I Love You, Let's Share Calendars: Calendar Sharing as Relationship Work

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ABSTRACT

While there has been substantial research into the use of online calendar systems (OCS) within organizations and families with children, no research focuses on adults without children. In our study, we focus on these OCS users' practices of calendar sharing as relationship work, the continually negotiated practice of managing friendships and intimacy. We conducted semi-structured interviews as part of a qualitative user study of Google Calendar users. We report the calendar sharing behaviors and strategies of our participants, who maintain multiple calendars for different purposes and with different users, communicating factual and emotional information through their calendar events. We contribute new knowledge by discussing four strategies derived from our participants' calendar sharing and relationship work activities.

Author Keywords
Calendars; intimacy; groupware; relationship work.

ACM Classification Keywords
H5.3. Information interfaces and presentation (e.g., HCI): Group and organization interfaces.

General Terms
Human Factors; Design.

INTRODUCTION
To date, user studies of online calendar systems (OCS) have focused primarily on the "calendar work" [25, 26] that occurs among members of an organization, or the "life scheduling" [13] that occurs when families with children coordinate their activities using a combination of OCS, paper calendars, and offline digital calendars. These two groups of calendar users have somewhat different scheduling practices and requirements that have been thoroughly explored [cf. 2, 5, 9, 13, 22, 23, 25, 26, 28, 32, 33].

Our user study examines calendar sharing activity in the context of adults who do not have children around whom they must coordinate their activities. These OCS users share calendars with a variety of people in their peer networks (e.g., coworkers, friends, significant others) and use their shared calendars to schedule a variety of events (e.g., professional meetings, vacations with family members, dinners with friends, fertility consultations with doctors). Relationships with members of peer networks are played out, in part, through the sharing of calendars.

As a result of the diversity of people who can view their calendars, as well as the spectrum of event types they enter into their shared calendars, it is not surprising that childless, adult OCS users engage in strategies of calendar use that are similar to those of organizational and familial OCS users [cf. 25, 34]. However, our research finds that calendar use can also be *relationship work,* a set of negotiated practices that foster, maintain, and sometimes damage friendships and feelings of intimacy.

OCS are exceptionally empowering for helping people address the age-old dilemma of staying in touch with others. OCS are powerful partly because they trade in time and intimacy development, which are both extremely valuable relationship work commodities. To use and share calendars for both work and personal lives, as many of our participants do, is to manage what is most important in life. To share calendars is to participate in activities that are much more complex than managing a binary tension between "public" and "private" information, or "personal" and "professional" information.

Taking this perspective as the basis for our work, we enhance the current understanding of OCS sharing behaviors by answering the following research question: *How does calendar sharing among OCS users accomplish relationship work?* For our qualitative user study, we interviewed users of Google Calendar, a freely-available OCS. Our findings contribute new knowledge to the study and design of OCS by describing a set of unique calendar sharing strategies derived from our participants' activities of calendar sharing as relationship work.

In this paper we first explore the HCI and CSCW literature on organizational and familial uses of calendar systems, as well as the psychology and sociology literature on relationship work. We continue with an explanation of our methods and results and conclude with a discussion of the findings that are relevant to OCS researchers and designers.

RELATED LITERATURE
In this section we first discuss the history of OCS studies and the general understanding of the different audiences for these systems. We continue with a discussion of how people generally perform relationship work and enact feelings of intimacy with one another, and close by considering how OCS users express emotions and preserve privacy with and through their shared calendars.

Brief Overview of OCS Studies
The earliest studies of organizational calendar use reflect both a general interest in the potential of OCS and the hazards of implementing such a system within an organization [cf. 18, 19]. OCS are considered communication devices when used among members of an organization [11, 14, 27], an observation that helped designers think about how to meet the challenges associated with transitioning managers, secretaries, and other professionals from paper calendars to OCS. Grudin [15] highlights differences in attitudes toward calendar use among users of different OCS, while [16, 21] examine the differences in meeting scheduling across a ten-year span and the usefulness of group scheduling tools, respectively, during the 1990s when OCS had become more prevalent.

Palen [25, 26] provides the most in-depth investigation of OCS adoption and use within a large organization, determining in part that OCS users perform *calendar work* and *interpersonal boundary management* activities to make coordination happen as smoothly as possible. Calendar work is a set of activities that includes temporal orientation, scheduling, tracking, reminding, note recording and archiving, and retrieval and recall [25]. Organizational OCS users perform these activities while also managing how others perceive them as a function of their calendar information. Calendar owners are aware of the impression that others could get by reviewing their calendars, and they attempt to manage those impressions while protecting the privacy of their information using interpersonal boundary management techniques: restricting and granting calendar access, practicing defensive scheduling techniques, writing cryptic event descriptions, omitting events entirely, and sharing calendars reciprocally with another person [cf. 9, 25, 26]. For example, "Meet with L" might actually be a reference to a tattoo removal appointment that only the calendar owner would understand.

Compared to organizational OCS users, family OCS users engage in relatively different calendaring practices [22]. Family members in charge of their families' calendars perform *life scheduling,* or the process of managing "personal, family, and professional schedules across settings and calendaring tools" [13]. For example, whereas organizational OCS users rely on their calendars for interpersonal coordination, families use OCS along with paper and digital calendars to maintain awareness of scheduled events and plans [cf. 13, 22, 35]. Also, family members do not tend to schedule each other through their calendars: They make plans using other means of communication and then track those plans on their family calendar [9, 13, 22].

The practice of life scheduling highlights another difference between organizational and family calendaring activity: the considerations of privacy and impression management that arise when using shared calendars. Family members are not concerned about the privacy of "personal" information because family calendars are meant to serve as awareness tools [22]. Issues related to calendar access, activity scheduling, and event descriptions are discussed openly among family members rather than negotiated through the calendar [9, 22]. Calendar event descriptions provide important contextual information to family members and are, therefore, quite important to record in accurate detail.

In summary, previous OCS research has focused on organizational and familial calendar users. However, there is another group of calendar users worth studying: childless, adult OCS users. These users rely on their shared calendars to help them schedule their lives and coordinate events with the entirety of their peer network: coworkers, friends, family members, and significant others. The events they schedule range from professional to highly personal, yet a variety of people might have access to those events through their shared calendars. Therefore, these acts of coordination and information sharing necessitate the performance of *relationship work*.

Relationship Work, Intimacy, and Emotional Self-Disclosure
Relationship work is a term used to describe the continually negotiated construction, maintenance, and dissolution of friendships [7], as well as the reciprocal sharing of information to achieve intimacy [6]. Fehr [12] provides a useful model of the process of making friends, a process of relationship work. People typically meet other people because they live or work in close proximity, or because someone else in their social network introduces them. Pairs of people forming a friendship undergo a mutual negotiation process whereby they decide whether they like each other and want to engage in reciprocal self-disclosure; these decisions will solidify budding friendships.

Friends must actively maintain their friendships to preserve their desired level of intimacy with others [29]. This maintenance activity is challenging because people's lives change in predictable and unpredictable ways. Hence, relationship work is a continually negotiated process, which allows friends to be responsive to these changes and which requires significant time and emotional commitment from both parties [36]. Intimate relationships are largely defined by the amount of self-disclosure in which two people engage, as well as the development of similar interests or tastes over time [12] and the responsiveness of each party to requests for communication [20].

When two people discuss personal rather than factual information, they commit to a level of self-disclosure that makes both of them more emotionally vulnerable. These acts of self-disclosure are important in intimate relationships because they promote the development and maintenance of intimacy more effectively than factual disclosures; emotional self-disclosures are recognized as the expression of needs that must be met [20]. It is this type of reciprocal self-disclosure that close friends and significant others engage in more often than acquaintances, casual friends, or even family members [30].

Enacting Intimacy, Emotion, and Privacy through OCS
Following [3], we define the term "emotion" not as an internally-constructed feeling but as an externally-observable product of interpersonal interaction. When people engage in discussion as a method for performing self-disclosing behavior, they are also expressing their emotions to one another. People often express emotion as a way to communicate specific emotional needs and request that those needs be met, but they do so in subtle ways [8].

OCS support this subtlety of expression because users can share their feelings through their event descriptions. These descriptions serve as a distribution channel for the direct expression of emotion, to borrow phrases from [4]. For example, the event description "Salary Review Meeting" has more overt emotional meaning than "meet with Dan." Clearly, OCS users need to be cautious about who can see each event description; given the emotionally sensitive information that shared calendars can convey, privacy of information is quite important. Furthermore, compared to organizational and familial OCS users, the practice of enacting privacy is made more challenging for childless, adult OCS users because they often share the same calendar with various members of their peer networks.

However, as with relationship work, privacy is a continuously enacted social practice [10] rather than a switch than can be turned on or off. As [17] point out, systems designed with interactional principles in mind enable users to manage their privacy concerns by letting them choose which information to share, and which information to keep to themselves. In the context of OCS, this allowance for information privacy occurs in a few ways. For example, users can author event descriptions carefully to avoid sharing sensitive information, or they can maintain multiple calendars to control the information they share with the members of their social networks.

We raise these points about relationship work, intimacy, emotion, and privacy with an eye toward our findings; we will return to these discussions of the enactment of emotion and privacy in the findings section shortly. First, however, we describe the methods we used to design our study.

STUDY METHODS
In this section we describe the specific OCS application we studied, provide an overview of our participants, and explain the methods we used to gather and analyze our data.

OCS Application
We chose to study Google Calendar users because this OCS is freely available and widely adopted. Calendar owners can grant others a variety of levels of access: Users can be allowed to make changes to another person's events or to the list of people who also share the same calendar, view events or event details, or view only free/busy information. Calendar owners can also create and manage multiple calendars, share them in different ways, and view all of their own calendars simultaneously with other people's shared calendars. The most active users of Google Calendar in our study had 15 or more calendars (including other people's calendars) visible at the same time.

Participants
The study took place in the Seattle area from May—August 2009, during which time interviews were conducted with 30 participants (20 women and 10 men). Participants were solicited through e-mail mailing lists associated with our university and snowball sampling was used to gather additional subjects; these sampling methods resulted in a slight imbalance in gender representation among our participants. The criteria for participation included using Google Calendar, sharing a calendar with at least 1 other person, accessing at least 1 other shared calendar, and being older than 18 years of age. Participants were not compensated and were informed of the voluntary nature of the study.

With regard to participant demographics, 18 participants self-identified as Caucasian, 8 self-identified as Asian, and 4 self-identified as multiple ethnicities; 28 participants were US citizens, while 2 were citizens of other countries. The participants ranged in age from 22 to 49 (mean: 31.5, median: 30, SD: 6.66). Thirteen of the participants were undergraduate or graduate university students, 13 participants held jobs in the technology industry, 3 participants were university professors, and 1 participant managed a non-profit organization. Nearly half (14 of 30) participants reported their relationship status as "single, never married," while the rest were either married (14 of 30) or engaged in domestic partnerships (2 of 30). We did not collect demographic data for participants' significant others, friends, and family members with whom participants shared their calendars.

Methods and Data Collection
The research team interviewed each participant once, either in person or over the phone, using a standard semi-structured interview protocol. The questions focused on usage practices with regard to the calendars that participants controlled and shared with others and that were shared with them (e.g., "Have you ever added an event because of who

would see it?"). While the protocol ensured all interviews would include a standard set of questions, interviewers were encouraged to ask follow-up questions and probe for greater detail and unexpected insights when possible. All interviews lasted between 16 and 79 minutes (mean: 44, median: 44, SD: 17.37) depending on the number of calendars and intensity of usage. The interviews were recorded and transcribed, and all participant names were replaced with pseudonyms.

We applied a grounded theory approach to analyzing the interviews. In order to develop initial themes describing the data, the research team performed a closed coding pass through the data using a standard codebook developed from the interview protocol. Next, to ensure commonality of interpretation across coders, all team members coded the same 5 interviews using the same codebook and discussed the results. Finally, after writing memos based on the closed codes, the team performed an open coding pass that was focused on locating instances of relationship work and intimacy, and then wrote memos based on those new codes.

In the following sections, we first consider the specific calendar sharing and usage characteristics of our participants. We then discuss how our data diverge from previously reported research on shared calendar use, as well as describe design implications that result from our study.

FINDINGS

We begin this section with an overview of participants' typical Google Calendar usage. Our 30 participants share 88 different calendars (mean: 2.93, median: 2, SD: 2.69); the following list describes the types of people with whom participants share their calendars:

- 73% (22 of 30) share with a significant other,

- 33% (10 of 30) share with a friend,

- 27% (8 of 30) share with a coworker,

- 23% (7 of 30) share with a family member (e.g., mother, father, sister),

- 17% (5 of 30) share with groups of associates (e.g., exercise partners, student group members).

In the sections that follow, we discuss examples drawn from our data that illustrate typical behaviors of our participants. We first examine why the majority of our participants maintain multiple shared calendars. We then examine how some participants rely on emotionally meaningful context when they author and interpret event descriptions. We conclude by describing how participants negotiate shared activities with significant others and with friends, and why certain participants maintain shared calendars with friends who no longer live close enough to see one another on a regular basis.

Distributing Relationship Work across Multiple Calendars

We observed that most participants (20 of 30) partition information across multiple shared calendars; participants shared anywhere from 2 to 13 different calendars. A minority of participants (10 of 30) maintain only one shared calendar; in all cases, these calendars are shared **only** with significant others.

Of the 20 participants who maintain multiple calendars, the typical participant has an unshared calendar containing only tasks or "to-do" information, a calendar shared only with a significant other that lists the entirety of their events in their lives together, and at least one other calendar shared with multiple people that lists a subset of their events. It is these latter calendars that participants share with people outside of their romantic relationships.

For example, Linda and Nathan are a young married couple without children. They each have personal calendars as well as other calendars that they maintain and share. Linda maintains a calendar within which she schedules personal events (e.g., having dinner with a friend) and professional commitments (e.g. taking a professional development class). She shares this calendar only with her husband so they can coordinate their time together. As with other married couples, this calendar is a useful tool for both partners to maintain awareness of their schedules, and a cue to perform specific tasks required of significant others (e.g., making dinner or going to a friend's wedding).

Our participants maintain multiple calendars in order to keep specific people informed about selected areas of their lives rather than opening up their entire lives to scrutiny. Continuing the previous example, Linda is a runner; in addition to the calendar she shares only with her husband, she also maintains a separate calendar that she shares with several running partners. This calendar includes only information about her training regime, which her running partners use to help them train as well, and does not list any of her personal events, such as doctor visits.

Similarly, Harriet maintains a calendar that only her husband can view, as well as work and travel calendars that all of her professional colleagues can read. Through her shared calendar with her husband, she lists every event in her life, even the most sensitive events (e.g., a coffee date with a potential new hire at her office). When updating her work and travel calendars, Harriet avoids including the "personal stuff."

"in terms of what the entire public is seeing, they just see I'm out of the office as opposed to 'get my haircut.'"

Harriet does not include events such as these on her work and travel calendars, which primarily include social events that involve a number of people (e.g., a dinner party with several colleagues) or work-related trips (e.g., a trip to a professional development conference).

Finally, the vast majority of our participants (26 of 30) feel that masking event details and simply saying "busy" is too impersonal, or that setting an event to be described only as "busy" suggests a level of secrecy that could annoy or confuse the people with whom they share their calendar. Linda sums up the general sentiment about how others might perceive "busy" as an event description.

"'Busy,'" I just think, seems suspect. It just seems sort of rude, too."

Events marked as "busy" stand out in calendars with otherwise viewable event details; those "busy" events seem special and exclusive in a way that can harm the perceived level of intimacy between the calendar owner and the people with whom he or she shares that calendar. Fehr [12] cites genuineness as a strong indicator of intimacy within a friendship, and the use of "busy" within a shared calendar clearly damages the perception that feelings of intimacy in a given relationship are genuine.

By maintaining separate calendars, our participants are able to keep specific people informed about certain aspects of their lives rather than opening up their entire lives to scrutiny. As these examples demonstrate, our participants set expectations for their relationships with the people in their peer networks who can view their shared calendars; making only a workout schedule visible, for example, indicates that other types of social engagements beyond those scheduled through the shared calendar are not necessarily desired. In addition, maintaining multiple calendars is a way to avoid making all events visible and describing a subset of those events as "busy."

Negotiating and Maintaining Romantic Relationships and Friendships Using Shared Calendars
In this section we explore a particular facet of calendar sharing as relationship work: the strategies of our participants to maintain or enrich relationships with significant others and with friends. We posit that the use of shared calendars can help people maintain certain levels of intimacy in their romantic relationships and friendships; additionally, the desire to preserve awareness of a friend's activities is sometimes the only reason why friends reciprocally share personal calendars.

Availability, probability of future interaction, frequency of exposure, and responsiveness are four of the most crucial aspects that determine whether two people will become more intimate with one another [12]. Our participants use their shared calendars to negotiate all of these situational hurdles: They use them to determine the availability of others, see how long or how often they can meet with another person (possibly by setting up a recurring meeting), and invite people to a specific event with the expectation that they will receive a reply. They also use the shared calendars of friends and significant others to sustain exposure to their personal lives when spending time together in person is not possible.

When two people commit to a friendship or romantic relationship, they must find time to "hang out" with one another in order to make those relationships last. Being invited to hang out enriches feelings of intimacy because that time is reserved for that relationship alone. However, our participants find it challenging to carve out time for their friends and even their significant others, so they rely on their shared calendars to schedule time together.

Negotiating Shared Activities with Significant Others
Our participants sometimes negotiate shared activities through their significant others' calendars without discussing the details in person first. They use shared calendars in this way in order to accomplish relationship work by scheduling events that are often necessary in the lives of partners engaged in romantic relationships (e.g., fertility planning, meal preparation, and household chores). In so doing, they want to minimize the stress associated with coordinating two busy lives by scheduling events for both partners when necessary.

However, this scheduling technique can cause conflict; Tiffany describes how she argued with her fiancé about scheduling overlapping events.

"We had this argument and…it ended up that I already made plans during this week. And that was the week that he had this…workshop thing that he had to go to. So I got really mad and I'm like, 'You didn't tell me.' He said, 'You didn't look at my calendar.' And I was like, 'I don't look two months ahead.' So we had this argument about it."

To resolve these scheduling conflicts, participants sometimes discuss their plans verbally after noticing the problematic calendar events, and then decide which event will take precedence or whether a specific event can be moved to alleviate the conflict. Other participants who anticipate the potential for conflict use certain event settings (e.g., indicating that an event is "tentative") or special codes within the event descriptions they write (e.g., a question mark to indicate a suggested destination for a meal). They use these settings and codes to indicate that the events they are negotiating through their shared calendars require discussion before they can be considered "scheduled."

For example, Laura uses a special code when planning events with her boyfriend. When she started sharing her personal calendar with him, Laura would enter events and her boyfriend would get upset because he felt obligated to attend every event. After some discussion, Laura developed a new, mutually-agreeable tactic for indicating potential events: She includes a question mark in the description of a calendar event that will require in-person negotiation before any obligations are set. Using this strategy, Laura balances her need for shared time with her boyfriend with his need for a suitable amount of control over his schedule.

We consider this use of shared calendars as a site for the negotiation of shared activities as an example of our

participants' stated desire to maintain their feelings of intimacy with the people to whom they feel closest: their significant others. They want to keep their relationships vital, and they look to their calendars as a way to manage the chaos of two different schedules that often provide little in the way of overlapping time.

Negotiating Shared Activities with Friends
Friends who have established emotional bonds with one another also want to keep their relationships vital over time. These bonds are formed by spending time together and by mutually sharing personal information [12]. Our participants cite this desire to spend time with their friends as a primary motivator for sharing and accessing online calendars. They often discuss their interest in coordinating schedules not because of any particular life scheduling necessity (e.g., picking up children from school, working on a project), but because they want to stay close to their friends. Their behavior is driven by their desire to hang out with friends so they can maintain their existing friendships or build stronger feelings of intimacy. The events they schedule with one another often have no agenda: They simply exist to let two friends share a few precious hours together.

For example, our participants tell us that their calendars allow their friends to see what they are up to and whether they are available to see each other soon given their busy schedules. Michael uses his friend's calendar to find time when the two of them can get together for a beer after work.

"This was during one of [our] three-week long attempts to find a date when we could get together for a beer. And toward the end of that process he said that he was just getting online with Google Calendar and he would share it with me and that would be easier."

Friends also rely on their calendars to identify and schedule times to engage in specific activities together. Kevin uses the gaps between events in his friend's calendar to judge when they will be mutually available to play an online game together. For Kevin, these structured times to play games with a friend enable him to stay as close to that friend as he can given his busy schedule.

Having a beer or getting dinner together is a good example of two friends wanting to hang out together in a social situation that grants them unstructured time to simply relax. Therefore, it is a particularly poignant juxtaposition when close friends must resort to an online scheduling tool in order to hang out. Yet our busy participants indicate that relaxation with friends is a special event that must be scheduled, or else it will not happen. They understand that more time spent together leads to stronger feelings of friendship and intimacy.

Staying Connected to Friends' Lives
Shared calendars provide exposure to another person's life even when spending time together face to face is not

possible. While shared calendar access can serve as a way to schedule time together or provide talking points for conversations, staying connected to a friend's activities in order to maintain intimacy is sometimes the only reason why our participants reciprocally share personal calendars.

For example, Louise describes shared calendars as diaries that she and her friends use to know what they have been doing lately. She reciprocally shares calendars with one friend specifically because their calendars enable them to keep in touch and up to date on the activities in their lives.

"It's nice to see, like, 'Oh you've been working on your house,' or, 'you've been away in-' he travels, a lot, a lot, a lot, and so I can tell when he's in China or India, or he's in wherever he is."

Louise told us that she goes back and adds certain things that she did just so this friend can see what she has been doing. Similarly, when Julio returned to the US after living in Japan, he and his friend (who remained in Japan) began sharing their personal calendars not to schedule time to chat, but because they wanted their friendship to persist. As with Louise, Julio uses his friend's calendar as a diary of his activities.

"Randomly, out of curiosity…I scroll [through] his events when I want to know if there's something happening that I've missed."

As [12] points out, people understand that the probability of future interaction impacts the level of intimacy that two people feel for one another. Our participants sometimes share calendars with friends who they rarely, if ever, see in person because they consider the intimacy of those friendships worth preserving. In Julio's case, he has no coordinative reason to share calendars. Instead, he reads his friend's calendar to see what he has missed since he moved: a clear example of his desire to maintain a certain level of connection with that friend.

Exploring the Emotional Meaning of Shared Calendars
The event descriptions that OCS users write can serve as expressions of emotion, rather than purely factual communication. The richness of emotion that can be interpreted depends on the social relationships of the participants. Close friends and significant others who have enough shared history with a calendar owner can interpret event descriptions as emotionally meaningful, a level of interpretation that other calendar users who lack the contextual knowledge might not be able to achieve. Some of our participants told us that they interpret event descriptions that appear purely coordinative or factual as emotionally meaningful in order to provide emotional support. We consider this behavior the performance of relationship work to enhance or maintain intimacy.

The shared calendars of close friends and significant others are valuable because they provide the opportunity to read and interpret the emotional states and well-being of the

people who matter most in their lives. For example, Harriet told us that she reviews her husband's events to determine whether he will be upset when he comes home that evening.

"now I use [my husband's calendar] somewhat as an awareness thing…just sort of understanding like how stressed out he is going to be or if he needs help with something or whatever."

Others who share the same calendar might not have the depth of contextual knowledge necessary to make the same assessment judging solely by an apparently factual event description (e.g., "Meeting with Paul").

Similarly, Roger describes feeling concerned about his friend after noticing a number of dental appointments on his shared personal calendar.

"my Canadian friend went to the dentist a lot for a while. And I was like 'wow, you've gone to the dentist a lot, what's going on?' and he was telling me about some dental thing that was happening with him."

Roger contacted his friend specifically to see if he was feeling alright, an action that indicates Roger's desire to provide emotional support. It is also worth noting that Roger was geographically removed from his "Canadian" friend, so he used his friend's shared calendar to infer the potential need for support.

Shared calendars are a site for emotional self-disclosure of information partly because event descriptions are a site for expressing emotion, and because calendar events can have the sensitivity of a diary entry [31]. Unlike a diary, however, shared calendars reflect what has happened in the recent past and *what will be happening* in the near future. When viewed as a whole and with the proper contextual knowledge, the set of events in a person's calendar can be a barometer of that person's emotional state and provide friends with cues as to when concern or other types of emotional support may be warranted.

DISCUSSION

In this paper, we have described a number of calendar sharing practices and goals in the context of our participants. Although they perform a combination of calendar work and life scheduling activities reflective of the activities identified by previous research, they also engage in practices that form a set of unique strategies for calendar sharing as relationship work. In this section we describe four strategies of calendar sharing that differentiate our participants' OCS usage from that of organizational and familial OCS users, and consider the broader implications of those strategies with regard to OCS design and use.

Maintaining Multiple Calendars as a Privacy Practice

We observed the majority of our participants *maintaining multiple calendars as a way to control how much knowledge different individuals or groups have of their activities*. By sharing multiple, purpose-built calendars with specific organizing principles and users with access, they can set and manage expectations for their interactions with others and accomplish the relationship work necessary to manage their desired levels of interpersonal intimacy.

This relationship management strategy differs from the calendar work and life scheduling techniques of organizational and familial OCS users, respectively, for a simple reason: Organization and family members are essentially constrained to using only one calendar as the primary shared calendar they update and access. Families with children typically use a "main" or "primary" family calendar supplemented by "secondary calendars" that are not used as the central calendar for coordination [22]. Organizational calendaring usually occurs through one shared calendar to which other members of the organization have access [25]. For these OCS users, issues of event visibility play out through the calendars, necessitating calendar work and interpersonal boundary management techniques to avoid causing interpersonal conflict [25, 26].

We observed that our participants did not actively manage their calendar settings; instead, they might adjust the settings for a specific calendar once and never check those settings again. During our interviews they often had to be shown how to access the settings menu. As a result, even when maintaining multiple calendars as their practice for managing the privacy of their information, several participants still allowed the "wrong" people to see their calendars and events.

Clearly, these participants would appreciate an easier way to control who can see the details of their shared calendars. Although maintaining multiple calendars is the most popular mechanism of control in our study, this strategy can be quite inefficient given that some participants did not want their calendars to be entirely mutually exclusive. What participants really wanted was a provision for different and flexibly controlled views of their events without the overhead of entering items into separate calendars. This could be a productive area for design attention; at a minimum, an alternative to the "busy" event description would be a positive step toward reducing the management issues associated with maintaining multiple calendars.

Ultimately, OCS designers can strike a better balance between the task of managing calendar access and the fact that although users choose not to perform this task regularly, they still need to remain aware of who can access their calendars and events.

Coordinating Life through Shared Calendars

The second strategy is to *use shared calendars to maintain and enhance relationships by maneuvering to spend time together*. Many of our participants in romantic relationships describe their attempts to coordinate their lives **through** their shared calendars. This finding diverges from the familial OCS use reported by [22], who observed that their participants **did not** coordinate through their family

calendars. Because familial OCS users need to maintain awareness of family members' plans and locations, they discuss those plans first and use the shared family calendar to broadcast their decisions. By contrast, our participants often use their shared calendars to broadcast their plans and to suggest events to their significant others that require extra discussion before a decision can be made.

These attempts at maneuvering to spend time together stem from the fact that partners in romantic relationships often do things as a couple, creating a requirement for shared time [12]. By contrast, organizational OCS users' requirement for shared time stems from their need to accomplish work tasks collaboratively. Their performance of scheduling as calendar work is an attempt to balance the "constraints and priorities" [25] related to their organizational roles and responsibilities.

We know that our participants maneuver to spend time together in a number of different ways, and using their own systems of nomenclature to do so. However, we believe the most interesting aspect of this strategy is, as several participants described, the use of shared calendars to know when **not** to schedule activities with their significant others. They want to appear available to their partners by leaving gaps in their schedules that align with the gaps in their partners' schedules. This behavior, motivated by the requirement for shared time between significant others, reflects another dimension of the rich emotional behavior that plays out through shared calendars.

As with meeting the emotional needs of others, however, current OCS do not support this behavior effectively enough. In the same way that privacy is not a toggle between binary states, a person's schedule is not simply a distinction between "available" and "busy." When our participants structure their time through their shared calendars, there are times when they are potentially **more or less** available than a simple gap in the schedule might indicate.

Stated differently, not all gaps are created equal: A calendar opening at 6 PM on a Friday is quite different from an opening at 5 AM on a Tuesday. For some couples, a 5 AM jog would be a welcome mutual activity; for others, 5 AM is bedtime. It is up to the partners within the relationship to make ad hoc decisions about availability in order to satisfy their desire to spend time together. While we are not specifically advocating various "shades" of availability within OCS, we do think there is an opportunity here to explore how OCS design could better support this sort of ad hoc maneuvering to spend time together, particularly with regard to OCS users who do not know enough personal details about their colleagues' lives to distinguish which times are more "free" than others.

Sharing Calendars to Prolong Friendships

The third strategy is to *use the calendar to stay in touch with friends*. When friends are unable to spend time together in person, they start or continue sharing calendars as a demonstration of their interest in maintaining their mutual feelings of intimacy. They enact this behavior by browsing friends' calendars to see what they have been up to, and in return they keep the details of their lives documented in their own shared calendars.

This behavior differs sharply from that of organizational OCS users: Although employees at a company sometimes "browse" their colleagues' calendars, they are assumed to have a specifically coordinative reason in mind, such as determining mutual availability for a meeting [24]. They are not skimming other people's calendars to learn more about their personal lives [26]. Similarly, it seems logical that family members would browse the family calendar for primarily coordinative, life scheduling purposes. Families with children use their calendars to see when everyone might be available for a specific outing, for example, or to determine what events each person is committed to over a specific weekend. In short, neither of these groups of OCS users are sharing calendars as a strategy for maintaining mutual feelings of intimacy.

Some of our participants obviously enjoy adding detail to their past events specifically so others could access that information and reminisce about their relationship. OCS can do much more to support the addition of richer, more socially connected information within events. Our participants use their shared calendars to remember what they have done with others, to stimulate new conversations, and to stay connected if only in a small way. Finally, the length of time that OCS preserve past events is of tremendous importance to these participants; they would enjoy being able to travel several months or years back in time so they could see the same events again and again. Given these uses of OCS, we believe the design challenge at hand is to figure out how to support richer conversation and discussion through the interface of the shared calendar.

Meeting Emotional Needs Using Event Descriptions

The fourth and final strategy that emerged from our data is that participants *use the calendars of others to derive or anticipate the need for emotional support or understanding*. Specifically, a few of our participants told us they regard event descriptions, and even the amounts of free and busy time visible in shared calendars, as valuable barometers of emotional needs. This practice of OCS use stems from who has access to shared calendars, and what sorts of information are presented in those calendars.

Familial OCS users need to maintain awareness of their communal activities across all family members. One way they maintain this awareness is by associating "extra information" [22] with their calendars, such as maps, contact information, and additional schedules. This extra information must include clear, actionable details to facilitate the desired level of awareness. Organizational OCS users also attach extra information to their meeting

requests, such as project schedules or links to relevant information. For these OCS users, this extra information is purely factual: Maps help family members find the location of an event, for example. It seems unlikely that familial and organizational OCS users would read emotional meaning into this extra information.

A few of our participants chose to extract a different kind of extra information from shared calendar events. These participants rely on their shared history with friends and significant others to understand certain factual information contained in their calendars as emotionally meaningful, and they decide when to act on that information as a way of maintaining intimacy by making contact and providing emotional support. Finally, because this relationship work is occurring through shared calendars, our participants can consider each event in the broader context of all events and determine whether emotional support is necessary.

At this point we recall the distinction between informational and interactional design that [3, 17] make in the context of affective computing systems. In the process of interacting with one another using their shared calendars, our participants decide to request or provide emotional support, which can occur through or outside of the calendar. This activity resembles the affective loop experiences of [17], in which the dialogue with a friend and a system blurs together. The fact that OCS might enable such experiences is a positive yet underexplored attribute of these systems. Given that currently, the onus is on calendar viewers to discern the need for emotional support, a question for future research and development concerns whether, OCS should provide explicit support for the sharing of emotional information with others.

CONCLUSION
Our study has a number of limitations that we hope to address in future studies of the same topic. As an exploratory study, our sampling method resulted in a somewhat homogeneous set of participants with regard to gender, cultural background, and socioeconomic status; we recognize, however, that these characteristics play an important role in technology practices [1] and hope that future studies will include more diverse participants. Future studies could also explore how relationships and calendar sharing activities co-evolve over time, and could include more details about the networks of friends with whom people stay in touch using their calendars.

The strategies outlined here describe how our participants accomplish relationship work using their shared calendars. They perform some activities that are similar to organizational and familial OCS users, but as their motivation for performing those tasks is fundamentally different, their calendaring behavior is also different. In addition to coordinating their own lives and schedules, our participants accomplish a great deal of relationship work with, through, and around shared calendars.

For example, our participants arrange and set reminders for events, invite others to those events, and recall the details of events that have already taken place. They conduct these activities in the service of maintaining or enhancing their relationships and levels of intimacy with members of their peer networks: friends, family members, and significant others, any of whom may have access to one or more of their calendars. The challenge that OCS users such as our participants face, then, is to perform the relationship work required to maintain and enhance their relationships and different levels of intimacy with others who use their calendars, all while avoiding the disclosure of information perceived as negative, insulting, incriminating, and so on.

By studying the calendar sharing practices of adult OCS users, we begin to understand calendaring activities as a type of relationship work. The freely-available OCS we studied supports additional practices beyond calendar work and life scheduling, practices that illuminate the relationship work that occurs when people share calendars. We believe our participants' performance of relationship work using their shared calendars suggests a reframing of OCS as a type of social media. Doing so would open up a larger design space that more accurately reflects the rich and nuanced activities already taking place with, through, and around online calendar systems.

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