Groupware for Case Management and Inter-Organizational Collaboration:

The Virtual Rehabilitation Team

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Abstract

This paper presents LINDA, a prototype system designed to support virtual rehabilitation teams. LINDA enables professionals from different welfare-state agencies to collaborate in case management. Our approach to supporting teamwork involves the sharing of minimal case sets across organizational borders needed to provide a shared situation assessment among team members. The system provides a shared workspace for the team; a lightweight client-database, visualization of case histories and plans, and means to communicate effectively in the team using yellow sticker-notes. We present LINDA and discuss how we approached the problem to design groupware to support work under changing and uncertain conditions.

Keywords

Groupware; Computer Supported Cooperative Work; Vocational Rehabilitation; Participatory Design; Teamwork; Virtual Organizations; Case Management, Open Systems.

Introduction

In the Swedish welfare-system, several agencies are involved in the rehabilitation process [1]. To improve cost-effectiveness and quality of services, the government has decided that the local agencies should collaborate in the case management of individuals (e.g., the local primary care, and the social insurances and employment offices). Although inter-organizational rehabilitation teams have been formed in some communities, case managers still find it difficult to cooperate in practical rehabilitation (ibid.). For example, actions taken by one case manager are often not communicated to other case managers in the peer organizations. Consequently, it is difficult to maintain momentum and effectiveness in the rehabilitation process. This problem leads to disappointing outcomes in rehabilitation of clients and eventually to increased societal costs.

Meanwhile, researchers are discussing how information technologies can enable new forms of work and collaboration across organizational borders [2,3]. For example, *Virtual Organizations* [4] have been discussed

intensely in the research community. A virtual organization can be viewed as a collection of geographically-distributed, functionally and culturally diverse organizational entities that are linked by electronic forms of communication and rely on lateral dynamic relationships for coordination (ibid.).

Groupware is the class of computer programs that enables professionals to cooperate on common work issues [5]. These systems provide shared interfaces to common information sources and a means to communicate within groups. Typically, they are attached to networks such as the Internet and local area networks. E-mail, newsgroups, and chat are familiar examples of groupware.

Developing groupware has been reported as being complicated [6]. In particular, it is difficult to support groups that originate from different organizational cultures. For example, collaborative computing requires that users function as a team, sharing goals, norms and work-practices [7,8]. Thus, it is important that developers acknowledge and address the social aspects of design. However, research has shown that these factors are frequently omitted in the design of new technologies [9].

We have reviewed the literature on systems that support teamwork and collaboration. However, few systems were found to have been designed to support inter-organizational cooperation in the public and health-care sectors. Our approach to the development of groupware is based on Participatory Design [10], a method that acknowledges the social aspects of computing.

The particular aim of this study is to present a tool designed to support inter-organizational collaboration in case management [11]. Specifically, the tool supports a virtual rehabilitation team of case managers.

Background

Vocational Rehabilitation

Vocational Rehabilitation is targeted at the socially disadvantaged long-term sickness absent [12]. Modern rehabilitation practices set the individual, her needs, and resources in focus. Rehabilitation involves case management to ensure that coordinated actions are taken in

the rehabilitation processes. Everyday rehabilitation work concern tasks such as client-counseling to discuss immediate actions for improving their situation, and to set realistic goals and plans for the future. Research has shown that it is important for clients to have stable social conditions for rehabilitation to be effective. Thus, one goal in rehabilitation is to minimize the probability for social disturbance. Job training and basic education are frequently-used tools in the rehabilitation process. In addition, it is important to follow-up and provide feedback to clients.

Because several welfare-state agencies in Sweden have different responsibilities in the rehabilitation process, it is vital to coordinate actions with case managers working in other organizations.

The Resource Rehab Team

In 1996 in a Swedish municipality, local rehabilitation professionals created a group with the goal of implementing modern rehabilitation practices and to coordinate their activities. The *Resource Rehab Team* is a face-to-face group consisting of six representatives (case managers) from the three local welfare-state agencies involved in rehabilitation of clients. The *Social Insurance Office* is responsible for national social insurance and provides rehabilitation allowance to clients. The *Employment Office* has as its primary goal to provide jobs and job-training. The local *Social-Welfare Office* provides care, financial support, and basic job-training for people with physical and mental disabilities. Accordingly, the team consists of two social insurance officers, two job-center officers, and two social workers. Team meetings are held once a week to discuss clients and how to approach their problems.

The Resource Rehab Team, which can be seen as an informal group [13], was formed out of a particular combination of "formal" managerial decisions and human needs. Informal groups are powerful and can improve effectiveness because they bring together the right people at the right time around a specific set of questions (ibid.).

The team works in a dynamic environment where unanticipated situations occur frequently. For example, in Sweden, politicians regulate the rehabilitation sector. New policies are often imposed which change the nature of the work. In addition, vocational rehabilitation is dependent on the availability of jobs and job training placements, resources dependent on the local labor market.

However, even thought practices improved significantly because of this new collaboration, rehabilitation professionals still have problems in coordinating their efforts. In particular, practitioners report on problems to "get small messages through" to colleagues in the peer organizations and a lack of awareness as to what actions they are taking in the case management of clients. In an effort to improve the situation, we developed groupware in a joint effort together with practitioners in the Resource Rehab Team.

Methods

Participatory Design

The LINDA system was conceived as part of a larger action-oriented research project on inter-organizational cooperation in local communities, Motala, Sweden. It was developed using a Participatory Design [10] approach, known as Action Design [14], jointly with the case managers in the Resource Rehab Team.

Action Design is a toolbox of several instruments designed to communicate ideas and negotiate among parties in the design team, and to manage the design process. In Action Design, the goal is twofold: to elicit technical/functional requirements of the software, but it is equally important to encourage the social formation of goals, norms, and shared meanings in the design team [ibid.]. Thus, we see the design of software as a social process, constructed as part of a conversation between developers and practitioners with the goal of developing a social system. At design meetings, we typically discuss problems of cooperation among parties and work jointly towards solutions on the problems.

Twelve design meetings informed developers on the requirements of the work in the rehabilitation sector. Researchers conducted a set of small workplace ethnographies [15] at the organizations to get a better understanding of the daily work situation of case managers. In addition, we attended face-to-face meetings of the Resource Rehab Team, and observed communication patterns and efforts of coordination.

Results

Requirements

LINDA was designed to support collaborative case management and communication in a virtual inter-organizational rehabilitation team. The overall design was guided by a consensus notion of "light-weight communication" held by both case managers and developers.

Developing tools to support early inter-organizational collaboration is difficult because the work-culture has not been established. Furthermore, because inter-organizational cooperation in the rehabilitation sector is turbulent, our goal was to develop a robust non-rigid application that will survive changes in regulations, work practices, and group membership. For example, we avoided implementation of specific temporary work-procedures that easily become obsolete in favor of the general aspects of vocational rehabilitation practice. Under these circumstances, it is crucial to avoid over-formalization of routines in favor of an open, flexible, and living design since the "schemes for work" is still under construction. Over-formalized procedures will probably fixate work and hinder the group in developing more elaborate modes of cooperation. The goal is that the system will also be a catalyst for the team to further develop their work practices.

Acknowledging these problems, our approach to supporting teamwork and case management involves the sharing of

minimal case sets[1] among organizations and means to *communicate effectively* in the virtual group. This approach enables professionals to have a *shared situation assessment* [16] of clients and their problems. In addition, the system makes colleagues' actions in the rehabilitation process visible, which further enhances awareness of the situation. A case manager communicated this requirement during a design meeting: "We don't need to see into each others case files to get the work done. What is needed is *light-weight communication* among organizations to know what is going on [with clients]".

LINDA

LINDA combines a shared lightweight client-database with a flexible communication tool. These functions are implemented in the two tabs seen in the upper part of Figure 1. First, let us consider the database part of LINDA.

In LINDA, every client is represented as a *case*. Each case represents a *set of states*. A state is a set of client-related information representing the *current rehabilitation situation*. For example, it describes what measures the client is currently engaged in such as education and job-placement. In addition, the form has fields displaying the agency that is responsible, who is financing the measures, and for how long they persist. In the lower-right pane of Figure 1, we see the fields of the state form. In the upper right pane of Figure 1, we can see the list of client states. The uppermost element in the list always represents the *current* state (e.g., the current rehabilitation situation) and the remaining elements display previous states representing the case history.

During design meetings, practitioners emphasized the need to visualize graphically the case histories. We acknowledged this need and implemented a visualization function based on timelines [17]. The case history is visualized with horizontal bars that show rehabilitation actions over time. This approach enables practitioners to view the overall picture of their efforts over time assisting them in setting in appropriate rehabilitation services to clients.

The leftmost pane in Figure 1 shows the Resource Rehab collaboration and its participating organizations in a tree view. Clients are classified and placed under the organization engaged in rehabilitation. This view can be sorted according to user preferences. For example, it is possible to view the database according to the client's organizational membership or by the urgency of the case. In addition, a flag is displayed in this view if another colleague has been in contact with a client and altered the state of a case.

Modern rehabilitation practices emphasize the need for follow-up [12]. The system generates follow-up flags to support the memory of rehabilitation professionals. If no actions have been registered by the system for five weeks, a follow-up flag is generated and placed on the client's name in the tree pane.

The communication tool in LINDA is based on desktop and a yellow sticker-note metaphor (implemented in the rightmost tab). Each member in the team has a virtual desktop where they can place yellow sticker-notes (similar to Post It notes) using a drag-and-drop approach. Furthermore, the coordinators have a shared desktop used for public messages within the team. It is intended that this desktop should be used to schedule meetings and for priority setting in the team. In addition, client-specific notes can be placed directly on the case forms.

Furthermore, basic functions to create, delete, search, and print are implemented in LINDA. These functions are available from the menu-row and as context-sensitive popup menus. Additionally, basic statistics can be generated for the need to follow-up and monitor progress of case management.

Discussion

Teamwork in the rehabilitation sector is dynamic and changing. For example, in Sweden the rehabilitation sector is managed politically. New policies are frequent and they change the nature of work in the team. In fact, one can also argue that the formation of the Resource Rehab Team per-se was a measure on part of the collaborating organizations to deal with the uncertain situation. Developing tools that support work under these conditions is difficult because of requirements on the system. For example, too rigid implementations (that fixate work) are inappropriate since they are soon obsolete.

Researchers have proposed that groups and their tools can be considered as *living socio-technical processes* [18] that *regulate* their action to a turbulent environment [19]. This view is especially appropriate when groups operate in unpredictable environments where the requirements of work often change such as in the rehabilitation sector. In the following sections, we discuss how this view directed the design of LINDA.

Developing successful groupware for inter-organizational cooperation is not merely a matter of eliciting and implementing the "right" set of functional requirements. In our view, the social requirements are equally important. For example, it is crucial that group members agree on goals, have similar basic values/norms, and are able to communicate effectively [8].

In the design of LINDA, we used a Participatory Design (PD) approach [14] to foster the formation of the social system in which goals, norms, and tools are parts. In addition, the PD approach is valuable because it informs developers of the functional requirements of the system and supports practitioners in obtaining shared understandings of the system.

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[1] The case sets are based on guidelines from contemporary rehabilitation research and on the requirements set by case managers in the design and rehabilitation teams.
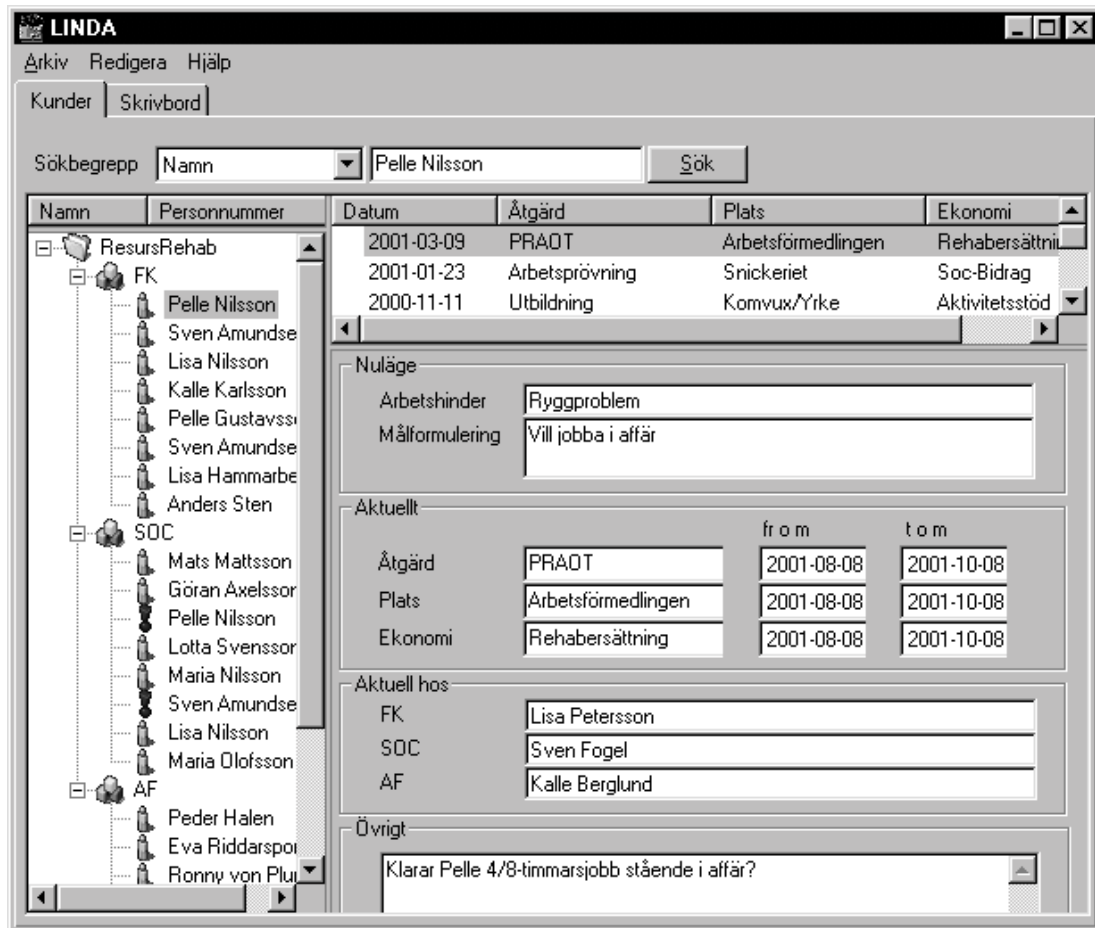
Figure 1 − A part of LINDA, the tool designed to support cooperation in an inter-organizational virtual rehabilitation team.

Additionally, to support such evolving collaboration to adjust to new work-requirements, tools need to be *flexible* (i.e., because requirements are not known at design-time). For example, tools could provide support for practitioners to partially *re-design* the system. One goal of our research is to design flexible tools that practitioners can reconfigure when work-requirements change (i.e., to empower practitioners to manage their own tools [20]). One possible approach could be to develop tools that make possible reconfiguration in a basic meta-tool methodology [21]. The following section discusses how we used sticker-notes to design for flexibility in LINDA.

The yellow sticker-note implementation in LINDA has two functions. First, it was intended as a flexible means to communicate within the group. However, because practitioners can position notes on many different places in the system, they can be used opportunistically to create their own sign-system (not intended by developers at design-time). For example, notes could be stacked and placed in a particular configuration on the public desktop to prioritize clients at the next meeting in the face-to-face group.

Furthermore, it is not meaningful to develop too rigid systems since work is constantly undergoing change. Consequently, fixed database implementations are inappropriate. In LINDA the client-database implementation is minimal and can effortlessly be changed. In addition, practitioners can change values in drop-down menus. When we determined the fields we should implement in the database, we focused on the general non-changing aspects of vocational rehabilitation practice and those that are important for creating a shared situation assessment [16] in the team.

We see visualization of case histories as a valuable tool for case managers. Research has shown that appropriate visualization techniques can significantly increase human performance and decision-making [22]. Traditionally, rehabilitation management is text-based by nature. For example, appropriate visualization of case histories makes it possible to see patterns over time in the rehabilitation process, which is not possible with traditional text representations. We believe this approach to be especially valuable when addressing clients with diffuse and long-term illness. However, more research needs to be conducted in this area.

Conclusion

We have developed a tool to support collaborative case management in an inter-organizational virtual rehabilitation team. We found that a minimal, non-formal and flexible design, focusing on communication, is appropriate because the team works under unpredictable and changing conditions. In our lightweight approach, we avoided over-formalization of the system to minimize the need for maintenance due to the frequent change in the management of the rehabilitation sector. Furthermore, we implemented a flexible approach to communication in the group based on a yellow sticker-note metaphor. Even though information sharing concerning clients is relatively moderate in the system, our view is that it is sufficient to support work-processes and offers a shared situation assessment among team members. Future work includes an ecologically valid evaluation conducted in a real-world setting.

Acknowledgments

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