Needs, Requirements and e-Services for Collaborative and Patient-Centered Care

Monica Winge, Benkt Wangler

[1]Department of Computer and Systems Sciences, Stockholm University, SE 114 18, Stockholm, Sweden
{monica.winge, benktw}@gmail.com

Abstract. This paper discusses the fact that more and more patients are treated in their homes by a whole set of organizations, and how this fact places new and more intense demands on health and social care staff to communicate and collaborate. The aim of the paper is to further explore the detailed needs for collaboration between different care units, individuals and professions, and to outline organizational and/or IT-based solutions. The suggested solutions are based on a patient and process oriented perspective and on an analysis of needs and issues expressed in interviews with key actors in a number of research projects focused on collaboration in care. We point to the need for managers in different organizations to agree on ways of communicating and collaborating on the operational level over sectors and units and how this aspect has to be taken into account already during procurement of care services. Most importantly, by reasoning from a basic set of issues, we derive a set of related problems and suggest solutions for how to deal with these. The solutions include suggestions for various e-services aimed at improving coordination and collaboration among care personnel.

Keywords: Multi-sectorial collaboration, home care, home health care, social care

1 Introduction

Health care in Sweden is currently in a phase of immense change. One important change concerns the fact that more and more patients are treated and taken care of in their own homes instead of in hospitals or nursing homes. This may also concern severely ill patients, for whom several different professions from health and social care may be involved in the care process. In order for the patient to get good total care, this poses essential demands on collaboration and coordination among the involved caregivers. Intense collaboration among several parties requires well functioning information logistic to supply the information necessary to perform the various tasks involved. The situation gets more complicated by the fact that the many different professions involved belong to different organizational units each of which may be a private or public organization, owned by county councils or municipalities. Bridges need to be built between care personnel belonging to different professions and units.

In a previous paper [1], we accounted for an investigation in two Swedish communities, Stockholm and Umeå. The results indicated that there were problems in inter-organizational communication and cooperation in health and social care. Most of these problems were due to organizational and social obstacles that resulted in lack of communication among the various units and individuals involved. In five subsequent papers [2-6] we have analyzed the requirements this situation poses on collaboration and coordination. The findings stress the need for improved collaboration among managers on strategic and tactical levels, and among staff at the operational level, in order to facilitate and ensure a high-quality care for the patient. In particular, managers from different organizations need to collaborate more effectively in order to set up goals and routines for collaboration at the operational level. In addition, results showed that collaboration also has to be considered during procurement of health care and social care and that managers need means to follow-up the quality of delivered services. The need for substantially enhanced e-services to support coordination and collaboration was also evident.

The aim of this paper is to further explore the needs for collaboration between different health and social care units and professions, and to outline e-service solutions that will instigate a process oriented knowledge supply focusing more on processes closer to the patient than on general organizational structures and processes. This involves:

- understanding, holistically, the forces influencing how collaborative care processes could and should work;
- identifying the need for new ways of communicating and for mobile and immediate access to information concerning both medical and administrative information;
- understanding the need among operational care staff for clearly allocating and accepting the responsibility to explicitly communicate and collaborate in the patient's care process;
- suggesting changes in information support, particularly of information related to the planning and administration of care activities. The support has to be mobile since many care professionals are moving to and from the patients' homes. It also has to be based on process centered information models that support collaboration.

In the following we define how we use certain terms in this paper. Although admittedly a bit vague, the definitions will hopefully help to make the paper easier to understand.

- *Home health care* is an orginazational concept, which involves
  - *basic health care* – provided by nurses and/ or nurse auxiliaries, in Sweden usually the responsibility of municipalities, although sometimes outsourced to primary care units run by the county councils.
  - *advanced health care* – operated by the county councils and provided by teams of doctors, nurses and other staff. This care often concerns severely ill children or patients in palliative care.
- *Social care* is personal care that involves help with activities of daily living, such as cleaning, shopping, feeding etc, and care that physically supports the patient,

such as help with outdoor activities or personal hygiene. In Sweden this is the responsibility of the municipalities and may be provided by one of their own units, or by a contracted private company.

- *Home care* as used in the title of this paper denotes the combination of home health and social care.
- *Patient care process* is the sequence of activities carried out for the patient by health care or social care personnel from various organizations and in which the patient and often his relatives or friends participate. The process can be seen as a project, the aim of which is to produce better quality of life for the patient, while at the same time maintaining patient safety. Each activity in the "project" should contribute to this value creation. Technically, a virtual project team could be set up to run a certain number of similar "projects".
- C*ollaborative (home) care, which* denotes a setup of collaborative care services performed by a set of care providing units. In particular, it concerns the cooperation of home health care with primary care, hospital care and social care. On a generic level the concept can be considered to include any setup of cooperative health and social care.

The paper refers where specific circumstances are considered, mainly to Sweden. However, we do believe that many if not most conclusions are valid for large portions of the western world.

We use the term cooperation to denote co-work on the organizational level and collaboration to denote individuals working together. For simplicity, we use, where needed, "he" and "his" to refer to the patient, although he may be of either sex.

The paper is structured in the following way: The next section provides an account of collaborative care as a whole and some related research and point to the demands for communication and collaboration among and between different managerial and operational levels. After that we briefly account for the research projects and the methodological approach taken in our research. Section 4 describes the research findings, i.e. it contains an analysis and discussion of issues related to collaborative care, their causes and consequences and what to do about them. Section 5 discusses IT support and proposes a set of e-services aimed at facilitating collaboration. The last section provides a few concluding remarks.

2 Collaborative Health and Social care

Two or more parties collaborate when they work together in order to achieve a common goal, i.e. perform a task that each one cannot cope with alone or at least not as well or to as low a cost. This implies that all parties must understand the mutual goal and the basic circumstances, demands and restrictions that the other party faces. Each party must also be clear over how the work tasks are split up (or divided) and how ones own work tasks contribute to the common goal.

Thus, collaboration between organizations is a complex matter and may, for a single patient, involve a set of entangled processes each run by a separate care unit.

Existing research has focused on a wide variety of aspects. In research concerning collaboration within health care, van Eyk and Baum [7] have studied what they name as interagency collaboration. Hudson [8] has studied joint commissioning across the primary health care-social care boundary in the UK. El-Ansari et al. [9] have focused on public health nurses' perspectives on collaborative partnerships in South Africa. El-Ansari et al. [10] investigated collaboration and partnership and the problems with measuring collaborative outcome. Lichtenstein et al. [11] have studied the effect status difference has on individual members in cross-functional teams. Mash et al. [12] have studied team learning in healthcare that sees the organisation as a living system in which information flow, participation and the development of team work are key aspects. If managers of the health system wish to enhance organisational change, then their goal may need to shift from optimizing health care delivery from a mechanistic model view to optimizing health care workers in a living system.

It is also possible to find some examples in the field of mobile work and information processing. In the health care area, Ammenwerth at al. [13] explore how mobile artifacts can be used for information processing in a hospital. Pascoe [14] describe how mobile artifacts increase the amount and speed of data being recorded out on the field; Najjar et al. [15] describe how wearable computers might increase the performance of quality assurance inspectors. Guerlain et al. [16] write about personal information systems for roving industrial field operators and Heath and Luff [17] examine the ways in which mobility is critical for collaborative work.

Each of the stakeholders involved in caring for a patient has its own obligations that need to be taken into account in order to reach a reasonable compromise that meets most requirements at the same time as it focuses on the best interest of the patient. When several parties collaborate it is often difficult to formulate one single objective, since each organization has its own goals. It is, however, important that all involved are aware of the overall purpose of the work around an individual patient and make sure that this is in accordance with their own and with the patient's goals. A simple example of collaboration is a doctor in primary care who needs to consult a specialist in a hospital. A more complex case is when a patient's problem and its treatment require many units and individuals to be involved. An even more complicated case arises when several care units and professions are involved and where the patient suffers from several diseases. This kind of case is not uncommon e.g. in palliative care. It will result in a conglomeration of more or less interdependent processes, each run by a separate unit, becoming entangled with each other.

For collaboration to work successfully (cf. computer-supported collaborative work), the parties may have to communicate

- *over a distance*, i.e. the communicating parties are at different locations and have to use some kind of tool to bridge that distance, or
- *over time*, i.e a place (a database) is needed, where information can be stored at one occasion and picked up and read at a later time.

Collaboration may take place both at a top (strategic) and a middle (tactical) management level, and at the operational level, as well as between different levels. These levels exist within all health and social care organizations. Thus, there are several organizations and organizational levels, each one responsible for its part of the total care provided for the patient.

3 Methods and Materials

Arguments put forward in this paper are grounded in focus groups, interviews, and studies of documentation conducted in the projects Intercare [18] SAMS [19, 20], MobiSams [21], VVP [22], and LARC [23], in which the authors have been involved. The results are also supported by research conducted in the project VITA Nova [24]. All studies have focused on collaboration within and between health and social care organizations.

The overall aim of these projects were to study care processes and the needs for information exchange, as well as the needs for organizational reengineering at the operational level and especially in clinical routines, all from a patient and a collaborative perspective. Information collection was carried out on fairly small populations of patients and professionals (including managers) in health and social care. A common point for all these case studies was that representatives from several care providing organizations were involved.

Interviews were carried out within the last three of the 5 projects. Interview respondents were selected to reflect a representative amount of stakeholders in various positions. All had long experience of health care or social care (from their different perspectives). Their experience regarding IT and its use varied. The respondents were doctors from primary and specialist care, primary care nurses, specialist nurses, assistance assessors, IT strategists, managers, patients, relatives and representatives of patient organizations. In total more than 50 semi-structured interviews, each lasting between one and two hours were conducted within the projects. All interviews were recorded, some were transcribed verbatim, and some were summarized in interview protocols after going through the recorded interviews several times. A content analysis was used on interviews and documents identifying issues raised in relation to collaboration.

Focus group studies were mainly conducted within the first three of the 5 above-mentioned projects. The focus groups included representatives from health and social care staff in municipalities, counties and private care providers. The focus group were interdisciplinary, with participants such as doctors, nurses, occupational therapists, physiotherapists, and psychologists. Participants were predominantly from operational units, but there were also representatives from management and from the IT industry. The latter were there to share knowledge about new ways to use ICT.

The groups worked interactively and met regularly during the project to produce lists of requirements and scenarios focusing on patient needs, and use cases and other models together with modelling facilitators.

4 Issues and Requirements

In this section we will take a closer look at the problems of collaboration in home health and social care, their causes and effects. There is not so much research dealing specifically with these issues. Except the previously mentioned works by Winge et al. [1-6], one example is however, [25], where Åhlfeldt, based on a set of interviews with health care staff and patients, derive a set of problems related to information security

in connection with collaborative care. It turns out that most of these problems were connected to administrative routines and policies and not to technology. In [26], Åhlfeldt and Söderström discuss the need for coordination of home care activities and propose a possible solution for this. On a more general level one well-known organizational problem, as organizations grow, concern specialization and integration [27]. Health care is by its nature also subject to medical specialization, which in turn places special emphasis on the need to coordinate units, groups and professions. Horizontal organizational coordination is, among other areas, addressed in attempts to improve the logistics of health care (for example national projects in Swedish healthcare to improve availability and shorten waiting times), while vertical coordination is a common problem concerning for instance control and feedback systems of work environment, quality and economy. A general discussion of horizontal and vertical integration of enterprise systems can be found in [28].

As indicated in Figure 1, we will present a set of underlying problems based on an analysis of the empirical material. These issues contribute to the lack of collaboration between care providers, the poor utilization of resources and the substandard quality in health and social care. We will suggest solutions and improvements to help avoiding the effects of each particular situation.

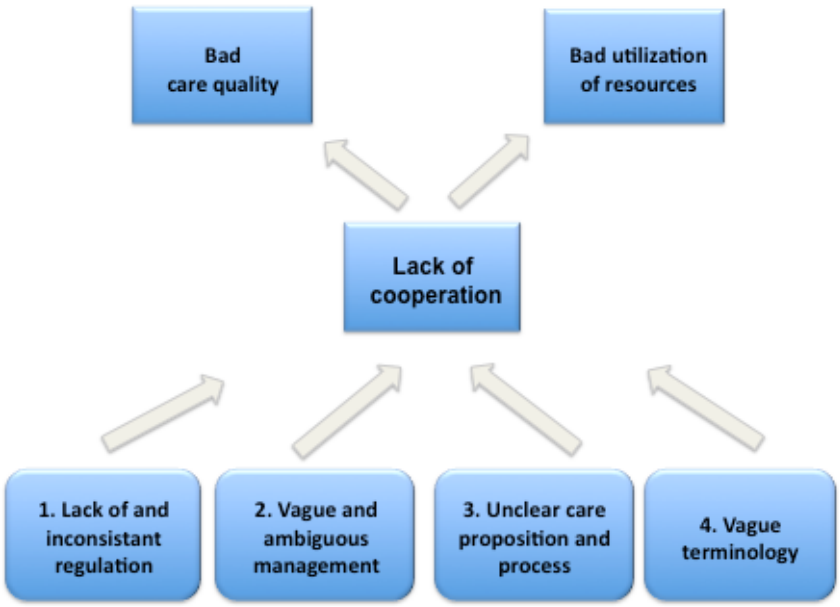

Fig. 1. Basic causes to lack of collaboration in collaborative care and their effects.

What is offered to patients by a diverse set of care providers is a collection of services intending in various ways to improve the patient's quality of life, at best to a degree that the patient will not need more care. In the sequel we will discuss in some detail the shortcomings indicated in Fig 1, and how they affect collaboration.

Statements in italics are derived from interviews mentioned in Section 3. The solutions we suggest include a variety of e-services that together with rules and guidelines suggest how these services should be undertaken.

4.1 Governance, Leadership and Management Issues

Sweden is divided into 20 counties, each with a county council to hold the highest responsibility for the tasks allocated to them. Among responsibilities allocated to this level is to provide citizens with health care in the form of primary care units and hospitals. These may be owned and run by the councils themselves or they may be outsorced to private companies.

Social care on the other hand is the responsibility of the 290 Swedish municipalities. Also in this case, care may be outsourced or run by the municipalities themselves.

There are a number of laws governing how care has to and should be conducted, such as the Health and Medical Services Act, the Social Services Act, the Secrecy Act, the Personal Data Act, and others.

In conclusion, there are a great number of factors that affect each other and that may result in less than optimal care quality and a waste of resources. Plausibly, many more issues than those accounted for below exist, but these are the ones derived from our investigation.

As pointed out in Figure 1, one of the most important reasons for deficiencies in collaboration is the **(1)** *lack of or inconsistency in regulation on all levels* of governance. In addition to discrepancy among laws governing health and social care there is also on the local level a *lack of clear routines and guidelines for how to communicate and collaborate* among all those involved in caring for the patient. Futhermore, the *compensation systems are inadequate* in that they do not properly reward collaboration, which in turn causes a lack of motivation to do so. The remedy for these shortcomings is obviously to try to minimize inconsistency among laws regulating care, at least clarify how to deal with it, to prepare clear instructions for how to collaborate, to provide proper tools and other means to help communicate, and to construct compensation systems that somehow reward collaboration.

Another important reason is **(2)** *vague and ambiguous management*. If managers do not succeed in explaining how the collaboration is intended to work, why and which specific collaboration actions that need to be taken, the *operational staff will not be motivated to perform these activities*. Lack of motivation may lead to less encouragement and will to contribute to the collaboration.

If managers do not understand what is required when it comes to coordination and collaboration, there will be a *poor general understanding of what actions collaboration requires* and as a consequence these actions will not be undertaken.

In conclusion, the managers need to:

- clarify to themselves and others what the organizational mission as a whole involves when it comes to collaborative health and social care,
- explain what is required and why,
- give precise instructions and

- provide convincing explanations to why certain coordination and collaboration activities are necessary and how they should be conducted.

As a result operational care personnel will be better prepared and motivated to carry out their work.

Collaboration between county council and municipality should take the situation of the patient as the starting point and a common plan for the care of the patient must be produced with safe and high quality care in focus. It should also enable follow-ups of the results of the care both on an individual and a general level. Moreover, the goals of the individual patient process have to be explicitly formulated and based on the needs of the patient. The staff has to be trained in thinking on the goals of the process. Describing and clarifying the strategy for collaborative care on the basis of a common health care and home services process will clarify responsibility, facilitate planning and collaboration, and make it possible to monitor the care across organizational borders. The clarification of the collaborative care concept must involve management levels and staff where old routines and habits can be difficult to change. Procurement of health and social care has also to include requirements for collaboration.

There is a need for a new and better system for economic compensation for collaboration. Furthermore, responsibility has to be clearly distributed among actors and everyone to have basic knowledge of who is doing what. There also has to be ICT services that support the patient process and the interaction of the caring staff. The staff may be motivated through participating in planning of the individual patient process. Doing so they can understand how their own work contributes to better collaboration and better results that meet the patient's needs. Organizational responsibility has to be clarified, also concerning manager decisions. Political and strategic leaders have to recognize this and provide means for collaboration.

4.2 Information and e-Service Related Issues

A basic shortcoming in collaborative care is that **(3)** *the underlying care model is unclear* and that involved managers have little knowledge and understanding of the way collaboration has to work in order to produce good quality for the patient. *Obscurity in the patient process* leads to obscurity in how collaborative care, as a whole needs to work to be both effective and efficient. It also leads to a *poor understanding of how collaboration should work* and of what characterizes the collaborative care itself on behalf of the health and social care staff as well as the patient and next of kin. This issue concerns the fact that *it is not clearly expressed, in each individual case, what the various units do and how they should take each other into account* in order to achieve high quality for the patient. It may also include a lack of understanding of the role and responsibility of a unit for "advanced home health care" in relation to hospitals, primary care and other units. The patient himself and his relatives may, for instance, feel that the patient has been sent home and left abandoned, while the accurate process will be hampered due to lack of cooperation, caused by a poorly defined care model stating both that high-quality health care may be provided and that resources are available.

To provide field workers with correct and timely information about what is going on around the patient and with tools to communicate with others is crucial for them to

be able to plan their work and to perform the various care actions that have been allocated to them in the best possible manner.

In this context **(4)** *lack of clarity in terminology* contributes to making collaborative care as a whole ambiguous. If *concepts are vague or ambiguous* you cannot express information requirements clearly. From this follows the risk that information systems will not provide the information needed for coordination and collaboration. The ability to provide the right information when needed, presented it in a way that is understandable also for those who have a different conceptual view of the world, requires well understood concepts.

Different units and professions offer different competencies, have different tasks and see different aspects of the patient. Concepts that are not well-defined and hence not well understood make communication less effective, which in turn contributes to making coordination and collaboration more difficult.

Unclear or ambiguous concepts lead to a lack of understanding for parts of the whole care proposition and hence to a *bad understanding of what information that is needed also concerning collaboration*. Ambiguous notions in medical records also offer risks for the patient.

The common information needs must be identified and defined in a common generic information model for future IT systems. The concepts have to be identified on the basis of the generic patient care process. Collaboration has to take place with the patient and his needs in focus and be described on the basis of cooperation involving care and collaboration strategies (which are lacking in today's care). The collaborative care model must define how care should be carried out. The distribution of responsibility must be clearly described. Concepts that are involved in the process should be defined in an information model. All of this should be set in a relevant context. For collaboration to work, it is particularly important to define concepts that are important for communication between various kinds of care units.

Care staff in a particular unit may have *little knowledge of, or in some cases are not interested in, what actors in other units do* to the patient. Such awareness is, however, important as a basis for developing effective and quality oriented collaboration. A joint care plan for each patient has to be defined and developed by somehow involving representatives of care staff from each care unit and hence making them understand how activities carried out by different actors contribute, in a coherent set of tasks, to reach the goals of the treatment of the patient. Information support for care personnel will also contribute to a better understanding of which actions that will lead to particular goals. There is also a *need for better coordination of the individual patient process*. New e-services for care planning can support this function, which should be a common responsibly of the virtual team, although a single professional may be appointed as "process leader". The e-services must include support for quick changes in the patient's care plan.

If *information is poorly understood or incorrect*, actors in different units will not understand the information that may arrive from other units. Such information will not lead to activities that are coordinated with the goals of the overall situation of the patient. The concepts and the common frames of reference will have to be clarified for different actors in different units that have to communicate.

If *goals for the individual patient process have not been clearly formulated* it is difficult to coherently provide activities from several care units for the best of the

patient. There will be no basic ground for adapting and understanding information concerning what other units do to reach the goals of the patient process. Different care providers do not strive towards the same goal concerning a patient in a particular situation.

A set of goals should be formulated for each single patient process when new essential needs of the patient have occurred. The care provider's responsibility for achieving the goals should be clearly stated. One new instrument for this is to use a well-developed care plan that all cooperating units can access and to which coordination support is connected. The patient and/or his relatives must be involved in formulating the goals.

One of the reasons for experiencing bad collaboration is that various *care staff does not know what others are doing or planning*. Activities are therefore not coordinated, which may result in lack of quality and that resources are used in a less optimal way. In some cases there may also be risks for the patient.

Information services have to be developed to inform actors of other units what is relevant for them to know about the patient and about planned and performed activities. This should be based on clarified goals and roles as defined in the new care model. Based on a well functioning care plan, actions can be coordinated so that work distribution will become more optimal.

Lack of interest among those involved about what others are doing contribute to lack of team-oriented work and hence to lack of collaboration.

Everyone involved should be informed about what the other parties and professions do and of their role in the patient process. The expectations and demands from the organization on its members own responsibility to seek out this information should be clarified.

Collaboration across organizational borders is a prerequisite for good teamwork involving various professions as well as the patient and his relatives or friends.

Lack of collaboration easily leads to lack of care quality for the patient. This may result in the patient feeling unsafe and various actors being uninformed about the patient's condition. At worst, the patient's health may be at risk.

Lack of collaboration and agreement on the management level concerning what is required when it comes to collaboration at the operational level may lead to procurement of care (request for quotation and ordering of care services) that does not take the collaboration aspect into account.

Lack of collaboration leads easily to bad utilization of resources, e.g. that the same activity is carried out several times or in a less than optimal order.

If care team members are trained in reading documentation originating from other units (provided that patient privacy allows it) and if there is information support for this, different actors can see patterns and signs at an early stage. This can lead to more timely actions meeting new needs of the patient and to a better anticipation of problems. Collaboration supported by good IT solutions will increase safety for the patient and make him less prone to take unnecessary contacts with the care team. It will also facilitate a good utilization of resources. Managers must agree that requirements for collaboration must be taken into account already during procurement of care services. Routines for measuring and following up the care should be implemented on the basis of evidence based competency such as to be able to judge

how care ought to have been conducted had one realized early on what was happening.

To bring about collaboration in care is demanding. Everyone involved need to have a basic understanding of the complete care situation and perform different tasks in an order that accounts for an established collaboration and coordination. If procurement is not done the right way, the result, among other things, will lead to a bad utilization of resources.

Requirements for collaboration and coordination must be taken into account during procurement of care services. This includes clear descriptions of what services are needed to support collaboration for all involved. To achieve this, the health care procurement units have to be trained in the new care model and how collaboration should work. New strategies for following up care are needed, in particular concerning how collaboration works.

The suggested solutions will address and contribute to improving both vertical and horizontal coordination, within as well as between organizations. In the next section we will outline the most important e-services that need to be provided.

5 Towards an Information and e-Services Architecture

To summarize, the issues pointed out in Section 4 suggest that improvements are needed among all involved parties both on the management levels and at the operational level. The conclusions and suggested actions are a mix of development of care and collaboration concepts, various organizational measures, and IT support. Most importantly a new strategy and a new care model for collaborative health and social care as a whole needs to be established, which involves:

- the need for managers in involved organizations to work out and agree on goals, rules and routines for collaboration on all levels,
- the need to include requirements for collaboration already in the care procurement process,
- the need to recognize the importance of coordination among care givers and care activities along the care process,
- the need to have clear goals for every single patient process and of which the care givers must be aware.
- the need to make clear how care results will be described, what kind of results that need to be followed up, and how this should be done.

Participants in the focus groups that were mentioned in Section 3 identified a number of functional requirements. In particular, demands were made for the following information to be made available in a mobile setting and to anyone concerned who has the right authority:

- A list of planned care contacts, i.e. patients that need to be visited.
- Goals and objectives for the care of the patient,
- Diagnoses and planned treatments for the patient,
- Planned actions for a patient,
- Which other care personnel will visit the patient according to plan,
- The visits and care actions that are planned for other actors in the team,

- Contact information for patients and families,
- Instructions and guidelines for the conduct of health and social care actions,

Care personnel should, depending on authority be able to:

- Document that a planned action has been or has not been performed,
- Create and plan a new care action,
- Change of time and order for scheduled care actions.

The patient and involved relatives or friends should be able to:

- View the patients schedule for a day,
- Make own notes of care actions and patient status.
- View care giver contact information.

With reference to the well known (cf. CSCW) 2 by 2 time/place groupware matrix [29], it turns out that all of these services fall into the different time/different location category.

In Section 4 we have pointed to the requirement of making the various actors come to a reasonable agreement on common concepts and terminology. Unclear or ambiguous concepts are a problem in the whole health care sector. Here, like in other parts of society it is not rare that even the most central terms are understood differently among different stakeholders. We believe that to a certain extent this is something one has to accept and learn to live with, but at least we need to be aware of it. In the context discussed in this paper it is, however, desirable to agree at least on terms and concepts that concern collaboration. The models, primarily information models that have been developed in the projects InterCare [18], Sams [19, 20] and MobiSams [21] are important contributions to getting to grips with this issue. These models build on a process that describes important information exchanges around the patient regardless of which organization that is responsible for the information.

These projects have also resulted in explicit knowledge on how improved and patient-centered collaboration among care providers can be accomplished. The improvements partly build on an enhanced way of working and partly on a utilization of IT support that aims at facilitating and enforcing collaboration. The new ways of working should be described in process and conceptual models, which will also function as the basis for building the IT support. The MobiSams project also had the intention to clarify the patient process, i.e. on one hand how it functions today and how the patient experiences it, but also how it would appear if the suggested new ways of working and the IT tools be available.

The process is started when a patient has “qualified” for it, e.g. by having achieved a certain age, and/or by having need for complex and extensive care. In this context, it is important to define and to understand what the care process looks like for each category of patients and how it distinguishes from a standard process. Gurner and Thorslund describe in [30] how the lack of cooperation leads to elderly getting inadequate care. They call for a ”coordinator”, i.e. someone being like a “project manager”. The “coordinator” will have the overall responsibility for the patient’s care planning. Together with the patient and with representatives of all involved units, the coordinator plans and decides which improvements and objectives that should be achieved and which initiatives that will be introduced and who will carry them out.

From expressed requirements and needs we can derive which services that are needed to support collaboration and coordination. Some of these services may be implemented as e-services using e.g. web service technology.

The IT support developed in Sams and MobiSams comprises a set of e-services that are well defined and built for communication to support coordination and teamwork. They are able to exchange information in a structured way.

Fig 2 shows an example of user interfaces adapted for a PDA device. The user logs in, is authenticated, and then looks for what actions are planned for the patient the user intends to visit. Information is provided for all diagnoses, the goals, and the actions other caregivers plan to conduct.

When care actions have been performed, these actions can then be ticked off documented and presented as performed in the common care documentation in real-time.

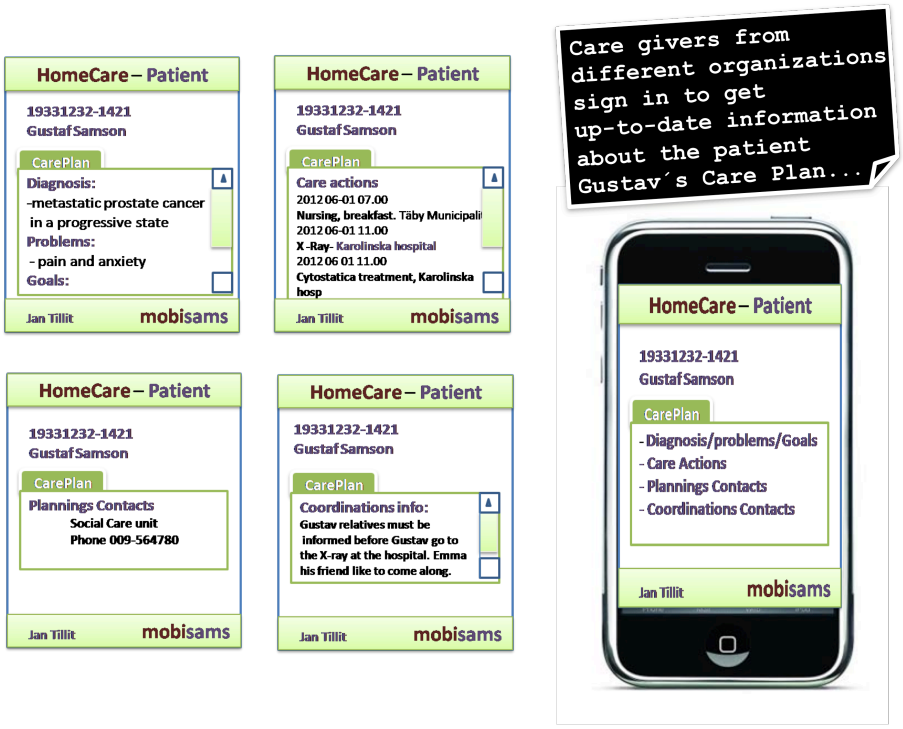

Fig. 2. Sample e-services from the MobiSams project for collaboration in home care.

Examples of Common Information eServices.

Services for planning care. For each individual patient, it is important to provide e-services for care planning. Since we focus on the interaction between stakeholders such as health-care staff and patients and family members. The plan has to be organization-wide. It should outline the common goals and objectives, go through the patients' needs and problems, etc., and define the care actions suggested by each participating unit. The plan describes the joint commitment of the parties involved

since individual care actions could also be related to the overall care objectives. The service can also be used to establish local and detailed plans.

Services for performing care activities. For each person responsible for carrying out a care action it should be possible to document the outcome of that action. In doing so, the overall care plan may have to be updated and changed. In the continuing care process, all local and specific plans and actions need to be in accordance with the goals in the common care plan.

Services for following-up results. It is important to follow up a patient's goals and objectives in relation to the health and social care actions carried out. An important element is that the information is consistent and in accordance with the common information structure.

The services presently available concern:

1. Planning and coordination of all work tasks along the individual care process as a whole. This includes formulation of mutual goals and objectives for all involved organizations and professions, and at the same time focusing on the best interest of the patient.
2. Definition of activities planned for each unit, in accordance with the agreed goals.
3. Allocation of tasks and resources for the planned activities. Assignment of personal responsibility for achieving goals and objectives for each task. Determination of how goal fulfillment should be measured.
4. Planning and registration of the result of the care activities.
5. Registration of undertaken care activities in such a way that goal fulfillment can be assessed.
6. Conducting follow up and evaluation of the care process from the individual's point of view.

The Sams and MobiSams projects have implemented these tools in a common test-bed where they were tested in real environments using novel ICT techniques, i.e. stationary as well as mobile and handheld devices. Tests were specified from use cases developed by care staff. The project and test-bed were set up to work such as to facilitate learning while developing collaborative care as (a virtual) enterprise, including the ways of utilizing IT. Organizations and individuals that possess knowledge about adequate platforms, architectures, network and mobility techniques that are suitable for making the applications useful in the care process have been participating in the work with the test-bed.

6 Concluding Remarks

In this paper we have discussed the fact that more and more patients are treated in their homes by a whole set of people from different organizations and how this new situation places new and complex demands on the communication and collaboration among health and social care staff. We have further pointed to the need for communication and collaboration on different organizational levels, i.e. both

managerial and operational levels. In particular we have pointed out the need for managers in different organizations to agree on ways of communicating and collaborating on the operational level and how the need for collaboration and coordination must be taken into account already during procurement of home care services. In [4] we provide more detail on this discussion. Most importantly we have in this paper, by reasoning from a basic set of problems, derived a set of related issues and suggested some solutions for how to deal with these. The suggested solutions are a mix of organizational and administrative measures, and development of e-services for communication and coordination, even though more specific aspects will be needed concerning the process of organizational change and how to deal with specific organizational obstacles.

The intention of collaborative care is to employ a holistic view of the health and social care given to a patient, so that the patient perceives no boundaries between different care giving units. Collaborative care comprises a coherent set of activities aimed at meeting the needs of a group of patients, and in each case also adapted to the individual patient. Structured collaboration between units providing care is a prerequisite. Collaborative care is aimed at improving the existing procedures, routines and rules for communicating and coordinating activities; in order to achieve better collaboration among all involved actors. It is based on a clearly stated care strategy, on an overall and on an individual level.

For every individual patient, a care plan should be laid out with clearly formulated goals. Ideally, the goals should be connected to a plan of actions. This plan should also consider the effects on staff's working environment and the effects of chosen actions on the unit's economy, including an estimation of the cost of poor quality. The responsibility for coordination and collaboration should be identified and clearly distributed among the different actors that take part in planning and performing care activities. One of the largest problems is how to clarify the tasks, and identify how different units, individuals and types of competences can work collaboratively. Clarifying and explaining the notion of collaborative care for staff, patients and their relatives/friends is therefore imperative.

Finally, it is very important to stress the need for a new collaborative care model defined with the patient in focus and for health and social care as a whole and not only for IT.

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