Calendars: Time coordination and overview in families and beyond

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Abstract. This paper discusses how calendars and time coordination can be used across social and organizational borders, bridging between work and non-work, and between family coordination and external collaborators. The paper moves beyond family on-line calendars towards coordination and collaboration with professional caregivers and public authorities, and discusses how such shared calendars revitalize some of the very basic discussions of CSCW: The notion of shared goals in cooperative activities, the understanding of time and time-granularity in cooperation, common information spaces, and in particular boundary-crossing capacities and the holding back of information for fragmented exchange. Based on two cases, in which we have worked with sharing and coordination of time-resources in families on the one hand, and external parties such as external care-givers, employers and municipal authorities on the other, this paper will reopen these old CSCW debates. This paper questions if calendars, in particular family calendars should be designed based on shared goals and common interests. We argue that collaboration needs to be supported, even when families and their professional and amateur collaborators do not share the same goals, rhythms and routines.

Introduction

This paper will discuss how calendars and time coordination are and can be used across social and organizational settings, bridging between work and non-work, and between the much-hyped area of family coordination and external collaborators. Family on-line calendars are a somewhat new topic that we find is treated somewhat naively as seen from the point of view of CSCW. In this paper we will revitalize some of the very basic discussions of CSCW in order to provide

a less naïve view on family calendars. We will discuss the notion of shared goals in relation to cooperative activities (Bødker et al., 1988; Raeithel, 1992; Bardram, 1998), the understanding of time, time rhythms and time granularity and its relationship to the cooperation (Egger and Wagner, 1992), boundaries, boundary-crossing capacities (Star and Griesemer, 1989) and fragmented exchange (Clement and Wagner, 1995). All of this with a view towards family calendars and how such time resources are shared within families and across boundaries to a network of other amateur and professional communities.

The paper is based on two cases in which we have worked with sharing and coordination of time-resources in activities involving families on the one hand, and external parties such as external care-givers, employers and municipal authorities on the other (Bohøj et al., 2010; Borchorst and Bødker, 2011; Bossen et al., 2012). Through two calendars, built intentionally to support different forms of collaboration across organizational and social settings, this article will examine and discuss the calendar as a collaborative tool that spans from families across to organisations and non-professional constellations such as a municipality.

Calendars and cooperation

A calendar is a common tool for planning, communication and collaboration. Calendars are used by individuals to organize and document one's life. Calendars are used within defined groups, such as families or at workplaces, and can there enable collaboration as one can locate people, see their availability and book them. In the words of Crabtree et al. (2003), calendars represent "*temporal plans of coordinate action (...) and may be characterised as temporal maps constructed by users to coordinate events with others*" - (Crabtree et al., 2003, p. 120).

Calendars are one of the most successful collaborative tools in existence (Palen and Grudin, 2003) and the use of calendars has been investigated extensively for many years within CSCW. Family calendars have been designed to support (temporarily) separated families (Markopoulos et al., 2004; Saslis-Lagoudakis et al., 2006; Neustaedter et al., 2009; Yarosh and Abowd, 2011), or divorced families (Yarosh et al., 2009; Odom et al., 2010). The increased popularity of cross-group coordination support such as Doodle (Doodle, 2012) indicates a need and benefit for allowing diverse groups to coordinate and collaborate around certain activities without giving unlimited access for others to one's calendar.

Calendars have for long been recognized as an important coordination artefact in the home setting (Venkatesh, 1996). Elliot and Carpendale (2005) discuss the use of family calendars, and put emphasis on three major activities supported through family calendars: 1) *Coordination and Negotiation* – to work out a shared understanding of what, when and by whom something should be performed, 2) *Review and reminders* – to provide an overview (short-term and future) of what

activities will take place and act as a to-do list and finally 3) *Awareness* – provide and understand what other people within a family are doing and where. Neustaedter et al. (2009) discuss different calendaring practices within families, focusing on who is in control, and whether one or several calendars are involved.

Crabtree et al. (ibid.) propose that to move from the workplace and into the home, calendars should be made available at home as well as elsewhere; they should devise negotiation protocols to enable users to negotiate their schedules, and support the development of distributed collaborative access models. *"The domestic calendar is a personal object, not in the sense that it belongs to one individual, but in the sense that it belongs to a very small collection of individuals to organize and coordinate what can only be described as their intimate affairs."* – (Crabtree et al., 2003, pp. 134).

The two cases we present in this article, in each their way, live up to the requirements outlined, and we will return to the challenges of *how they are made available outside the family; how they set up negotiation protocols and how they support the development of shared access models.* Lee (2005) points out how artefacts that live within organizational and activity boundaries are constantly developed, both through the development of local uses (in the dialectical manner), and because there are many situations where the standardized methods and forms need to be negotiated across activity boundaries, in continuation of Crabtree et al. (2003)'s demand for development of shared access models.

Ganoe et al. (2003) stress the need to provide awareness of the 'overall situation' including dependencies and shared task goals within a collaborative group. In other words, adding to Crabtree et al (ibid.), *calendars must share and give access to rhythms of activity and they need to provide awareness to the overall situation, or overview.* Star and Griesemer (1989) analyse in detail the design and use of various artefacts as boundary objects in and around a zoological museum. The setting of family calendars resembles the work of Star and Griesemer (ibid.) in that *boundary objects such as calendars are shaped by professionals to support participation by professionals and amateurs* (in this case parents, children, and various kinds of volunteers) in sharing information and duties. However, it is also a case of the opposite, namely *amateurs shaping boundary objects to be shared with professionals.* If we think about how family calendars may be used to reduce complexity across boundaries we need to look for how amateurs and professionals alike limit information that is provided for boundary crossing, in our case calendar entries and information.

Clement and Wagner (1995) describe fragmented exchange across organizational boundaries. As we shall discuss for family calendars, like the work of (Reddy et al., 2006), they challenge different needs of privacy, and diverse temporal trajectories among the collaborators. Grönvall et al. (2005) describe a calendar/timeline based system where opportunities to communicate are set by different actors in a healthcare scenario. They discuss the value of being able to

restrict bandwidth or services available (e.g. only allowing audio, even if video could be possible) in specific collaborative care situations and by that introducing granularity to handle specific privacy and filtering-concerns exiting in their case. In this paper we will discuss *if and how it makes sense to provide equal access or if there is a need to support fragmented exchange through different granularity*.

In divorced families, collaboration (e.g. concerning the shared care for a child) can be challenging. Divorced families challenge collaboration as they often are distributed, may not like each other and have a need to retain privacy while still collaborating. Odom et al. (2010) describe challenges and opportunities in how technology and electronic calendars can be used to support the joint care of a child in divorced families. Yarosh et al. (2009) describe communication challenges arising from the physical separation, different rhythms and lack of subtle cues to detect activities (e.g. might a child's dirty shoes for example indicate a trip through the forest or a football game?).

Bødker et al. (1988) discuss how CSCW had, in its early days, adapted the small research group as ideal for cooperative work. They point out that this ideal leads to a rationality that is naïve and limited, and suggest that there are other forms of rationality at stake. In (Noddings, 1984), they find a philosophical alternative, *caring* or "the Mother's voice." In contrast to the authoritative "Father's voice", a person cares about somebody by taking on this person's situation, based on her former experiences with caring. For example is it not uncommon that adult children provide assistance to their older parents, seeing this as a way to 'pay back' for previously received help or care when they were young, rather as 'work' (Schulz, 2010; Christensen and Grönvall, 2011). Where work calendars may be viewed from a classical rationality, the notion of care rationality provides a challenge for family calendars.

There is an additional difference between private and shared work calendars: At work, time fundamentally belongs to the employer, who can make decisions, e.g. for everybody to use and share calendars and for the time rhythms as such (Begole et al., 2002), whether this happens or not (Palen and Grudin, 2003). In the private sphere there are no instrumental incentives like salary or straight-forward demands from management to enforce a shared calendar use. Without outside push it is even more important that the users can see an immediate benefit themselves of doing the work to share information with others (Grudin, 1994).

(Bardram, 1998), as well as Clases and Wehner (2002) use Raeithel's categorization of cooperation in relation to shared goals and identity, in the context of CSCW. This model illustrates that there is no simple way in which a common goal is the precondition for cooperation. At one end of the spectrum, actors are gathered to act on a common object, but their individual actions are externally related to each other through scripts and routines, which is why Raeithel (1992) talks about how people in this type of coordination see themselves as 'me-and-the-others'. At the other extreme, the actors focus on re-

conceptualizing their doing in relation to their shared objects. Both the object and the script are re-conceptualized, and people according to Raeithel (ibid.) see themselves as belonging together as 'we-in-the-world'. This kind of perspective may be used to further discuss the assumption made regarding family calendars; that they deal with *the family as a group of equal peers with joint interests.* Calendars, and other coordination artifacts are needed as much for 'me-and-the-others' setting as they are for 'we-in-the-world'. However, the scripted gathering around a shared object, may point towards different needs than the open sharing. Accordingly simpler means of cooperation are needed, where each party can to a large extent mind their own business. We will return to this discussion later.

Two family calendar cases

In the following section we present two cases where we have been involved in understanding and designing family-related calendars. We shall look at how our two cases address the challenges of shared calendars, in particular how these cases deal with the concerns for shared interests within the families, how they deal with access to rhythms of activity, their attention to awareness to the overall situation, or overview, to how calendars were made available outside the family; how they dealt with negotiation protocols and shared access models across families and outside collaborators.

CareCoor: Supporting homecare-referred older adults' care networks

CareCoor was developed in a research project based on ethnographic field studies and a participatory design process, involving mainly care-workers, a care-worker team-leader and family members. The purpose of CareCoor was to address a number of collaborative challenges in referred, home-based care, especially in those situations where the referred, older adult could not be an active partner in the collaboration – for example due to dementia. The following case description represents a condensed version of previously published work. For details regarding the study background, design rational and method, the developed system and test results the reader is advised to consult the following two works (Christensen and Grönvall, 2011; Bossen et al., 2012).

Homecare work is to a large degree a cooperative effort. Numerous home care-workers, relatives, friends and others all contribute to the care of an older adult. All these actors provide care from different perspectives and with different goals and motivations while following their own temporal rhythms. While all partners like to provide the 'best possible care' for the older adult, they do this from different stances as these actors all have their own individual roles, goals, rhythms, time to invest and relations to the other actors. For example, the professional care-workers provide care as part of their job, and based on a need-

assessment (i.e. the referral process). Relatives on the other hand rarely see their contribution as 'work' or home care, but rather as acts of love or giving back care received earlier, for example as a child (Schulz, 2010). Also, a professional care-worker may have to attend ten different clients a day whereas a family member only has one or two older relatives to care for. We observed that these diversities at times challenged a, for all parties, fruitful collaboration. Usually it is the close family members and the care-workers who are the most active care-providers. However, other parties are involved such as friends of the elderly, volunteers from NGOs and other professional actors. CareCoor accordingly was designed to support communication and collaboration among these diverse actors, i.e. the Care Network, supporting an older adult.

Without the CareCoor technology, the collaborative activities depend on the use of a paper-based care-binder placed in each referred person's home, face-to-face communication, phone calls and letters. The paper-based care binder contains information such as the referred activities (i.e. when and what referred tasks will be done) and a message-exchange area where care-workers and family members can exchange information and communicate. Typically several care-workers work with the elderly, due to their internal work shifts. At times the referred work schedule in the care binder is not up-to-date (i.e. being paper-based, someone must remember to print, bring and change the care-plan when the referred tasks change) and the message-exchange is not optimal: One have to be in the apartment and look through the whole care-binder in order to learn if someone has written a message or the care-plan has been updated. Alternatives such as face-to-face or telephone conversations between carers require both parties' availability and attention. Many relatives have the telephone number, and sometimes even the private number, of one or two care-workers. As the relatives do not have access to the work rhythm and schedules of the care-workers it is, however, difficult to know when to call. In our studies, the care-workers mention that such calls are often disruptive because they are attending other care-receivers, are in other problematic situations or simply not attuned with the discussed situation. Accordingly, providing *a better overview, or understanding, of these time rhythms* is an essential part of CareCoor.

CareCoor is, in its simplest form, a digital implementation (on a Samsung Galaxy Tab) of the paper-based care-binder connected to an internet database through the mobile 3G network (see Figure 1).

Through web and app-based calendar-based interfaces, CareCoor provides an awareness and collaboration platform that allows family members and the municipal care-workers and team-leaders to collaborate in the care of an older adult. In CareCoor, the referred care plan, medication information etc. is always up-to-date and CareCoor indicates when someone has left a new message. Furthermore, CareCoor extends the paper-based care binder's functionality by
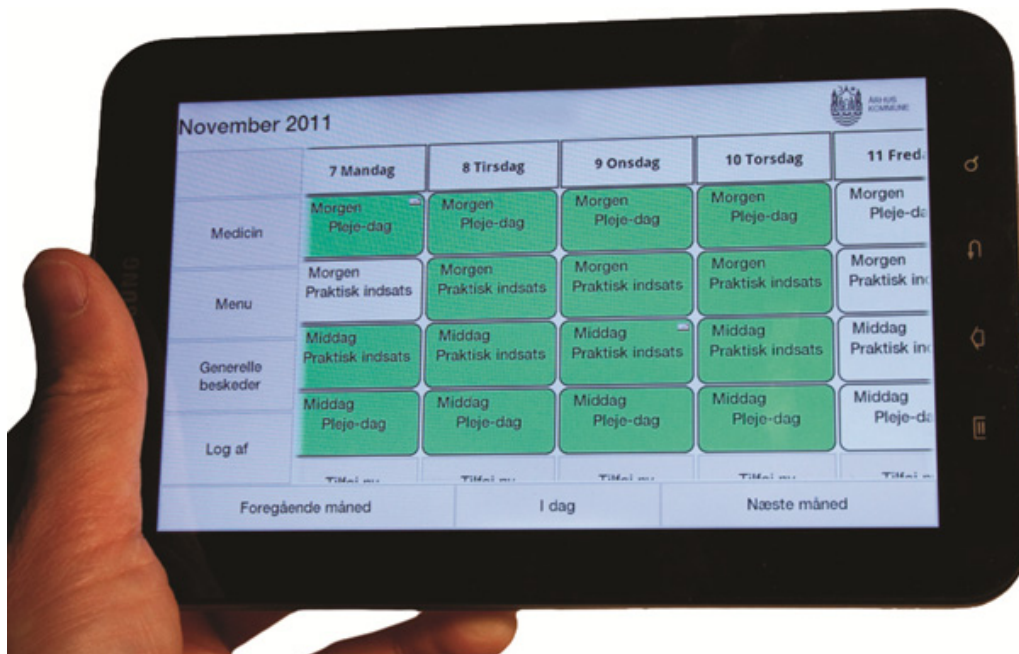
Figure 1. The matrix-based CareCoor calendar interface running on a tablet.

allowing all actors to 1) insert non-referred care activities in the calendar and 2) allow collaboration around the listed activities. For example a son visiting his older mother on a Sunday can decide to clean up his mother's apartment. Through CareCoor he can see that his mother's apartment is scheduled for cleaning Monday afternoon. Without CareCoor, there is no effective way for him to 'take over' the cleaning and the care-workers will clean the apartment even if this is not needed. With CareCoor the son can 'take over' the referred task of cleaning by acknowledging this using the tablet. The care-workers and their team leader will obtain this 'transfer of responsibility of a referred activity' and can hence plan other activities. The son can also propose a new (but not referred) task, such as buying some milk to his mother. Since the son cleaned the apartment, the care workers can now have time to buy the milk and have a chat with the old mother. The acceptance of tasks, proposed new activities and messages, and the acceptance of messages are all documented through CareCoor. The set of rules in which the different actors act, for example when taking over a referred task must be negotiated to maintain a clear definition of responsibilities, etc. The documentation of these tasks as they are carried out can be seen as an ad-hoc contract between the municipality and a non-professional care-provider such as next-of-kin. Accordingly the challenges of providing shared calendars in this setting include:

- Providing a shared overview across carers in the Care Network.
- Yielding time rhythms visible at levels that support sharing of routines at granularities that are suited for the various practices.
- Facilitating negotiation of rules and contracts.

The latter two, in particular are challenges of potential tension and conflict between parties.

CaseLine: Couples planning parental leave

This study addressed the interaction and collaboration involved in the planning and control of parental leave in a Danish municipality. The planning involves several citizens, a municipal office and several other stakeholders such as the parents' employers and labor unions. We developed CaseLine in a research through design process, involving initial field studies and participatory design. CaseLine prototypes have been tried out in various workshop settings, and our findings are based on data from these and the initial field studies. The following case description represents a condensed version of previously published work. For details regarding the study background, design rational and method, the system as such and test results the reader is advised to consult the following three works (Borchorst et al., 2009; Bohøj et al., 2010; Borchorst and Bødker, 2011).

This parental leave planning process is typically a product of the negotiation between the parents and the surrounding stakeholders, focusing on how the parents may use their rights for parental leave, as determined by national legislation and managed by the municipality, while making the most of the payment that either parent get from their employers. The legislation constrains this planning in particular since the rights of the parents are interwoven with one-another, as do e.g. the parents' vacation rights and agreements with each employer, if there is one. Establishing the best possible solution, in terms of total leave-time, split between mother and father, total income during the leave period, the possibility of spending leave-time together, and saving leave-time for later, calls for the consideration of various "what-if" scenarios. Parents often do not have all the information necessary to calculate these scenarios, and the legislation is difficult to work with due to its inherent flexibility. The municipal office is an important source of advice on this as well as it is approving the final plan. As part of the counseling process the "what-if" scenario can be explicitly shared with a caseworker (see Figure 2).

The planning period for parental leave is up to nine years, which is the child-age when all parental leaves should have been used. Even when parents have decided on the best solution, this has to be *communicated to, and negotiated with* the respective employers. Moreover, despite having settled on even the best of plans, parents may desire to *change their plan*. Often, when the time comes for the child to start daycare, the parents need to adjust their plans e.g. to the actual starting date of the daycare. Over the nine-year period, many events may happen that makes a change of plans necessary: New jobs, additional children, etc. Consequential changes need to be reiterated with all of the above stakeholders.
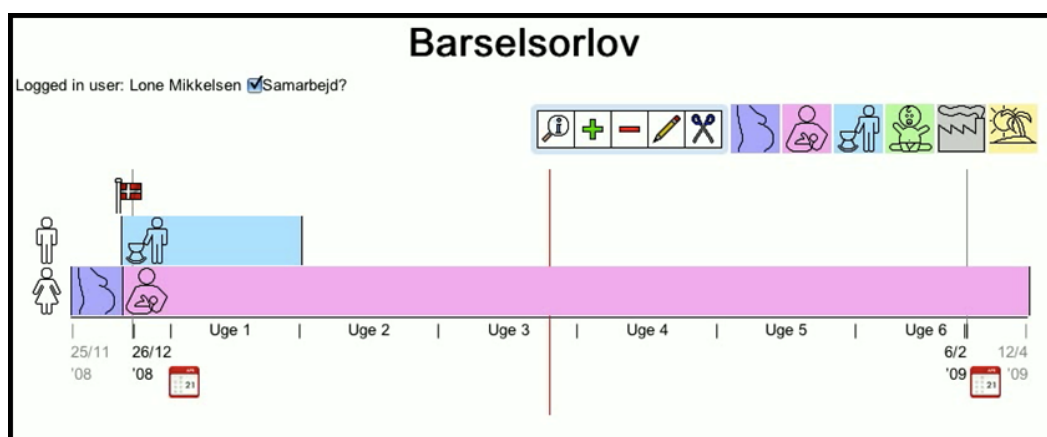
Figure 2. The timeline based CaseLine calendar (Sandbox mode, the tick-box makes explicit sharing with caseworker possible).

As a consequence of the above complexity, friends become an important source of inspiration and advice. However, sharing experiences is also complicated and often the municipal office gets questions from expecting parents, who cannot understand why and how their situation differs from that of their friends and relatives. This is also true for parents who search for information in the limited, available Internet sources.

Bohøj et al. (2010) describe the many challenges of joint parental leave planning, suggest a design concept and present some early prototypes for CaseLine, a timeline/calendar based planning and overview tool to be shared between parents, and towards employers and public authorities (Figure 2).

The design concept supports the enabling of citizens to help themselves and each other in understanding, planning, and applying for parental leave funding through a timeline-design. CaseLine is designed to facilitate the communication and collaboration between citizens and municipal caseworkers, and ultimately also between the parents and e.g. their employers and unions. Simplified, CaseLine provides a timeline-based interface to parental leave plan objects. This supports and facilitates sharing and open exploration between parents, at the same time as it supports controlled sharing with the municipality, when parents allow access to their plan. In addition, the municipality can provide general plan elements on-line. These latter elements may be tailored by e.g. employers and unions, and used by parents as basis for their agreement with the municipality, or by each parent in their agreement with their employer. However, a shared timeline poses a number of concerns even among the parents: "*Do parents of a child wish to share with each other all information about their interaction with employers, and government? Even if this is the case, can such openness also be assumed if the parents are divorced, but share joint custody over the child? (...) Who gets to decide which information is shared? Should the consent of*

information sharing expire after a certain period of time, and how is this visualized?" - (Bohøj et al., 2010).

It is important for all parties to be explicitly aware of when a certain timeline gets shared, and when it is approved and hence binding. Such sharing of information only takes place when a formal application is generated. Indeed, both citizens as well as the municipality need to withhold information from each other, not sharing "everything". Consequently, the citizen needs to be able to make a clear distinction between exploring possibilities and sharing information with other stakeholders such as employers and the municipality.

CaseLine contains both an experimental 'sandbox' and a more formal part where the actual agreements are made visible. The formal part can be seen as a contract between parents and the municipality (and the employers). The parent's motive for using CaseLine is to get as much out of the parental leave as possible as the system helps them to experiment and learn about different parental leave configurations and their short-, and long-term effects.

CaseLine helps families manage and visualize shared time resources. It does so on a time-scale that may be a bit unusual to family calendars, but perhaps for this reason it helps challenge what shared family calendars are.
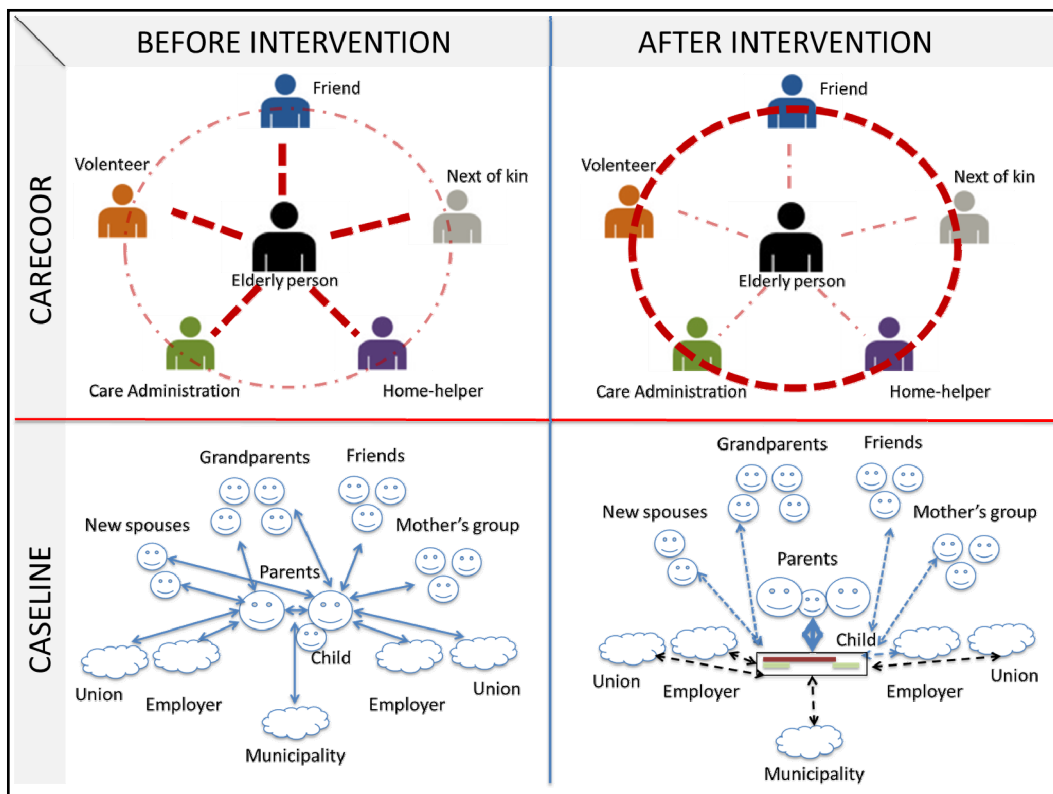

Figure 3. The two settings, the involved actors and their modus operandi before (left) and after (right) the implementation of the calendar-based, collaborative tools. In both cases there is a change of focus through which the complexity of the coordination is reduced.

In terms of the time coordination and calendars, this case has the following main challenges:

- Supporting both a 'sandbox'-mode and a formal contract mode.
- Sharing of plans with many parties supporting different granularities in time and personal information (sharing the time rhythm independent of personal information, or with only the personal information of one of the parents).
- Accommodating change and control over sharing over an extensive time period.

As with CareCoor, these are areas of different interests and potential conflict.

Through the implementation of CareCore and CaseLine, the nature of collaboration changed (see Figure 3). In CareCore, the focus shifted from care providers acting to a large degree in isolation, to an actively collaborating Care Network. In CaseLine, parental leave planning went from being parent-initiated communication to collaboration around the CaseLine tool. The two cases present the starting point for exploring (time) coordination within families and across to public offices, wider networks of professional and non-professional actors, etc.

Similarities and differences between the cases

On an overall level CareCoor is addressing the existing coordination needs between care-workers and next of kin in relation to an older adult's referred home care. CaseLine is addressing the parental leave pertaining to one child and the therefore needed collaboration between mainly the parents and the municipality.

The two cases directly target collaboration, negotiation and shared access between different primary and secondary actors, considering both the professional and amateur set of users (see Table 1).

Both cases are developed for their primary users, but support and benefit from when used also by the secondary users. While highly depending on the non-professional users, it is the primary professional user (i.e. the municipality) that controls, and has set up the rules and space for interaction.

	CareCoor	CaseLine
Primary professional users	Care workers	Municipal office
	Care workers' team leader	Employers of mother and father
Primary amateur users	Adult children to older adult	Parents
Secondary professional users	Municipality	Previous employers
	The general practitioner	
Secondary amateur users	Friends and neighbours	Grandparents
	Volunteers (from NGOs etc)	Mother's support group

Table 1. The different actors in the two cases.

The two cases bear resemblance in how they orchestrate private-public communication and collaboration (i.e. in our two cases primarily family-municipality communication and collaboration) and similarity with other (calendar-based) collaborative tools. However when further exploring the cases they present important differences that emphasize diverse aspects of collaboration and set them off from other work. In this section we will highlight and discuss some of these differences.

Caring or sharing goals

CareCoor and CaseLine distinguish themselves from the literature on family calendars on the one hand, and that of professional shared calendars on the other, in that they both bridge between one or more professional communities and amateurs, in particular the family, in addition to various forms of extended families, groups, friends, and NGOs. In both our cases the planning and coordination activity is triggered by, and centred on, a person being either a child or an older adult. The family-municipality collaboration and communication are the starting point, but is on neither side of the collaboration a simple and open relationship. Families are complicated as are municipal bureaucracies, and there is a tendency for each side to not fully understand the other. Additionally, other parties can participate in the collaboration as well (Table 1), further complicating the matter.

Membership in different groups (as in these cases e.g. the municipality workers group and the municipality-family group) is known to create tension (Mark and Poltrock, 2003), especially if different goals and collaborative systems exist within these groups and are not outspoken and shared. This is one of the places where families don't necessarily share a goal, being "we-in-the-world" to use Raeithel's term, with the municipality. This phenomenon is discussed for the parental leave situation in (Borchorst and Bødker, 2011) where suspicion, or lack of understanding of the goals of the municipal office, leads to a number of workarounds and information filtering strategies used by the citizens in their communication with the municipality.

Even if the set of actors is rather well defined in both cases, and both having the municipality and family members as part of the primary user set, a large variation exists in each actor's motivation, needs and temporal scope. CareCoor illustrates that even among the professional actors there are different interests and goals that are only to some extent related to the rationality and goals of the family members: For the care-workers, ease of communication with relatives and documentation are the main concerns. With CareCoor, the care-workers move from a synchronous telephone communication to a chat-based, asynchronous communication model that can easier be integrated into their individual work rhythms. For the team-leader managing the municipal care-workers is a matter of resource planning and quality-assurance through e.g. always updated care plans as these

can get automatically updated over the 3G network rather than manually carried out to each care receiver. For the municipality, the concern is to provide better and even-quality services, for better flexibility in the care situation and for sharing care responsibility with other parties. CaseLine provides further examples; while the parents like to get the most out of their parental leave, the municipality's role is to educate and make sure that regulation and rules are followed.

With family calendars in general and with our two examples here, it may make more sense to see the rationality as related to the caring of the particular child/children or an elderly relative, than to shared purposes, a contrast to e.g. (Neustaedter et al., 2009)'s calendars within families. This does not mean that the numerous practical tasks should be ignored, but rather that they are not pending on a shared motive. They often can and will be pendent on the caring-relation with the child or elderly being cared for. This relationship and its practical tasks can still function even if the actors see themselves without a common goal and motive, in a "me-and-the-others" relationship (Raeithel, 1992). Characteristic to such a relationship is exactly, according to Bardram (1998), that it is about coordination of routines, and not about sharing an understanding of motives, and in this type of case, insight into the lives of others. Indeed some of the professional actors in particular still act from a more classical, "Father's voice" rationality, emphasizing rules, etc.

The two cases explore a design axis where collaboration on one side takes place among equal peers with joint interests, whereas on the other side collaboration takes place among diverse actors with diverse interests and scope. Accordingly, in the situations we have analysed, there are three ways in which we are not dealing with calendars from the perspective of a common goal: That different rationalities are at stake, that the actors do not see themselves as being "we-in-the-world" and that they have different purposes or motives, even as seen from a more classical rationalism.

Time, granularity and rhythms

The essence of calendars is sharing of temporal plans and temporal rhythms. When describing the "we-and-the-others" perspective we emphasized that the sharing of these time rhythms is not a matter of an open sharing of 'everything'. We pointed out that it makes sense to look at the activities being coordinated through the shared calendar as scripted gatherings around an object, this being the care of an elderly or the parental leave regarding a particular child. The time rhythms are in both instances plans, i.e. they are resources for action (Bardram, 1998). They script the actions that go into the caring for the older adult, or the leave periods, which are also actions from this perspective. There are behind these shared rhythms many levels where the actors follow their own rhythms, as discussed below. The rhythms as such address the shifts: When is somebody with

the elderly, when not? What overall activities are being performed? Which parent is home with the child? When is he or she going back to work, and the child going off to day care? They provide overview and awareness, both of what is happening, and what is not.

The two cases work with different levels of time granularity. In CareCoor, both the care-workers and next-of-kin use the system ranging from some days or weeks up to years. The use of CareCoor is discontinued if the care-receiver moves (e.g. to a nursing home) or passes away. CaseLine is generally used in family-municipality collaboration for up to nine years. However, in both cases the amateur users (i.e. the family) only have to consider the own family and its situation, while the professional users (i.e. the municipality and its employees) tend to a large number of clients (i.e. older adults and parents on parental leave).

While CaseLine provides a tool for a family and the municipality to jointly project and plan activities some months into the future and even years, CareCoor works more on a day-to-day and week-to-week basis. What assistance an older adult will need in a year or even six months' time are in most circumstances considered irrelevant as no-one can foresee the future situation, while what help will be required in two days can be a main concern. The two systems' graphical representation mirror these diverse user needs. In CareCoor a matrix-based time representation is applied, where the detail-level is on activity and task level where one can navigate back and forth between different weeks and days. In CaseLine, time has been zoomed, or dragged, out to become a timeline that can be manipulated on a week, month and even year basis.

Another aspect of time-granularity can be observed in CareCoor where the care-workers did not like to communicate exact 'planned' time of arrival at an older adult's apartment to the relatives and other stakeholders but rather just 'morning', 'lunchtime', 'afternoon' etc. as they saw problems in giving away this precise information. The care-workers were concerned with making too specific promises in terms of time, and pushing their own work processes more than necessary. To the extent that the appointment involve other actors, such as volunteers or relatives, this perception of time points towards a general perspective on the side of the professional, that the time of these other actors, and not only the elderly, is worth less. It is, however, also a simple example of the kind of work that one group does to control the boundaries vis-à-vis other groups. And it simply reduces the complexity of what one group needs to know about the other. Obviously it is a specific challenge for each calendar design on such boundaries to identify what is needed and not needed in terms of granularity on the boundaries, as we discuss further below.

However, the timescale is not the only dimension of granularity. Neale et al. (2004) discuss work coupling and the granularity of dependencies and the amount of communication needed to complete a specific task. Our cases differ as CaseLine per se requires interaction, and hence has dependences with the

municipality seen from a family perspective. Homecare-work in Denmark is however not (yet) designed to rely on the involvement of next-of-kin, and even if often perceived as something positive, we have encountered examples where care-workers prefer less involvement of family members in the day-to-day care of an older adult.

Sharing across community boundaries

The shared, democratic approach to care made possible by CareCoor, where family members and others can assist in performing refereed care tasks can support the professional actors by for example enable a higher level of freedom in day-to-day reallocation of the care-workers in respect to emerging situations such as illness. Also, if tasks are shared and hence other actors than the homecare-workers can assist with referred tasks, this can give care-workers the time to provide other forms of support, e.g. having a cup of coffee and a chat with the older adult or preparing a meal together. The primary amateur user, the next-of-kin's, motive is mainly different forms of 'peace of mind'. This can be achieved for example through knowing that someone has been visiting one's older parent during the day, a better communication with care-workers and the possibility to help, or assist, meaningfully with the everyday care of their family member.

In CaseLine the municipal office and caseworkers represent the primary professional users, who get better control and overview of the parents' worktime and corresponding payments. A better control can help to secure law and rule compliance. This is independent of the citizens' willingness to share information (Borchorst and Bødker (2011)). However, the way in which the sandbox may be opened to a specific caseworker for a controlled time, as well as the notion of being able to share the plan/time line without fiscal and other information are examples of ways in which CaseLine supports sharing beyond the direct and open involvement of all parties.

It is evident that while the benefit or success of a particular parental leave plan is highly dependent on very specific details of e.g. ones individual's income, this kind of detail is rarely what anybody would like to share with acquaintances, whether these are in the same room or on-line. Still, sharing of experiences is happening extensively in mothers' groups and on Facebook and specialized webpages. Hence it is part of the idea to be able to share the plan with CaseLine, without personal details, for others to pick-up and use as part of a 'best practice' or for e.g. the municipality to be able to put certain recommended trajectories online. It is one of the still underexplored issues how these boundaries are drawn, and how information are controlled so that privacy is protected, and the information that is put online can be understood and used by others. With the divorce rate in e.g. Denmark, being tied to share with a spouse-turn-ex-spouse and his or her new family, detailed personal information provides similar

challenges of boundary control that touches upon complicated issues of privacy, and of understanding what other users see and don't see.

Over a period of time when the two systems are in use, a range of secondary users may interact with, and/or benefit from its presence. Among the professional users that directly access the systems, are the older adult's general practitioner (CareCoor) and parents' previous employers (CaseLine). Potential secondary amateur users in CareCoor are friends and neighbours to the older adult and volunteers from different NGOs' or other organizations that assist older adults in their home. Looking at parental leave, grandparents, friends to the parents and the 'mother group' can from time to time be involved in the use of CaseLine. In both cases, it can be observed that the secondary professional users have other functions, provide and require other information from the systems compared with the primary professional users. In order to provide a coherent system, it is important that they are involved in an effective manner when this is needed. The secondary amateur users, such as neighbours, NGO's and mothers' groups to a large extent share the primary amateur users' needs and requirements, such as peace of mind, communication and learning about the situation from the systems. While exceptions exist, like a very engaged neighbour to an older adult, the secondary actors' use of the systems is mostly more ephemeral compared with primary actors. Rogers et al. (2004) state that collaborative decision-making can be promoted through allowing stakeholder equal access to information. However, in our cases there are situations (e.g. in CaseLine where the parents are divorced or in CareCoor where the relationship between an adult child and older parent is not harmonic) where information filters, and different granularities should be applied. In such situations, the openness and closedness of information spaces become relevant system design elements to consider (Bannon and Bødker, 1997).

Drawing boundaries between places, activities, etc. is a way of reducing complexity (Star and Griesemer, 1989). In the beginning of the CareCoor project, most relatives wanted to have 'ALL' information more or less real time, but many of them later started to perceive problems in a constant 'information overload'. In the design process, this led to a discussion of different message types and levels of importance. There is a need for relatives to maintain their own lives even if they have to step in and take over parts of the care for their parents. Also, as the older adult gets frailer and in need of regular, more demanding care for example due to dementia, the closest relatives might live with much fear and need 'peace of mind'-support, for example to understand what is going on in the older adults home when they are not there (Christensen and Grönvall, 2011). In CaseLine, we observed that divorced parents may actually not want to know quite as much about what happens in the other home, they may prefer to rest assured that the child gets cared for when it is away, and it is indeed often part of the process of divorcing to draw such boundaries, based on a combination of trust and need-to-know-information. From both cases there was a wish for boundary control and

reduced complexity. As we move outside a strict group, such as two divorced families, collaboration among diverse companies or as in our two cases – family-municipality collaboration – the notion of 'the more information the better' is challenged by the respective collaborative entities and their need or will to sometimes restrict the information provided.

In our two cases the collaboration and coordination often involve external parties such as municipal workers of various kinds, other caregivers, employers, etc. with whom it is necessary and often straight forward to share some information elements, but not all. In the case of CaseLine it was for example discussed that ex-spouse's income is not something that one might want to share with one's own current employer, even if it is relevant to the couple's (and both employer's) joint planning of the parental leave. It is also an issue for the families what kind of information and how much they want to give to the municipal case-workers, because they are not certain how their own situation will be presented best to these case-workers. The approaches used by citizens essentially relate to whether they are able to define the constellation of collaborating actors and their respective motives and artifacts.

Depending on the situation at hand, the involved stakeholders, their former experiences and current needs, the use of the two systems will be dynamic and constantly developed, similar to the observations by Lee (2005). Indeed, the same system setup deployed within different family-municipality configurations will create different system use practices over time.

Framing our discussions in this paper as primarily family calendars, is indeed not telling the whole truth. We have pointed out that there is a need for a less naïve understanding of the family calendar as such. However, our cases work entirely with calendars that are *also* work calendars. We know from the past that there are many challenges pertaining to such calendars without the complexity of having to share content with amateurs/families. However, in this paper we have chosen to focus mainly on the challenges for work calendars that arise from their function on the boundaries between work and non-work.

Conclusion and outlook

In this paper we have used a number of perspectives and concepts coming out of computer supported cooperative *work* to address time coordination in, and with families. Our way to this has been *via* calendars on the boundaries between professionals, families and other amateur actors. Through this path we have come to a profound critique of many of the attempts to work with family calendars as such and the assumptions behind them: That modern family calendars, like classical groupware before them, are sometimes designed based on overly naïve assumptions regarding shared goals and common interests. We have even discussed how a different kind of rationality may be needed to understand these

situations and how *cutting off*, and having peace of mind, knowing that somebody else it caring, may be just as important as knowing what is happening for these kind of calendars.

With a revitalization of other concepts and assumptions from CSCW, we have discussed how time coordination and overview can be supported, in families and on the boundaries between families and other professional and amateur actors. We have illustrated how such calendars support, share and give access to rhythms of the diverse actors' core activities at a level of granularity that may vary, depending on the involved actors. Awareness to the overall situation is the essence of the two calendar-based systems and this overview is made meaningful for all actors without being dependent on the rhythms and routines of either actor. The development of shared access models is very much a matter of negotiation on the boundaries of various activities.

Looking beyond the two cases towards the many known calendar systems, for example Outlook, allows people to send an email containing a meeting proposal, but there is no way of learning if the other person is indeed available or not. For this, telephone calls, Doodle or other tools must be used. Accordingly, across calendar systems as we know them, we envision a calendar implementation that could be enhanced if it was possible to invite 'friends' to see, and make booking requests in, an online calendar. To be able to control the sharing of one's calendar with different people over time (share for a day, a week, etc.), and with different granularity (e.g. one person can see the whole calendar and the activities at hand while other external partners can just see availability-status (i.e. busy or free) on a particular day or week) could promote collaboration, with different partners and scope over time. Additionally, to allow people to discuss activities (proposed and accepted), e.g. as a chat connected to each calendar element would allow negotiations directly related to the specific activity.

Acknowledgments

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