An Open, Social Microcalendar for the Enterprise: Timely?

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ABSTRACT

We present the system design and rational for a novel social microcalendar called Timely. Our system has been inspired by previous research on calendaring and popular social network applications, in particular microblogging. Timely provides an open, social space for enterprise users to share their events, socialize, and discover what else is going on in their network and beyond. A detailed analysis of the events shared by users during the site's first 47 days reveals that users willingly share their time commitments despite an existing culture of restricted calendars.

Author Keywords

Social software, electronic calendars, GCS, microcalendar.

ACM Classification Keywords

H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

General Terms

Experimentation, Human Factors, Design.

INTRODUCTION

The Social Web has changed the way we share and interact with content on the Internet today. It has moved content such as photos, videos, and bookmarks, which previously sat on users' desktop machines onto sites such as flickr.com, youtube.com, and del.icio.us. Users and their social networks are able to socialize around the content they have uploaded to these sites; and discover interesting content uploaded by others. The chunks of data being shared on the Social Web have begun decreasing in size as well, from page-length blog entries to 140-character microblog status updates. We use the new paradigms offered by the Social Web to revisit decades of research on calendaring.

Electronic calendars first became available to enterprise users in the early 1980s, typically as a feature of office tools

[12,16]. Although users saw their potential benefits in helping to minimize the time spent scheduling meetings, they were not well adopted for the next ten years. Reasons included the lack of usability compared to paper calendars [16], and poorly networked organizations. This changed dramatically in the 1990s when calendars become a well adopted key office technology by the end of the millennium [12, 21].

Since then, electronic calendars have become more integrated into enterprise and personal information systems, more accessible through mobile devices [8], smarter [18] and more interoperable through standards. However, the basic concepts have remained more or less the same. While the electronic calendar is a reliable personal time management tool that helps with scheduling, reminding, tracking time and temporal orientation [20, 21], it has been mostly used as a static, closed repository of events. With a few exceptions (e.g., SUN nurtured a corporate culture with open access to calendar information [12]), access to electronic calendars is often closed or restricted, e.g., in Lotus Notes within IBM users can only see the blocked time of coworkers without any details, unless they are given explicit access.

Interestingly, early calendar research has described the value of open access models [11]. This includes finding the location and availability of a person, discovering relevant and interesting meetings, understanding the degree to which a meeting is open to interruption and rescheduling, or even learning how the company functions. Moreover, awareness of others' activities within the enterprise allows one to get to know one's colleagues better on a professional and personal basis [2] and provides opportunities for social interactions around upcoming and past events.

The research in this paper describes the system design and early lessons learned from a 6-week trial of a novel online microcalendaring system called *Timely*. The Timely design addresses a number of calendaring opportunities mentioned earlier, such as open access, social interaction, and discoverability, and combines them with a person-centric sharing model. We call Timely a *microcalendar* because its design and interaction model have been inspired by popular microblogging sites like Twitter. Our system aims to complement existing calendars, not replace them. Hence, we did not replicate traditional calendar functionality, but

instead sought to provide an outlet for enterprise users to broadcast their own time commitments, socialize around these, and discover the events of coworkers.

A major challenge for our project was the fact that IBM has been using traditional desktop calendaring systems for over 20 years: would the employees be willing to share their calendar events with each other after having been exposed to a restricted access model for such a long time? On the other hand, our company also has been using social software, including social network applications, for more than a decade now, i.e. employees openly share other types of content such as photos, bookmarks, blogs etc. An initial look at an internal social network site revealed a wealth of time-based information in the Twitter-like status messages posted. While most of the time-based information was in reference to what users were doing "now" (i.e. "in a meeting for the next hour"), we were encouraged by these initial findings and suspected that employees would also be willing to share future plans and events. Hence, we deployed Timely in IBM to better understand how social microcalendaring supports enterprise users. This paper focuses on the system design and describes the first 47 days of usage, including what types of events employees were willing to share. Our research goal was to understand people's willingness and motivations to share calendar data.

The paper is structured as follows: We first review existing work related to calendaring and enterprise social software. We then describe our design and the rationale behind our decisions. Using data gathered during the site's first 47 days, we describe how people used the system and provide a detailed analysis of the content shared. We conclude with a discussion of design implications for subsequent versions of Timely and directions for future research.

RELATED WORK

Groupware Calendaring Systems: Early research on electronic calendaring focused mostly on Groupware Calendaring Systems (GCSs) for personal and group time management. PCAL and MPCAL were early command-line systems developed and evaluated at MIT [9]. They provided role-based read access to calendars for other users. Kincaid et al. [16] surveyed office workers on their use of electronic and paper calendars and found that the use of paper calendars still prevailed. They offered user interface and interaction suggestions on how to improve electronic calendars. Grudin and Palen [12] examined the successful adoption of group calendars at Microsoft and SUN. They compared studies of failures in the 80's with the later success of GCSs in SUN and Microsoft. They describe socio-technical factors that led to predominantly bottom-up adoption. This work also illustrates different access models to calendar information: open versus restricted. Grudin [11] describes a case study of calendar use addressing access and transparency in a GCS and their benefits. He also describes the online calendar as "a massive organizational self-logging system that has great potential as a source of

[..] knowledge and learning." This statement touches upon what Ehrlich [4] calls the "dual needs" of retrieving calendar information: personal for oneself but also making it available to others. Palen [20, 21] further explored the personal-social duality of calendars. Her ethnographic work investigates group calendaring at SUN where open calendaring systems facilitated the understanding of the use of calendars for both personal work and social coordination. Her work illustrates that calendars can go beyond scheduling meetings and also function as distributed information and communication systems.

Family Calendaring: During the last decade, calendaring research has focused much on family calendars, calendar use at home, and the intersection of work and family. Family calendars are different than work calendars in that they are more a group calendar, rather than a personal calendar, with a primary scheduler maintaining it. Its main purpose is public awareness and coordination based on the shared information. Neustaedter et al. [19] argue that moving from paper to digital made coordination at the workplace easier; whereas for families, it is the opposite, because sharing a digital calendar in a public space as an awareness calendar is difficult. Grimes and Brush [10] studied 15 working parents looking at how they manage their personal and professional schedules. Their work shows how personal scheduling blends into work scheduling and vice versa and the tension that arises from the role as a parent and employee.

Enterprise social software: There is a large body of research on the use of social software in the enterprise. Several studies on blogging in the enterprise show how blogging aids collaboration and communication, community building and information discovery [3, 14, 15]. Millen et al. [17] demonstrate that social bookmarking is often done out of personal motivation but adds community value and solves an enterprise information discovery problem. Hasan et al [13] discuss benefits and adoption issues of Wikis in corporations. A larger body of work on a system called Beehive, a social network site for the enterprise [1, 5, 6, 7, 22], covers understanding user motivations, use of new social content types, the impact on social capital, and the use of recommender and incentive systems. More recently, microblogging has successfully made an appearance in enterprises. Zhang et al. [24] describe adoption patterns, general use, and the value of a microblogging system in a medium size enterprise. Yammer, the microblogging system used, has also recently incorporated user-created events into the update stream.

Calendaring on the Social Web. Outside the enterprise, the Social Web has recently produced a number of innovations that are related to our work. For example, doodle.com is a social meeting scheduling system which makes scheduling transparent to all participants. Tungle.me is similar but goes beyond by offering tight calendar integration and also a profile page on which users can

selectively publish calendar entries. Google Calendar is a popular online calendar whose access control and multi-calendar overlay features are beyond what standard desktop calendars offer today. Tungle.me has just recently published an online manifesto titled "The Calendar of the Future, [23]" featuring video clips of thought leaders in the space covering transparency, mobile access, and semantic relationships. There are also a number of web sites that support event sharing and discovery, such as Facebook, going.com or upcoming.yahoo.com. These sites are focused on leveraging social networks to help users in finding something to do and meeting like-minded people. Events on these sites typically involve a group of people rather than a single individual, and in the case of going.com and upcoming.yahoo.com are typically "official" events, comprised of concerts, festivals, sports, arts etc. Closest to our system is Plancast, a site that allows sharing and socializing around upcoming plans.

TIMELY SYSTEM DESIGN

The Timely design was driven by the desire to push the limits of existing calendars – in particular the value propositions of open-access calendars in earlier research [11, 10] – and leverage the success of the Social Web, which has changed the way we interact and share content on the Internet today. Microblogging in particular influenced our design because of the time-ordered nature of short posts and network-based discovery of these. In essence, Timely users can broadcast events by posting them to their event stream. Other users who are subscribed to this user will receive these events on their homepage event stream.

We did not seek to replace existing calendar functionality in IBM but rather complement it. As such we avoided re-implementing traditional calendar features. The existing corporate calendar, Lotus Notes, is a desktop client. While that system supports some extensibility, we felt that working in that application directly would limit our ability to reinvent calendars and also constrain the general availability of our system. Hence, we decided to build a separate web-based application. Figures 1 and 2 show screenshots of Timely, which we will illustrate as we describe our design guides.

Open Access

While the potential benefits of open calendars have been previously documented by researchers [10, 11], many enterprise calendaring systems still restrict access to a person's calendar, including IBM's internal deployment of Lotus Notes. While Lotus Notes can be configured for open access, IT departments often restrict visibility by default. Typically, others can only see "busy" blocks of time, with the ability to give another user direct access to your entire calendar. Many calendar systems position access control at the level of the calendar, which makes it awkward if one wanted to quickly share one event but not another within

the same calendar. Access to individual events on one's calendar can only be accomplished by adding individuals as participants to a scheduled meeting. The need for finer-grained sharing of calendar events has been highlighted by Grimes and Brush [10] as a socially more acceptable way for combining work and family calendars.

In order to overcome these limitations, we wanted to provide access control at the individual event level. Further, our research goal was to understand people's willingness and motivations to share calendar data. Therefore, we designed Timely to support only two levels of access control: public (default) and private, and chose to position Timely as the place employees go to broadcast their time-based data to others. Public events are visible to everyone on the site. Private events you have created appear in your event stream, but others following you will not see them. This strategy was also aligned with our research goal because we first wanted to understand people's willingness to openly share events. A finer-grained model would have made it more difficult to weed out the differences between private and public. However, this approach had its own risks. Firstly, the all-or-nothing access control was likely to deter people who would be willing to share information with only a selective group of people. Secondly, the existing restrictive calendaring culture was not conducive to people's willingness to share time-based events [12]. However, we did conceive a future access control model based on social networks which we were ready to put in place if needed, and will likely be supported in future Timely versions.

Discoverability

Our design takes the open access inspired by early calendar research a step further by layering in discoverability features common on the Social Web today. While some early calendars like Calendar Manager [11] supported open access, users explicitly had to specify a user whose calendar they would like to "browse" by providing a hostname and user name. Since you have to know who you want to browse beforehand, it makes serendipitous discovery of relevant events difficult. Going from one calendar to another also quickly becomes a tedious, manual "data mining" activity.

Our design was mostly inspired by microblogging sites whose time-ordered stream of text messages lends itself naturally to time-based events. However, instead of using recency as ordering principle, we use the time the event is taking place. Combined with a following model in which you can subscribe to users whose events you are interested in (just like Twitter), a user's home page on Timely shows all upcoming and past events of their social network at one glance (see Figure 1A). Similar to Twitter, we also show your own events along with your network's events, i.e. at any time, a user can see how their time relates to the temporal order of events of their social network (a user's events are color-coded in orange to be easily identifiable in
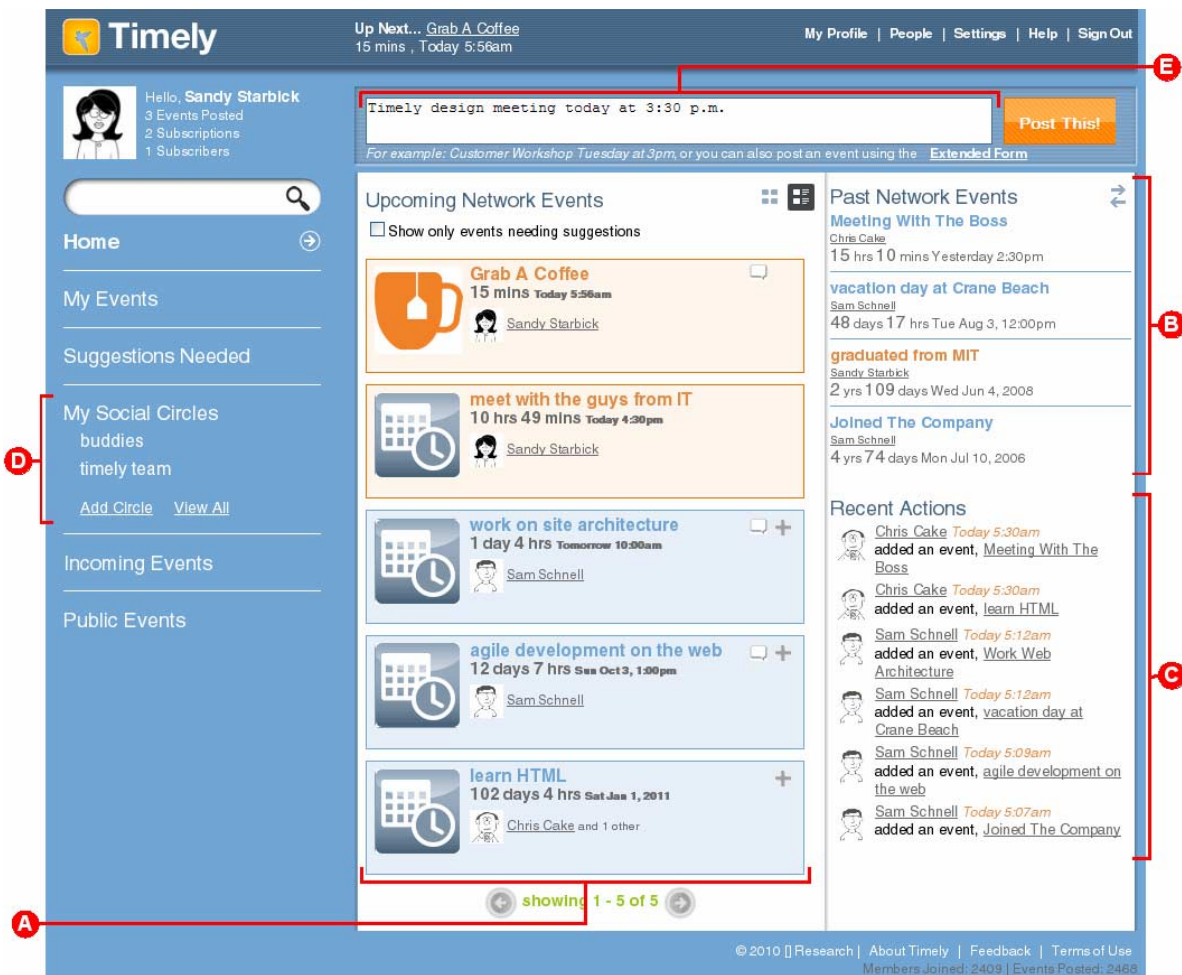
Figure 1. The Timely Home Page showing what's coming up in your network of subscribed users.

the event stream). While the left hand column consists of upcoming events, the right hand column (Figure 1B) consists of a condensed view of events that have recently taken place, with the most recent events at the top. We felt that showing the past side-by-side with the future might serve as an immediate reminder to users of recent activity. In addition, recent actions done by those you subscribe to on the site, e.g. commenting, creating events etc. are also shown at the bottom of the right column (C). This way, users can, for example, discover events that might be happening in the far future but were created recently.

We chose an asymmetric subscription model like Twitter instead of a reciprocated friendship model like Facebook so that users could follow others who posted events they found interesting, without there being a requirement that the other user is equally interested in his/her events, thereby reducing the cost of event discoverability. Given that the number of subscriptions can grow quickly, we felt that it would be important to provide a mechanism to filter events by a subset of users. "Social circles" (Figure 1D) are lists of users, similar to lists in Twitter. One can create social circles of users and filter events by them by clicking on that

circle name. Additional ways to discover events are public events (from everyone inside IBM), incoming events (someone notified you about an event), or search.

A site with public event sharing has numerous opportunities for making personalized recommendations for discovery. We anticipated that in addition to browsing list views of events, users might spend much of their time viewing individual events. Hence, we decided to add related event recommendations to individual event pages (Figure 2A). Events having textual overlap between their tags, titles and descriptions are considered related. For example, Figure 2 shows an event that has been tagged with "design" and a similar event called "Design Seminar" is listed as related. Social tagging also opens opportunities for future browsing capabilities, such as tag clouds or lists of trending tags.

Social Interaction

Traditional calendars offer little to support social interactions except for the built-in scheduling mechanisms. Built on email messaging, they support some social coordination. Calendar Manager with its public access went beyond that by being a distributed information system that

supports coordination [21]. However, communication about events typically happens outside the calendar which often becomes the static repository to track those events. Openly sharing events and making them discoverable offers opportunities for communication within or even outside of one's network. In order to support this, similar to other social media sites, Timely provides a page for each event, that captures all the social interaction around it by allowing users to leave comments (Figure 2B). On this page, users can also leverage existing communication channels, such as Twitter or IBM's internal microblogging system (LC) by posting to these services, with references back to the event. Moreover, a user can notify others of an event on the site whether he created it or merely found it and knows others who may be interested (Figure 2C).
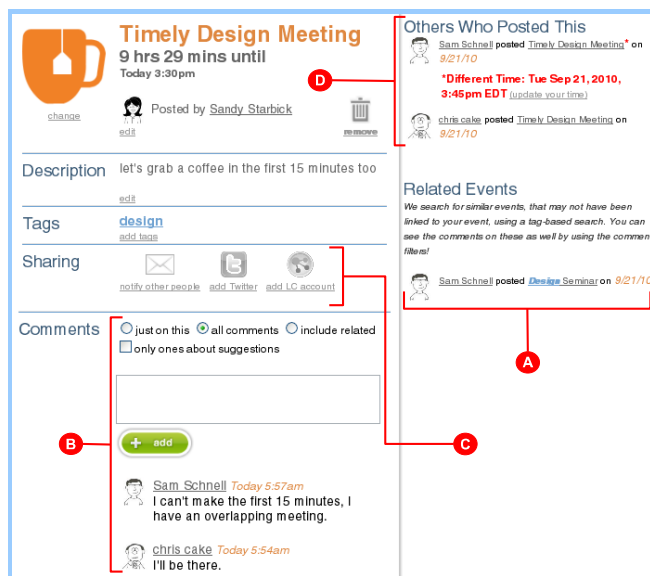

Figure 2. Details of an individual event page.

Natural Event Entry

Entering events into traditional calendar applications often feels heavy-weight because of the form-based input with numerous fields. To address this, our design allows users to post time-based status updates from any page in a single update box rather than requiring the user to fill out a detailed form (Figure 1E). We use natural language processing (NLP) capabilities of the Java library JChronic to extract the time/date portion from the entered text. For example, "Timely Design meeting today at 3:30 p.m." gets parsed to an event named "Timely design meeting" occurring that day at 3:30 pm. If the parsing is successful, the site redirects to the page created for this event (Figure 2). However, if the date parsing fails, or if the user needs to create an event with additional information such as description or thumbnail image, the system offers form-based input as a fallback mechanism. Similarly, Timely allows users to import microblog updates they posted (both internally and externally) that contain date/time information detected by NLP as events.

User-Centric Event Sharing

Event sharing requires the ability to associate multiple people with an event. Typically this is supported through the notion of participants or attendance on a single event instance. While this group-centric model supports sharing and aggregating information such as comments and involved people very well, it is not conducive to managing personal time commitments. For example, in the group-centric model, if the "owner" deletes it, the event instance would be removed from other people's calendars.

Timely is designed with a user-centric model, in which users post their own time commitments, e.g., a conference event he/she is going to. If another user wishes to associate herself with this event, she can then simply press a button to post it to her own event stream. This action is similar to retweeting a status message on Twitter. The date/time and name of the event are copied, and a loose linkage is maintained between the events in the database which allows us to display them together, aggregate comments across those events, and synchronize events if required. This also allows users to keep the same event while maintaining their own time preferences for that event, thus attempting to blend personal and social time management.

In Figure 2D, the "Others who posted this" section shows all those who have posted this event to their own stream. It also shows that Sam Schnell, who added the Timely design meeting event has changed the time to be 3:45 p.m. instead of 3:30 p.m. today. In the comment section he explains he'll be late because of an overlapping meeting. Everyone who looks at this event's page (or any additional posts of it) will see that Sam's event is listed as occurring at a different time, while Sam can still use this to manage and accurately broadcast his own time commitments.

DATA COLLECTION

We deployed Timely on the IBM Intranet and collected data over a period of 47 days, from July 27, 2010 to September 10, 2010. During this time, 2,395 registered Timely members created 2,206 events with a total of 254 comments. Timely was launched to a small group of 50 people in our department and in associated divisions. Through Timely's subscription model, built-in invitation messages, and word of mouth, the site grew to 2,395 registered users within the first 47 days as shown in Figure 3. An initial jump in members and events was followed by constant linear growth, with steps indicating weekends of lower activity. Users are from 62 different departments, reside in 57 different countries, 19% are people managers, and the majority (97%) were not from the research division. Content created by our team was removed from the data set.

A second source of data was semi-structured interviews with eight users of the site, selected based on their activity on the site. They were not affiliated with our project nor part of our group. Two members of the team conducted these interviews over the phone (7) and in person (1). The

interviews were relatively short and covered very general aspects of the site with a focus on open access. A third source of information was postings, comments and feedback from a public discussion forum and bug database used to support our internal deployment.
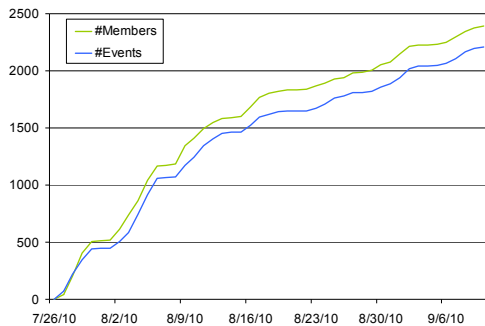

Figure 3: Cumulative number of members and events.

RESULTS

Our analysis of the Timely dataset addresses general usage of the system structured by the three major design principles: open access and sharing, discoverability, and social interaction. We were particularly surprised by how willingly employees shared information about their plans and whereabouts, typically only found in a personal calendar. Inspired, we conducted a detailed content analysis to better understand the types of events shared.

Content Type	Total	% of Users	Avg / Median Per Active User
Events	2,206	32.9% (788)	2.8 / 2
Comments	254	4% (97)	2.62 / 1
Subscriptions	11,664	77.5%(1,854)	6.29 / 3
Social Circles	274	8.4% (200)	1.37 / 1

Table 1. Timely content types created during the study period.

General Usage

Sharing Events

One of Timely's major design principles is open access. The system was designed for users to be able to publicly broadcast events. Our data suggests that users embraced this. About a third of the users posted events with an average of 2.8 events per person for those who posted (see Table 1). Event creation was among the top 5 activities on the site (Figure 4) and 98.8% of all events on the site were public. Note that the default setting was public and users had to explicitly check off a box if they wanted to make something private. The detailed content analysis following later, reveals that the types of events resemble what one would typically find on a calendar, i.e. users did not only share "official", already-public events but also personal content.
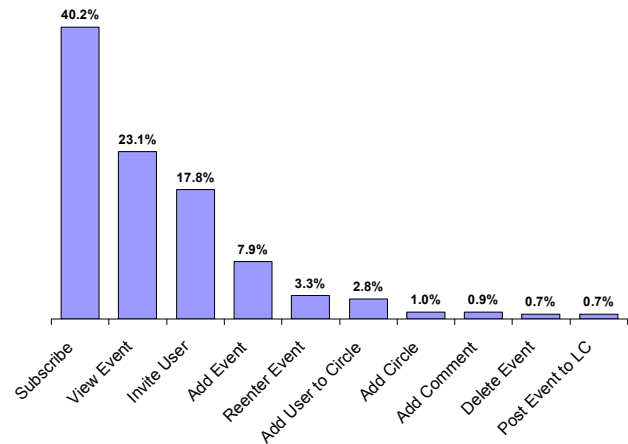

Figure 4. Top 10 actions on Timely of all logged activities.

Interview data illustrates different sharing attitudes, with a user on one end of the spectrum saying she would only publicly share 5% of the events from her restricted, desktop calendar, while a user on the other end said he would share up to 80% of his events. The rest of those interviewed fell into the range between them, willing to share around 30%. From some of the more "conservative" sharers, we heard that it wasn't necessarily because others should not know about events taking place, though that was mentioned at least once: *"the project manager wouldn't be thrilled, don't want random people on project calls."* Instead, they said they would not share a higher percentage of events in their personal calendar because they simply didn't think others would find them valuable: *"me doing my day to day job... not much value for other people"* and *"regular group meetings I wouldn't share because everyone knows."* One user said, about sharing the events he didn't think others would find valuable: *"If it wasn't extra work for me to manage it, [sharing's] not a big deal. No benefit for me to do even two seconds of extra work to get that in [Timely]. If there's no extra work [added automatically], I probably wouldn't go delete them."* But for those events he did think others would find valuable: *"even if it takes 15 seconds, if it benefits even 1 person, it's worth the 15 seconds."* Every user mentioned the need to sometimes share events with a broader audience: *"will use it when going to a client, people in my environment can provide me more input or value to help me,"* *"[for things] I want to advertise or want other people to know about,"* *"I say, 'here's an event, it's kinda cool, I can't go to it, but I'll share it.'"* Two users spoke specifically of this being a way for others to learn more about them through their events: *"where my usage would go in the long run: the external face of my activity that I want people to know of"* & *"I think of events in [Timely] as tags of what [I'm] socially and professionally associated with."*

Of the 2,206 events created, 36.5% (806) were created using the form-based input, 24.0% (530) were created as a part of prompting users during the signup process, 21.1%

(465) came from the free-form text entry box at the top of the page, 15.6% events (345) resulted from users "re-posting" events that others had previously added, and 2.7% (60) were imported from time-based microblog updates from internal and external services during signup .

While we had hoped to save our users the cumbersome process of filling out a form, it was used almost twice as often as the free-form text entry box in practice. However, this may not have been their first choice. As described in the system description, we also forwarded users to the form-based input page if there was a problem parsing their input from the free-form text box. Approximately 52% of events created through the form-based input page were immediately preceded by a recorded parsing-error from the free-form text box by that user. In those cases, the user was likely reentering the same event he had tried to enter in the simplified way. We also heard from users during our trial that the parsing technology led to frustration. In interviews, entering dates was described as *"tricky"* and requiring a *"learning curve,"* while one user went as far as saying that it *"was a barrier for me to want to share more events."*

Discovering Events

Our second major design principle was discoverability and in order to support this, we designed and implemented a following model similar to popular microblogging sites. Figure 4 shows that the most popular activity on the site was subscribing to other users: 40.2% of all logged activities were subscription actions and 77.5% of all users during the study period had one or more subscriptions with an average of 6.29 among those with one or more (Table 1). 8.4% of our users also created social circles with 1.37 on average; with valid circles having an average of 4.59 users.

Subscribing to others and creating lists enabled users to discover relevant content. Our data shows that discovery was another major activity of our users (see Figure 4: 23.1% of all activities were view actions). Of these views, 60% came from users looking at the pages of their own events, and 40% came from looking at other users' events. We further looked into where users had discovered other people's events. We were not able to determine which, if any, Timely page a user came from when viewing an event 35.5% of the time. In the remaining cases, 40.1% users discovered other peoples' events from their home page, 26.2% navigated to events from the page for public events, 25.2% of users came from another event page (from a re-posting of the event or through related events), 5.7% came from another user's list of events, and 2.9% came from a social circle page.

In interviews, users often spoke of the value of discovery: *"Good that people all over the world see the event."* In particular, for reaching out beyond one's network: *"That's the power of such a tool, other people subscribe, you get information from people you don't know. People I know, I can contact them."* And described engaging in such

discovery themselves: *"When I want to take a break from the day to day and look for something interesting outside my normal sphere of what's going on"* and *"When I go to [the site] I'm looking at - Are there events I didn't know about that I would be interested in joining?"* They also emphasized that broadcasting, with subsequent discovery by others, felt less formal than other methods of informing people about events. One user said, *"Stuff I think deserves attention to wider public. Where a calendar invite would be overkill,"* while another said, *"It is a good way of putting something out there, But not bother them. [...] If they have an extra 10-15 minutes, they can discover it. Seems like an unobtrusive way to give them the information."*

Socializing Around Events

Our design emphasizes social interaction through comments and the interview data was supportive of the value of this kind of interactions around events. While many of those interviewed said they wanted to share events that others would find valuable, some went even further, saying that they explicitly shared events hoping for a dialogue with others: *"If someone sees me having a meeting internally about [...] a specific project, and somebody thinks '[....]I can contribute and help [John] better prepare or share some ideas' that's the value I think [sharing] brings. So, basically, conversation starters."* Another user interviewed went as far as saying that he viewed it as a success that his event was able to generate conversation: *"I had some people comment on this. It worked. [Jane Smith] said 'This is cool, it's the first I've heard of it.'"* Another stated that while he did not experience this kind of interaction, he would use the system more if it did happen: *"If I go to a client, can anybody help me with this? Then I would use it."*

We did find anecdotal evidence of conversations in which people followed up on events posted on Timely, e.g. asking for details, or connecting to users who they had not known before. In one such case, a user found out about someone else going to the same conference and both connected on the site, planning to see each other at the conference. However, overall the commenting activity on our site seemed relatively low at 0.9% of all actions with only 4% of all users leaving comments.

Content Analysis

In order to find out what kind of event content our users were sharing publicly on Timely, we manually categorized 1,271 randomly selected public events of the 2,206 total events on the site. Two researchers did a level-setting session with 100 of these events, then independently coded the rest. Cases of disagreement were later discussed and reconciled. We were not able to code roughly 9% (114) of the selected events because of lack of information in the title and description, or they clearly were test data only. This schema gave us 1,157 categorized events. We used an open coding scheme to determine the type of activity it

represented. In addition we also coded each event as work-related versus personal, and group versus individual.

The work dimension was based on whether the event was related to a *work activity* or whether it was *personal* in nature. Previous research has found that employees readily share personal information such as "outside activities through status messages" or "personal life through photos" [1]; one enterprise social networking site found that only 29.7% of lists shared were categorized as "work-related" [6]. Events classified as work included team meetings, customer presentations, technical conferences, etc, for example: "UI Team Daily Call." The work category also included social events taking part through the work context, such as "IBM picnic nashoba valley." Events categorized as personal included vacations, plans involving family members, sporting events, etc, for example: "Help my son move in at NC State." Events with no obvious or explicitly stated business tie (such as "Italy", likely a personal vacation) were categorized as personal.

The individual/group dimension related to whether the event involved only the user who created it or included social participation of other people. Today, the majority of social networking tools which support event sharing (such as Facebook externally or enterprise-based Beehive [2]) typically focus on large-scale events with multiple participants, such as parties, concerts, etc. Similarly, we hypothesized that many of the events in employees' traditional calendaring tools involved other people as well, such as meetings. We wanted to get a sense for whether events shared on our system included those that were more individual in nature. The group category included any event where it was obvious other people would be taking part with the creator, such team dinners and conferences, as well as one-on-one meetings. An example of an event labeled as group was "web 2.0 expo NY." Individual events were those that involved personal tasks/deadlines, personal milestones/anniversaries, or other events where the inclusion of other people was not stated or implied. An example of an individual event was "I Joined IBM"

The final dimension was the overall type of activity the event represented. We created 13 categories through an

Activity Type	Work		Personal		Total
	Group	Individual	Group	Individual	
Todo - Piece of work was described as finished or worked on at a particular time, ex:"Take Evan To Soccer Camp" and "Catching Up Emails And Prepping For Presentation"	.5%	8.4%	.3%	.8%	9.9%
Presentation- One or multiple presenters presenting to an audience ex: "Two Customer presentations in Vienna" and "[...] Demo To CIO"	9.3%	.1%	-	-	9.4%
Meeting - Multiple parties meeting without a clearly designated presenter, ex: "Icrc Call With Labs" and "Ks Team Meeting"	33.0%	-	-	-	33.0%
Education – Time designated for learning/training: ex: "North America Technical Professional Management Training"	4.3%	.2%	-	.1%	4.6%
Customer – Involved work being done for customers or meeting with customers ex: "[Customer name] Project Status" and "Customer Workshop in Brussels"	25.2%	1.7%	-	-	27.0%
Food – An event which involved food or drink ex: "[…] Executive Breakfast The Ivy Sydney" and "Tea"	2.3%	.1%	.3%	.7%	3.5%
Anniversary/Milestone – Marked moment in personal history (such as birthday or work anniversary, e.g. "End of Internship") or company/project (e.g. "[Company]'s Centennial")	.3%	11.8%	.3%	.6%	13.0%
Conference – Event with many attendees and multiple presentations, typically over multiple days, ex: "Espoo Finland For Academics" and "[Company] Partner Summit"	15.8%	-	.1%	-	15.9%
Leisure – A "fun" event, including movies, sports, concerts, etc ex: "Paintball" and "[Second Life] DJ at Fireflys" and "Shakespeare On The Common"	1.1%	-	2.5%	2.8%	6.4%
Vacation – Time taken off from work, ex: "Vacation South Bethany Beach Delaware Usa"	-	-	.2%	5.0%	5.2%
Holiday – Typical observed holidays (e.x. "Ramadan"), but also including certain days marked as having a certain purpose/theme (e.x: "InspireTuesday")	.1%	-	-	.3%	.4%
Family – Events with family members or home life, ex: "Taking Son #2 To Driver Test"	-	-	.6%	.2%	.8%
Location –User designated a physical location where they would be at a given time, ex: "work from home," and "Going To Croatian Seaside" and "flight to columbia, sc"	11.9%	1.4%	.7%	5.8%	19.8%
Total	62.5%	21.1%	2.7%	13.7%	

Table 2. Distribution of 1,157 events by categories. Note: events could fall into multiple activity types (ex: food and family)

open coding process. Events were not restricted to fall into a single category in this dimension. Table 2 shows these categories and distribution of events.

Of the events shared, 83.6% (967) were categorized as work-related, while 16.4% (190) were categorized as personal, showing a clear preference of Timely users to share events around work happenings. The majority of the work events shared involved a group of people (74.8%), while the majority of personal events were individual in nature (83.7%). The overall breakdown of group versus individual events shared was 65.2% (754) and 34.8% (403), respectively.

The two most common types of activity shared were meetings (33%) and events having to do with customers (27%). The large number of customer events shared could point to Timely serving a particular value or need of a certain population, specifically, customer-facing employees such as sales people. Two users interviewed who worked in Sales described how they were particularly interested in broadcasting their customer meetings in case other employees could help them with their clients.

In addition, events where a user designated a particular location made up 20% of the total shared. This is not surprising given the recent rise in popularity of mobile sites for location-based sharing such as Foursquare or Gowalla. Designating a location as part of a time-based status update in Timely is similar, with the addition of having the ability to tell others about where you previously were during given time periods or where you will be at future times. Previous research on the benefits of open calendaring pointed to the ability to find others when needed [11]. Thus, these location-based time updates could potentially prove very valuable to a user's social network or colleagues in Timely.

DISCUSSION

We learned from the first 47 days of Timely usage that two of our design principles, open access / broadcasting and the discoverability of events, were appreciated by users. Despite an existing corporate culture of restricted calendar access, employees readily shared a wide variety of events that are typically hidden in their private calendars. A major activity of our users was browsing other users' events, filtered by their network of subscriptions, and public events on the site.

Usage data also illuminated some problems we will need to address in the near future. For example, the average number of shared events per user is relatively low. A closer look at the activity patterns during the 47 days of usage shows that for users who joined during the first half of the study period, 74% create all their events within 24 hours, with no other events created for the remainder of the study. We believe a few reasons contributed to this high attrition. First, users had difficulties with the natural language event entry as described earlier. While the system worked well in our tests, we did not anticipate all possible ways in which

dates could be entered, including country and time-zone specific formats. Users had to fall back in 50% of all cases to the form-based input which led to early frustration with the system. Second, we heard in interviews and our discussion forum that the number one barrier for users is to retype events that they already have in their corporate calendar. Interviews also revealed users are not willing to publish 100% of the events in their personal calendars on Timely. However, an easy way to broadcast existing events to Timely through calendar integration seems to be crucial for sustained usage. Deeper integration into Lotus Notes could be accomplished through a side bar plugin that renders Timely events and allows users to easily publish events to Timely, e.g. through drag and drop mechanisms or context menus on individual calendar entries. Moreover, Timely itself could support sending events to Lotus Notes through iCalendar email messages.

The discussion forum brought up another issue with our design. We originally thought that the idea of "retweeting" / posting an existing event to your own event stream would be an easy to understand gesture because of its consistency with the broadcast nature of microblogging. However, some of our users struggled with the notion of zero semantics for adding an event from someone else. Users would often ask how they can attend an event or rsvp, or indicate what their intention was when they "post" an existing event to their stream. While much of this might be terminology, it illustrates that users have a preconceived concept of an event and how to interact with one. While existing calendars do support richer semantics, they often fail when it comes to events that are visible to other users. Grimes and Brush [10] highlight that putting family events in an open work calendar can lead to peer judgment, although users often add these events only to keep track of but not necessarily attend them. In this case, traditional calendars also fail to provide affordances to indicate the level of commitment to an event. We are currently hoping that an informal, unstructured way of expressing your level of commitment, such as by selecting from default options (e.g. "attending") plus allowing users to provide their own textual descriptions (e.g. "Just want to remember") could address this issue.

The majority of events shared on the system (65.2%) were group-like in nature, involving more than merely the creator of the event. The nature of social software frequently leads to a long tail in contributions. It seems event-sharing in particular may be able to benefit from individuals sharing information about what they are doing in conjunction with others in order to populate the profiles/data of those who do not contribute themselves. This will also bring up potential privacy concern questions and sharing etiquette issues, as our ideas of what it is acceptable to share may be different and will have to be reconciled when I choose to share something we are doing together. This is especially important given the additional discoverability, sharing, and broadcasting features in this Social Web environment.

CONCLUSION

We see two major contributions of our research. First, the design and rationale for a novel social enterprise microcalendaring system that allows employees to broadcast events .and discover the events of their coworkers. Second, the empirical validation of some of the design principles that guided our system. Timely's usage during the first 47 days deployed inside IBM suggests that open access sharing of work and personal events seems to be embraced and valued by employees despite an existing culture of restricted calendars. We are currently working on some of the shortcomings of our design such as lack of integration with existing calendaring tools and inferior natural language parsing of dates. As our research of this system progresses, we will have opportunities for longitudinal studies .of adoption, and the impact and benefit of event awareness.

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