mobile Care very similarly. Before introduction of the system, the work was planned using a wall-sized board that contained a basic schedule for a period of two weeks. A common paper calendar was used to keep track of special events that was not included in the basic schedule on the wall, such as patients having doctors' appointments, patients going away, or other ad-hoc events. The detailed planning for each work day was carried out at morning meetings using the wall schedule and calendar to administer the work. Patients scheduled for care during the day were assigned to practitioners on duty. This was usually done collaboratively. Practitioners normally wrote their schedule for the day on paper notes or in personal note books. If extra information was needed to carry out the work of the day, such as medical information about a patient, it was gathered in the morning meeting and noted in the same way. Basic information about patients, directives and decisions from authorities, continuous documentation of the work and other information was kept on paper in binders, usually ordered temporally.

The majority of the practitioners on the sites where Joliv Mobile Care has been introduced had limited prior experience with information technology and no prior technical education.

### III. JOLIV MOBILE CARE: DESCRIPTION AND COMMENTS

The main motivations from the system providers behind the design and development of Joliv Mobile Care have been to

make it easier for practitioners to get access to the information they need to perform their work tasks on the field and simplify the documentation of the fieldwork. This is supported through system functionality that allows practitioners to automatically get detailed instructions for each patient in the mobile device, and functionality for taking notes on the field that is automatically integrated in the system at the end of the work day. Another important goal was to simplify and strengthen the information management to meet the legislation that demands the home health care to be able to give statistics on their work. This is supported through functionality that compiles statistic data from the work. Service providers present the above described functionality as the main strengths of the system.

#### A. System Description

Joliv Mobile Care has been developed to support work within home care, and the system has a desktop version and a mobile version. The desktop version is intended to be used at the office or in the common facilities of practitioners, running on a stationary computer. Its main functions are work planning (easy drag-and-drop of tasks to practitioners on duty) and handling of information about patients (entering information, sort and search functions etc.). The mobile version runs on a PDA and is intended to be used when carrying out work in patients' homes, or when moving between patients. The mobile version functions offline and information is transferred to/from the PDA through synchronization at the beginning and end of the work day. A synchronized PDA contains the practitioner's work schedule for the current day, information about each task to carry out, the work schedule and contact information of colleagues in case assistance is needed from anyone of them, and basic personal and medical information about patients (personal identification number, contact information to family members, medical history when available etc.). The mobile version also provides note taking functionality to allow practitioners to document any information from the field work that needs to be communicated to colleagues, family members of patients, or social authorities. Recently, stop watch functionality has been added to the mobile version on demand from the management of home health care. Data on the duration of various tasks performed by the practitioners is considered an important tool for evaluation and quality assessment of their work.

Using such an IT support system, the practitioners no longer need to select and write the information they need during a workday on small paper notes that easily get lost in pockets or purses. Documentation of the field work can be done in situ and the information is synchronized back into the system. Previously this was carried out in two steps: first notes were taken by the practitioners about what happened, alternatively they tried to remember and transfer the notes to the central information binder (or forget to do it) when returned to the common facilities. Keeping electronic documentation about the work and the patients also facilitate searching and finding information about a particular patient or a particular period of work. Information can easily be sorted in different ways.

Joliv Mobile Care is designed and developed in close cooperation with a team of home health care practitioners

which also have tested several beta versions of the system in their work. Joliv even had a practitioner stationed part-time at the company during the later development phase.

#### B. Comments

Two interesting design decisions have been made that merits further discussion: the system functions off-line although it runs on network-enabled hardware and all information on patients and practitioners are synchronized to the mobile device.

The decision to make the system function off-line has two main motivations. First, it reduces the complexity of the system. A system that is not network dependent has fewer sources of errors and downtime, which makes it easier both to develop and debug, and to use. Not having to connect to a server also reduces the startup time which can be important in health care situations. In case of accident or injury practitioners might need rapid access to medical information about a patient. Second, the information that is handled in the system does not change very rapidly so updating on a daily basis is more than sufficient. Medical information and the kind of care patients are entitled to usually do not change frequently.

Synchronizing all information about patients and practitioners to all mobile devices is a choice made to minimize the risk for lack of information. The current solution means that a practitioner does not only have information about her own schedule for the day and the patients she is assigned to attend to, but also the schedule of her colleagues and information about their patients. This makes it possible to know which colleague is nearby if help is needed, for example with heavy lifting of a patient in case of a fall or other unpredicted events. It is also possible to switch tasks with a colleague or take over a colleague's tasks (for example in case of illness) without extra information transfer. All information is already available in the mobile device.

## IV. STUDY SETUP

The preparation for the study included an interview with the commercial provider of the information system, together with a demonstration of the system. They were also kind enough to give the authors an installation of the system so that we were able to get a thorough knowledge of the design and the functionality before meeting the home health care practitioners.

We have further conducted two group interviews with assistant nurses holding an experience from 2 to 25 years from the home care work. They had no prior technical education.

The interviews were semi-structured and carried out in two different Swedish cities. Participants represented three different installations of Joliv Mobile Care and included both novice and experienced users: the first installation of the Joliv system had been in use for three months, the second for two years, and the third five years. Questions asked concerned the use of the information system, the practices used prior to the installation of the system, how the system changed the practices, mismatches between old and new practices, how well the system supports the work, the usability of the system, and personal opinions about the system.

The interviews were each about two hours long and were audio recorded. The interviews were carried out during the participants working time and their participation was approved by their supervisors. No supervisors attended the interviews though. Participants were compensated with movie tickets.

Both the authors were present during the interviews to take notes, ask for clarifications, and ask follow-up questions. It was also very helpful for the post analysis to have two persons taking notes. That made it possible to take turns in listening and interacting with the participants and taking notes. At least one of the authors could always focus on the participants and notes were still taken. Afterwards, an analysis was carried out by listening through the audio recording of the interviews, complement the taken notes and compile all the results.

## V. RESULTS: THE SYSTEM IN USE

Joliv Mobile Care is in general appreciated as a very useful tool by the home health care practitioners. However, they describe the advantages of the system somewhat differently compared to the system providers'. The practitioners stated that they virtually never access the information in the system about the tasks to perform at a patient's home. Most patients are well known by the practitioners and in general there is no need for instructions about the daily work. It has been done many times before and is a routine that do not need information support each time. What the practitioners describe as the strength of the system, and the functionality that simplifies their work the most, is the fact that they always have all personal information about a patient accessible. Before the introduction of the system problems often occurred when practitioners forgot to write down information that they needed for the day's work, for example patients' social security number that is needed at the pharmacy to pick up prescription drugs for someone. That is a task that is performed regularly but with an interval of weeks or months, which makes it difficult to build up a routine for it. Other situations where important information is needed are not predictable, such as in case of injury or acute illness when both personal information and contact information to family members might be needed quickly. The information about the daily tasks that are so promoted by the service providers could be more useful for temps that are not familiar with the patients. However, not all of the interviewed groups had mobile devices for temps, and even if they do it is difficult for temps to start using and benefit from a totally new system.

Handling and storage of documented information in the system was experienced by the practitioners as greatly improved since the introduction of Joliv Mobile Care. The advantages of sorting and searching in electronically stored information are appreciated since it facilitates finding information about a patient. A practitioner reported that before the installation of the system she could never answer questions directly when social workers or family members of patients called and asked questions about a certain patient. She always had to tell them she would call back in twenty minutes so that she had time to locate the right binder and find the right information. Information about a patient could be spread over several binders which made it extra complicated. Using the Joliv system she experienced it as easy to find the right information and she could instantly provide information to the

caller with no need for searching and to call back. It was also difficult to show the information if social workers or family members visited the office since the information was temporally organized in the binders. Thus, family members could unintentionally see information about other patients, which is a privacy violation. With the information system it is easy to find and print all the relevant information about a patient thus reducing the privacy problems.

Writing documentation in the system while on the field has not worked out as well as hoped for. It was considered too cumbersome by the practitioners, mostly because input on mobile devices is slow and tedious. Practitioners reported that it takes too much time to input notes on the mobile device, it is quicker to use their personal paper notebooks and then enter the written information to the system when they get back to the common facilities at the end of the day. There, a desktop computer with a standard keyboard is preferred for input. Other practitioners do not use a paper note book; instead they just try to remember the information that needs to be entered to the system until they get back to the common facilities.

The mobile device used for Joliv Mobile Care is a Qtek PDA with cell phone functionality. The interviews revealed that the ability to call colleagues during the work day is considered an important feature. The phone functionality is an important mean to solve issues that come up during the day such as need for help, schedule re-arrangements or need for a colleague to cover when family emergencies come up. Consequently, communication between practitioners has been greatly facilitated since the introduction of the information system. Now every practitioner has a cell phone number where she can be reached, and all numbers to colleagues are stored in the mobile device. Previous to the introduction of the system, practitioners relied on each other's private cell phones for emergency communication which was much more complicated. They had to keep their own directory of colleagues' cell phone numbers and not everyone had a private phone. A phone call can also help solving simple problems such as a patient that does not open the door when the practitioner rings the door bell. Practitioners reported that calling a patient is often a way to find out if the person just did not hear the door bell, has trouble to get to the door, or is not at home.

The few notes that actually are made on the mobile device while in the field are handled in a very general way when synchronized with the rest of the system. They are shown at login time and then stored under the folder "notes". This has caused some problems since the note functionality is used for both general notes as "*Mr. Smith has new medication*" or "*Mrs. Johnson fell and hit her arm, it does not seem serious but we should keep an eye on it*" and notes that are specifically connected to a time and a date such as "*Mrs. Smith has a doctors appointment 2 October at 10.30*". It is not possible to connect the notes made with the mobile device to a specific date or have them occur as reminders for the right date. Appointments have been missed since such notes usually are made well in advance and consequently read weeks before the actual event. Events like this were handled using the common paper calendar prior to the information system, and thus it was easy to see when they approached. Practitioners strongly

expressed the need for functionality in the system that when appropriate could connect a note to a date in the system's task calendar.

## VI. REFLECTIONS

It is very interesting to note that even though the practitioners in general are happy with Joliv Mobile Care, they promote different strengths with it than the provider. We have not yet had the possibility to bring these findings back to the service provider to find out if the discrepancy is a result from a misconception from the provider's side of how the system is used or if it is a sales pitch that is proven to work. A problem for systems like the one presented here is that the buyers and the users are not the same. Management is responsible for deciding what systems to buy and use, while home health care practitioners are the users who had little to say about the choice of system. Moreover, there is always room for misunderstandings even when a product, as in this case, is developed in close collaboration with users.

Joliv Mobile Care has provided improvement on several parts of the information handling connected to home health care work, mainly by providing easy access and search of the information and by relieving the practitioners from the need to anticipate their information needs. However, one of the main issues that the system intended to improve did not benefit much from the system. The documentation made in the field is still sparse and mostly paper-based. The main reason for this is considered to be the poor input facilities on the mobile devices. This is not a new problem when it comes to the use of mobile devices [1, 3, 4]. Expectations did not come true about that the system would be usable enough to facilitate practitioners' note-taking while in the field.

As concluded by Johansson [2] in a similar work place setting, it is clear that as long as there is a more feasible and easier way to achieve practitioners' goal and undertakings without using a cumbersome system as intended, these ways will naturally be used. Consequently the note-taking functionality in the mobile device will not be used as long as there are alternatives considered as easier. Traditional work and paper means will still be used as long as they are considered as easier to use. Thus, the process still is sensitive to memory loss and transfer errors.

The introduction of Joliv Mobile Care at the three work places seems to have been fairly smooth. The practitioners reported that they had very little computer experience before they started to use the system and that it was difficult to start using it. They received some education which helped a little, but most important was that they were given the time they needed to grasp and get used to the system. The introduction period was long and the former work with paper based tools was carried out in parallel for several months. However, the practitioners were not involved in the decision to purchase the system, which in combination with the recent addition of the

stop watch functionality has caused a feeling of the system being used to control their work.

## VII. CONCLUSIONS

The case study described above shows that information technology can be a powerful tool in home health care, a discipline that traditionally is not associated with modern technology. However, it also shows that great care is needed when introducing technology in new areas to assure that they support the right parts of the target work and that the technology is accepted by all groups of people that will use it. For Joliv Mobile Care, the introduction worked fairly well, but management's application of the system still made practitioners feel that supervisors would like to use the system to control practitioners work. It is also important to consider factors like use context and possibilities and limitation in the hardware to ensure that system functionality is designed in the right way.

The fact that system providers and home health care practitioners promote different functionality as the strength of the system shows how difficult it is to develop new supporting IT systems for professional areas. Close collaboration with intended users is a great help. However, the collaboration needs to take place not only during design and development phase but also during the early product phase in terms of studies of the context where the system is used.

For Joliv Mobile Care it can be considered obvious that the available input functionality in the PDA was not sufficient to make practitioners take notes during field work. Support like templates for notes or other benefits would be needed to make field notes a frequent reality.

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## REFERENCES

- [1] Ericsson, T., Chincholle, D. and Goldstein, M., Both the Cellular Phone and the Service Impact WAP Usability. In Proceedings of *IHM-HCI 2001*, (Lille, France, 2001).
- [2] Johansson, N. Usable IT Systems for Mobile Work. Licentiate Thesis, 2005-008, department of Information Technology, Uppsala University, 2005.
- [3] Nylander, S. Real-Life Use of Multi-Device Services, Swedish Institute of Computer Science, 2006.
- [4] Ramsay, M. and Nielsen, J. WAP Usability Déjà Vu: 1994 All Over Again, Nielsen Norman Group, 2000.