Consensus-driven event-scheduling

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ABSTRACT
Following a generative study, a gap was identified between professional meeting-scheduling programs and informal group coordination using open-channel communication tools. An application for smartphones was thus designed to provide an informal and synchronous way to schedule events. The application answers an additional need expressed in the study: the application should enable negotiation. A consensus-building process was thus embedded in the application workflow, to achieve agreement on scheduling decision beyond simple majority. The application further allows users to define positively their attitude toward negotiation, to speed up scheduling. The application is built as a service on top of an existing Instant Messaging platform. A small-scale field evaluation was carried, showing positive adoption, even in limit cases, such as rendezvousing and 2-person groups.

Author Keywords
Social group coordination; meeting scheduling; negotiation, consensus building; instant messaging.

ACM Classification Keywords
H.5.3 Group and Organisation Interfaces: Computer-supported cooperative work.

INTRODUCTION
Scheduling an event is a necessity of modern life: Frantic lives in both professional and private spheres almost forbid spontaneous gathering. Tellingly, a study concluded that 51% percents of text messages are directed to social coordination [1]. Event scheduling implies making a decision on its time and place for a group. Provided that the highest attendance is to be achieved, the complexity of this decision grows with the number of participants. It is no wonder computer scientists tried to assist this process. However, the task remains challenging to this day, even with the help of technology.

Further, groups do not necessarily have a single decision-maker. Oftentimes in non-hierarchical groups, the decision-markers are not even clearly identified. Scenarios with multiple decision-makers add an additional layer of complexity to event scheduling: the process becomes a 2-step collaboration, first to disclose availabilities, then to take a decision.

This complexity is especially visible for peer groups, where every member is (potentially) a decision-maker. In particular, friends organising a gathering are exposed to a decisional process without having defined roles, usually. Additionally, intuitive social thinking and rational approaches often take part in this process in conflicting ways.

We are interested in improving event-scheduling in peer groups, by developing a tool which focuses on collaborative aspects. We believe that decision-making in this case should not be reduced to an automated maximisation of availabilities. Rather, the tool centres the decision process on its *raison d'être:* a group activity. The tool facilitates cooperation between participants and helps them reach an agreement. The tool further applies proven principles of consensus building, to widen the agreement's support in the group. The agreement reached is thus more likely to be successful.

Last, our tool improves event-scheduling by quickening its decision-making using two strategies. Answer-postponement strategies are explicitly addressed in our workflow to minimise their consequences. Further, the tool is implemented as a service on an already-existing Instant Messaging (IM) platform. The tool benefits from the expectation of immediacy inherent to this medium — this expectation being reinforced by the ubiquity of smartphones.

RELATED WORK
Our review for this project is divided in three subsections: research in event scheduling, existing scheduling systems and instant messaging.

Research in Event Scheduling
Early attempts proposed a full automation of this process using electronic calendars, simply compared to find a common period of availability [2]. Researchers in Computer-Supported Cooperative Work (CSCW) soon exposed the weaknesses of this approach [3]: it requires all members of the group to commit to maintain their

electronic calendar, even if they do not see any benefit in doing so. Additionally, the users reject the system as it appears to carry scheduling on their remaining free time, without their approval. Researchers concluded that a balance between the goals of task automatisation and cooperative decision-making has to be struck, but can only be found empirically [4].

If research in meeting-scheduling system is as old as CSCW itself, it is still an on-going effort [5-8]. More generally, creating successful tools for collaboration is hard: cooperative work includes strong social dynamics, which are difficult to represent in software applications, and likely to undermine their adoption [9]. In particular, calendar-based approaches raise concern over privacy, since they require disclosure of one's schedule. They also fail at capturing the fine-grained preferences of the users [10].

Existing Scheduling Systems

In 2015, a user can be exposed in the course of a day to several event scheduling tools, each responding partially to those issues. In the professional sphere, IBM Notes (a software platform for business collaboration) caters for all preferences by distinguishing required and optional invitees, and giving them "the choice of accepting it, declining it, delegating it to another person, proposing a new time, accepting or declining tentatively, or requesting more information about the meeting" [11]. Microsoft Outlook, a personal information manager, softens the automated calendar approach, or its semantics, by including a "Scheduling Assistant" which displays "Suggested Times" for the meeting [12].

Outside the professional sphere, activity-specific applications, such as TeamSnap, a "mobile app for coaches, managers, parents and organizers" dedicated to sport team management [13], embed schedule coordination among other services. Last, Doodle, a web-based meeting coordinator [14], addresses privacy concerns by letting the users indicate manually whether they are available on days chosen by the poll administrator. This voluntary approach allows users to modulate availability disclosure according to their interest in the event, but also opens the door to manipulations, to orient the decision-making process towards one's own preferences, via *defensive scheduling* [15].

Instant Messaging

The tremendous popularity of Instant Messaging services has been remarked by journalists [16] and researchers alike [17] with the same incredulity: the functionalities offered are very similar to traditional SMS and other desktop-computer services now available on mobile phones, such as e-mail (Gmail) or videoconferencing (Skype).

Understanding the practices of instant messaging was thus the objective of numerous studies [18-23]. If economical factors seem a dominant explanation, researchers examined IM through the specific sociality these services enable. Two attempts are reported here, as they will be referred to in later sections. First, a sociological approach explained the popularity of messaging among younger generations by reframing this communication as an exchange of gifts [24].

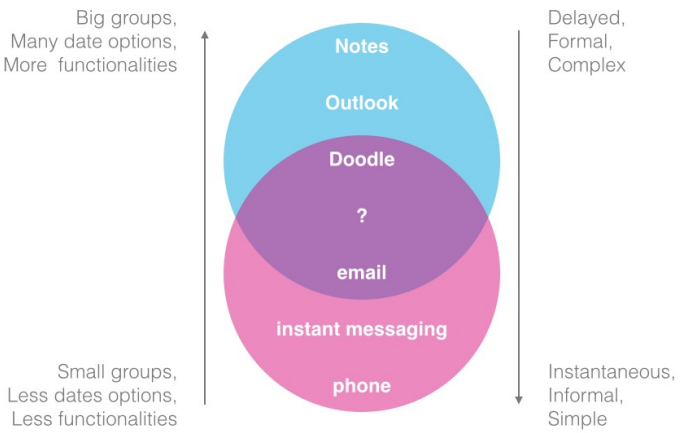

Figure 1. Perceived differences between current event-scheduling tools.

Second, an anthropological explanation has been put forward [17]: IM participates in "togetherness and intimacy enacted through small, continuous traces of narrative, of tellings and tidbits". The same researchers proposed to extend the concept of "dwelling" to the social realm, "not simply a place but a "doing" and needs to be seen as constituted by things done and felt endlessly in the moment-by-moment of togetherness and directionality". Their study demonstrated that IM was used by participants as a key component in their way of dwelling with others.

DOMAIN ANALYSIS

The inspiration for our tool stems from a generative research study, carried to investigate actual practices of event scheduling.

We conducted semi-structured interviews of 7 participants, most of them work colleagues. All of them attended university. Five nationalities were represented. The participants were used to set up meeting using applications such as Doodle and Outlook, and/or via instant messaging platforms, such as WhatsApp and Facebook Messenger. Most of the participants having an engineering degree, the interviews often hinged on the tools themselves, rather than the process and its conclusion. We also carried a contextual inquiry [25] where we asked a user to "thinkaloud" while he was creating a poll for a meeting using Doodle.

The main questions explored in this qualitative study relate to possible differences in attitude when scheduling a work event or a personal event, the relative importance of the negotiation and decision phases in this process, how the decision regarding the date of the event was taken, and finally whether the tools were perceived as satisfying and efficient.

Generative Study Findings

An affinity analysis of the answers received shows first a clear differentiation in usage: event scheduling tools

employed in the professional sphere are not considered for personal activities, where Doodle and unstructured communications, via instant messaging, dominate. Since the tools are "neutral" regarding the nature of the activity, only contextual factors can justify this gap: user's expectations for, and commitment to, the decision-making process are different at work and outside.

This differentiation explains a second finding emerging from the affinity analysis, rather unexpectedly: "[the tool] should feel personal". The sentence "Doodle is cold" and its variations were heard several times — some people discard its use and prefer "the old fashion way": "I phone them". Calendar-based approaches for personal schedulers thus suffer from their corporate inspiration, perceived as unfitting an informal context (see figure 1). This finding shows that an application to informally schedule group appointments, among friends, is lacking.

Another recurring theme alludes to negotiation, as many participants felt no negotiation takes place using the current tools. This finding leads to the requirement that "[the tool] should accompany the negotiation, not close it", in total departure to the current applications available. The current event scheduling tools seem to avoid this phase: hierarchical relations drives the process in a professional context, and in the case of Doodle, participants are asked as a first step to express their availability unconditionally, narrowing consensus-building to selecting the date with most availabilities. This contrasts with users' experience of open-channel communication tools, such as phone, email or instant messaging, which allow negotiation to happen, albeit in an unstructured way. Our application will thus aim at providing an informal way to negotiate event scheduling.

A last theme which emerged from the analysis revolves around the pace of the scheduling process: "[the tool] should get quicker answers" — a need supported both by a desire for quick answers when organising a poll to set up a meeting ("sometimes it takes days for people to reply") and by the complain that people need to be reminded of answering the poll. Some participants reply indeed very late, if they reply at all. The person organising the event must thus detect the delays and remind the missing participants. If delays are inherent to any asynchronous collaboration, event scheduling suffers in addition from reply-postponement strategies, to avoid long-term commitments [10].

SYSTEM DESIGN

Our application, code-named "WiseMonkeys", is designed to provide an informal and synchronous way to scheduling events, particularly suited for negotiation. We accomplish these goals through three main strategies. First our tool is implemented as a service on top of an instant messaging platform. Second, users are encouraged to define positively their negotiation behaviour. Third, the application's workflow is designed to focus and reward negotiation.

Instant Messaging

Instant messaging platforms fits very well the purpose of our application: they offer a synchronous medium where negotiations happen naturally and informally. This choice matches current practices, where open-channel communication tools are favoured for social coordination, "because the alternatives are seen as either disrupting or curbing to the natural conversational processes" [26]. However, negotiation procedures in chats lack structure: there is no mechanism to track the negotiations and the decision, which often get lost among other discussions held in parallel.

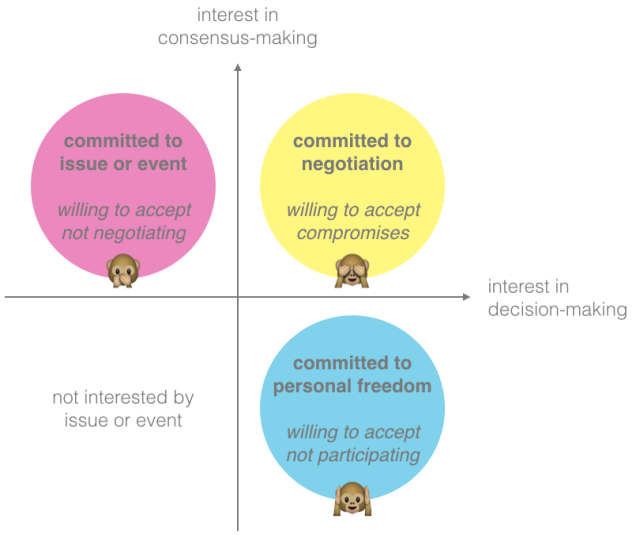

Figure 2. Partition of user behaviours by interests and commitment.

Therefore, our project adds to this medium the structure it misses. Our application is implemented by embedding an event scheduling service in an IM platform. This design provides many benefits: Besides providing a familiar interaction modality and built-in group management functionalities, instant messaging allows to track when messages where received and read. The availability of this information creates an expectation of immediacy for both the sender and receiver. In the best cases, this expectation works positively and increases the speed of the exchange (on the other hand, this expectation can be felt as social pressure [23]). Advantageously, turning to open-channel communication tools circumvents the issue of formality: the overall context of IM, the informality of its communications, will "spill" on our application.

User Profiles

Our generative research study found a variety of behaviours in front of event-scheduling tasks. Emergent roles in decision-making has been previously identified in [22] for chat applications, but do not match completely with our findings. Following the long-standing practice in user-centric interaction design, this project defines *personas* through their experience goal, life goal and end goal [27]. But this project further acknowledges this variety of behaviour by associating a commitment to each persona.

Users, in turn, can designate their behaviour by referring to these *positively defined* commitments (see figure 2):

- the "negotiator" profile engages in the event organisation by finding an agreeable set of parameters,
- the "committed" profile engages in the event organisation by bringing their unconditional support,
- the "independent" and "not interested" profiles engage in the event organisation by not limiting the other members' possibilities with their own preferences,

These profiles effectively decouple decision-making behaviours from expressed interest in the event. Therefore, choosing a non-negotiating profile bears little if no social cost (which invalidates commitment postponement strategies). Further, non-negotiators will not receive any notifications and messages about the on-going discussion, which is rewarding for people sensitive to conversational overload. Non-negotiators will simply be notified of the resulting decision, and optionally decide for themselves upon it.

Right after receiving an event proposal, the application proposes to choose a profile for this event. Since skipping the negotiation is not presented negatively, a reduction of the number of negotiators is expected, along with the length of the discussions.

Workflow

Beyond simply enabling negotiation, our application must propose a workflow which is both open and conclusive to structure the collaboration process.

Instead of considering majority-driven decisional process, as does Doodle, we looked for alternatives that could provide broader agreement. The consensus-building process, used by seasoned diplomats, seems to achieve this goal: "The consensus building process allows participants to find solutions and forge agreements that meet everyone's needs – and provides a meaningful basis for effective, long-range implementation of decisions" [28]. Consensus is defined as "overwhelming agreement", and is thus a more realistic goal than unanimity, but more ambitious than simple majority.

Therefore, consensus-building principles guided the design of our workflow. In particular, we assign to our tool the responsibilities of the mediator, who is the central figure of consensus building:

1. the tool should *facilitate* an agreement, not moderate a discussion, nor take a decision.
2. the tool should enable members to invent options for their mutual gain, giving them ownership. This expectation of mutual gain seems particularly aligned to our medium, described as fostering gift exchanges [24].
3. the tool should make clear that proposing or supporting an option should further be separated from committing to it, to avoid triggering postponement strategies.
4. the tool should leave enough time for the participants to review their options.

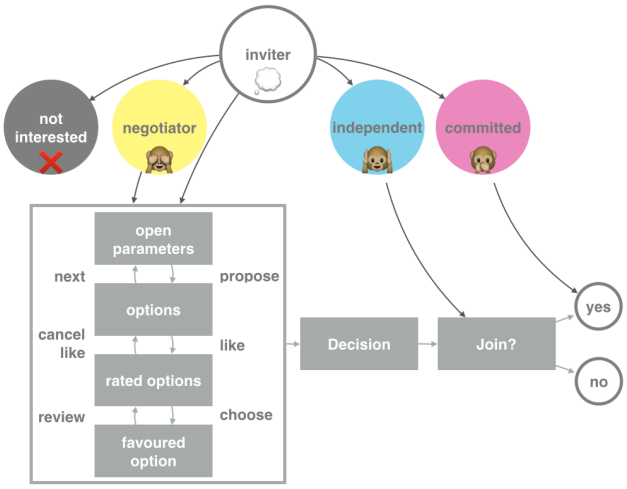

Figure 3. Conceptual model of the application, including roles and workflow.

The requirements were translated into our workflow as follows (see figure 3):

1. the tool does not automatically take a decision, but submit the best options for agreement.
2. the tool does not allow the user proposing the event to restrict the possibilities for date, time, or place. All the members, inviter included, can propose options once the negotiation starts.
3. the tool allow the members to express their liking for several options, but it is clearly a non-committing liking. In particular, any liking can be canceled anytime.
4. the tool leaves a period before ending the negotiation process by notifying the users that the negotiation is about to be closed.

Resulting scenario

A group discussion is implemented as a conversation thread in our app, as in any instant messaging client. A member of this group can create an *event proposal* for this thread. The event is called a "*get-together*" in the app. While creating the proposal, the *inviter* decides to input values for the event *parameters* (date, time, place) or not. The parameters without values are called *open parameters.* The open parameters are the subject of the negotiation with the other members.

Once they have received the proposal, the members select their negotiating profile. Only the negotiators can propose new *options* and express their liking (by double-tapping the "conversation bubble" containing that option). The inviter can *close* the negotiation when a consensus emerged.

The request to close triggers the start of the *review period*, for the negotiators to change their mind, or strengthen the consensus by liking the corresponding options. The decision on the open parameters is left to be announced by

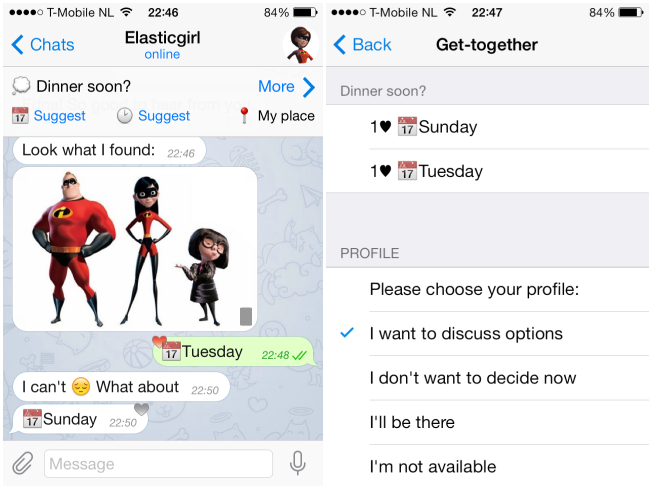

Figure 4. Screenshots of WiseMonkeys, left: instant messaging thread, right: profile selection screen.

the inviter to all members. The "independent" members can then notifying if they will join the event.

USABILITY ANALYSIS

Knowing that many iterations are often needed to achieve a satisfactory User Interface in mobile phone design [29], an analysis was carried to detect key usability problems. A paper prototype [25, 30] was built. Paper mockups were created for each substantial change in the GUI, for instance when a dialog appears. Test sessions using the prototype were carried. The users were given one or more use cases to perform. Seventeen use cases were derived from the personas defined earlier, but only eight "core" use cases were tested extensively. Two female users and four male users were selected for the tests. The sessions lasted between 30 minute to one hour, including a post-test discussion about their overall impression.

The problems identified fell unto three categories. First, too many screens were needed for basic functionalities, such as creating a proposal for a get-together. The flow was indeed segmented in several partial screens. The original intention was to always leave access to the IM conversation. This put a strong constrain in term of screen estate for forms with multiple input (e.g. date, time, and location). As a consequence, navigation was complex and error-prone: when designing, forgetting a simple "cancel" button on one of the screen would break the whole flow. This issue was remedied by replacing multi-step interactions by single-step ones, which require full-screen dialogs. This decision follows Apple's practice: when creating an event in iCal, a full-screen form with multiple input is presented to the user.

Secondly, the interface's wording was ambiguous, leading to erroneous decisions. For instance, when presenting the profiles to choose from, "independent" was labelled "Let the group decide on time and place". The consequences of this choice were not clear for the majority of users. Another example: The button to end the negotiation, which triggers the start of this period, was labeled "start countdown". No user connected this label to the action of closing the discussion. Several iterations were necessary to reduce wording ambiguity: During a second test round, the wording of several problematic labels was fine-tune by changing it and checking its understanding each time. For instance, the "independent" profile corresponds now to the entry "I'll decide later if I attend."

Last, the tests showed that people are very sensitive to imperative interaction. The initial prototype forced the user to choose her profile using a modal dialog. This design decision was taken to avoid offering users prone to postponement behaviours an opportunity to do so. In particular, one of the profiles to be chosen from was directed to this user type. Thus the forced interaction was easily resolved, in theory. However, this dialog blocked not only the display of the IM conversation it was created in, but all of them. Therefore, if a user felt she needed more time to answer than was available (due to characteristic multitasking), all her communications through this open channel were brought to a halt. This scenario showed that the application should leave a way to postpone decisions, even if it goes against the process efficiency. More leeway was thus given for the initial user input: profile choosing is no longer presented in a modal dialog, but as a setting in the dedicated screen for the get-together. As a counterweight, the interface was fine-tuned for the scheduling task to have enough visual presence: it is now presented as a panel at the top of the IM conversation, thereby acting as a passive reminder each time the user opens this IM conversation. Further, a red badge is displayed on this panel until the user chooses her profile.

SYSTEM IMPLEMENTATION

Our app was created using the client application of a real instant messaging platform, Telegram [31]. This platform was created and is maintained by a non-profit organisation based in Germany. The source code of their client was made available for various mobile operating systems, under the GNU General Public License version 2.0.

The source code of their server-side programs is proprietary, but the organisation allows developers, after registration, to access their API. This gives effectively the possibility to develop new client applications for the existing platform. In addition, the service has been redesigned to allow concurrent access from several clients, e.g. from a smartphone and a desktop computer. This is very convenient for our project and its evaluation: when installing our client, a person who used previously Telegram recovers her account details and application settings after a simple verification by SMS. Further, this user will see all her existing conversation threads automatically downloaded. This provides a seamless transition for Telegram users.

Telegram offers to send different types of messages (or rather attachment to a basic message): contact, image, video, location, sticker… The source code for message is structured in an object hierarchy, which eases the introduction of new types of message, such as the ones for

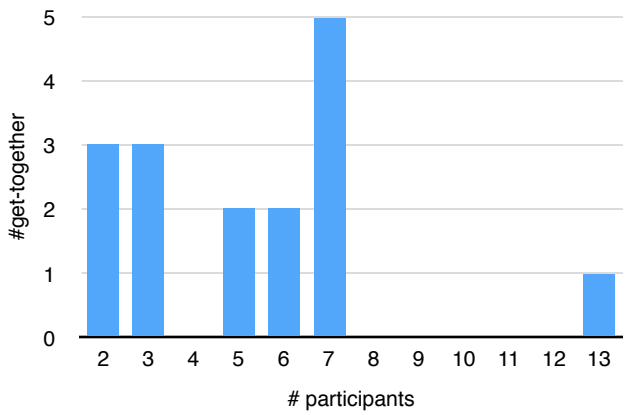

Figure 5. Number of events according to group size.

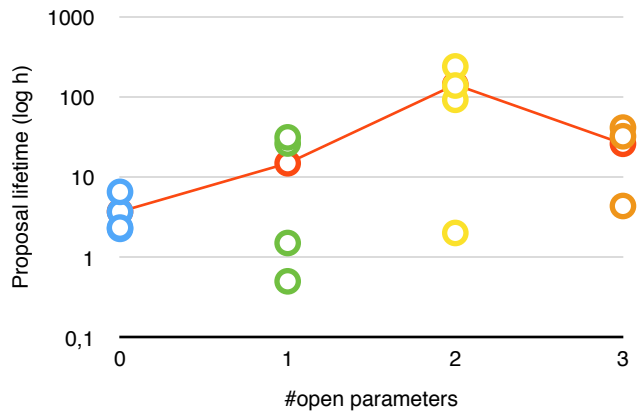

Figure 6. Proposal lifetime per type of proposal (red shows average value).

negotiation and scheduling. However, message transmission takes place via hand-coded Remote Procedure Calls, which depend on message type. Consequently, as the API cannot be changed, new data types cannot be transmitted. We circumvented this issue by encapsulating our application-specific messages, such as "like"-notifications, in the payload of already-existing messages (as contacts). This technique allows our messages to be server-independent, at the expense of losing backward compatibility: a user of Telegram receiving a scheduling message from a user of WiseMonkeys will see incomprehensible data.

The design of our app foresaw the creation of specific data types for date, time and location, each having a corresponding input interface: date and time were chosen via a date picker, and location using a map. The previous issue, along with the need to rapidly prototype our application, brought us to as a first step to simply store these parameters in text, preceded by a special character to code for their type. This allowed us to use text messages to transmit these types of data. This "hack" proved very fruitful: the text input of Telegram client could be used directly, instead of developing custom interfaces. Further, as XCode (Apple's development platform) is fully compatible with Unicode-characters, emoji were chosen as special characters: "📅", "🕑" and "📍". Thus when the user presses the button dedicated to inputting e.g. a date, the date-specific character is simply added to the text input field and the focus set to this field. This extends gracefully the practice of labelling metadata with a special character, a practice usually known from Twitter. This hack was kept in the second prototype, which was used for the field evaluation.

FIELD EVALUATION

Method

We investigate real use of the application for event-scheduling with 14 participants, who used the application over a period of two weeks. The application was deployed by installing the app directly on their iPhone, once their device was registered at the Apple Developer Center.

The participants were selected purposefully in a common social circle. This choice is motivated by the need to produce in a short timespan a substantial amount of group interactions with the application. This choice was made at the expenses of user diversity. Therefore, this small-scale field evaluation can hardly claim any representativity for a larger user base.

The participants were: seven male participants (the author included) and seven female participants, their age ranging from 36 to 47. They are structured in five couples, with 10 children in total, and three singles (the partner of the last participant did not participate, as he does not own an iPhone). Friendship in this group is mostly intra-gender. Five nationalities were represented (Spanish, Italian, Portuguese, Dutch, French). All of them received a higher education and are employed.

All the participants used Telegram previously, their use varying from once per month to several times a day. This was very fortunate, the evaluation did not suffer from any "baby duck syndrome". On the contrary, the choice of developing a service on top of a media they knew benefited from the observed "media stickiness": teams working remotely tend to keep the particular mode of communication they develop early in their common work [32]. However, this situation is certainly not representative of a larger population of users.

The evaluation protocol consisted of:

1. automated user actions logging, via instrumentation of the relevant functions of the application. The chosen instrumentation platform was Flurry Analytics [33]. To respect user privacy, no IM message was captured for this platform, other than the automated messages generated by the service. Custom events to be tracked were defined for each of the use cases and their intermediary steps. The duration of non-instantaneous events was also tracked: time from creating a proposal to closing of negotiation, time from receiving a proposal to choosing a profile; etc…

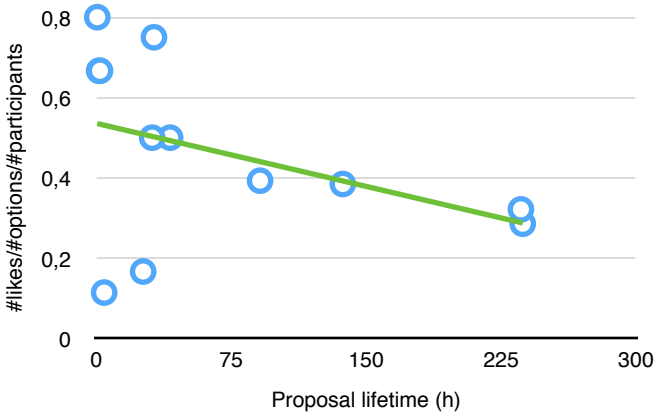

Figure 7. Participation according to proposal lifetime.

2. occasional logging through a voice mail: immediately after a sequence of interactions, a dialog is presented to the user, offering to call a voice mail number to leave her impressions about the recent interaction. Showing this dialog depended on the output of a random function, to avoid systematic display, deemed burdensome for the users. The threshold was set to 25% to log reactions a quarter of the sequences of interactions (on the long run).
3. semi-structured interviews at the end of the two week period. The voice mails entries, when they existed, were used to aid participants recall and to guide interview probes.

Results

During the two weeks of evaluation, 16 event proposals were created, among which 2 are still ongoing. This number is surprisingly high, and was justified during the interviews by a desire to support the project and to try out the service.

The interviews also showed that some participants created new discussion threads, on top of the ones existing in Telegram. These threads were created each for a specific event, by inviting only a subset of the participants. This practice is familiar to IM users, where threads are created on a need-to-know basis, e.g. for a girls night out. However, the participants justified this practice by the limit set in the app of one event proposal per thread. They bypassed this restriction by creating additional groups, sometimes with the same people.

During the interviews, the participants expressed satisfaction that a structured event-scheduling could take place in a discussion thread. For instance, a specific occurrence allowed them to negotiate the event parameters for a surprise birthday party, while discussing ideas for gifts.

The distribution of number of events according to the size of the group shows (see Figure 5) the expected bi-polar distribution between these two gendered groups of friends. Only one event gathered all participants but one, the surprise birthday party of that one participant.

Figure 5 exposes nonetheless an unforeseen practice: the use of our app for 2-people gatherings in three different occasions. Setting orally an appointment with someone else seems simple enough not to turn to a computer system requiring multi-modal interactions. The interviews revealed two very different reasons: in one case, the event was set to drive an elusive participant to commit to an event agreed to orally. In the second case, the events were date proposals in an already-formed couple. The proposals were left with all three parameters open, as a sign of full availability to the partner. This couple thus integrated our tool in their enduring courtship, a satisfying result, if any, when trying to improve cooperation!

In the following, the "proposal lifetime" has been calculated as follows:

1. if the negotiation was explicitly closed, the time of closing is used,
2. if the negotiation was not closed, but the date for the event already occurred, the date of the event is used,
3. if the negotiation is still on-going, with date options in the future, the end of the evaluation period is used.

To simplify our discussion, we consider that there is a correlation between the proposal lifetime and the expected length of negotiation, on one side, and between the proposal lifetime and the date chosen *in fine* for the event, on the other side.

Figure 6 shows no clear link between number of open parameters and proposal lifetime. This is counter-intuitive: a proposal with more parameters to negotiate could seem to require more time. But additional factors are to be taken into consideration, chief among them the number of participants and the number of options proposed. In particular, as mentioned previously, two of the proposals with three open parameters stem from 2-participant negotiations and were concluded more quickly.

Figure 7 shows the number of "likes" per participant and per option proposed, according to the proposal lifetime. We observe a decline of "enthusiasm" in planning an activity as the date is farther away. This is corroborated by interviews, where participants expressed that they do not feel any urge to propose and react quickly, "especially since a group has been created especially for this purpose" and they have no reason to consult it frequently.

DISCUSSION

Before offering a discussion, we should remark that the findings were based on a short-term, short-scale evaluation.

Consensus building

To our knowledge, this is the first time consensus-building principles are applied to social-group coordination. It is however difficult to quantify the benefits of this approach: whether the negotiation was perceived as consensual or not is a very subjective notion. Qualitatively, the participants interviewed at the end of the evaluation period found that most of the decisions taken were readily acceptable. Inversely, very few decisions felt imposed on them. Further,

no attempts were reported to reopen, after the decision was taken, the scheduling using another channel, which usually signals a unacceptable decision-making. Our approach, focused on building a consensus rather than finding the best possibility for the majority, confirms thus practically that scheduling is “less of an ‘optimizing' task and more often a ‘satisficing' task” [34].

That the decisions were perceived as more acceptable could also derive from the levelling in our workflow of the roles of organiser and participant. Traditionally, a large disparity of work between the two categories exists [26]. Here, the organisers stand during negotiation on an equal footing with the negotiators, who engage in this task voluntarily. Therefore, the decisional power is shared, leading to a wider ownership of the decision among members. The decision thus feels less imposed from more active members.

The validity of our strategy regarding proposing positively described profiles for non-negotiators (“committed”, “independent”, “not available”) could not be assessed. Indeed, a bug in the app allowed participants to start negotiating before choosing their profile. Participants who did so were counted as negotiators. However, a large majority of the people without profile did not propose options or like them. Therefore their intention remain unclear, even during the interviews, and no conclusion can be drawn regarding this aspect of our approach.

Scheduling practices

We found that a coherent behaviour emerges from closed proposals, i.e. with no parameter left to negotiate. These proposals are made very close to the actual event, within a few hours. The interviews revealed that these proposals all concerned sport. A participant broadcasts his intention to watch a soccer match or to go for a run in a couple of hours and his proposals acts as “rallying cry” for other members.

Further, we found that proposals were made very close to the actual event for regular activities, such as weekly swimming or running. The proposals contained 0 to 2 open parameters, but a closer examination showed time options with small differences. These proposals acted as confirmations, like the previous “rallying cry”, but were also used to adjust a planned activity to last-minute changes. This adjustment process has been described in the literature as “rendezvousing” [35].

Extending this category, twelve events out of sixteen were were planned in less than 48 hours in advance (five of these were planned in more than 10 hours). These events are designated in the CSCW field as “impromptu gatherings”. These events typically place a large burden on the activity organisers [36], due to the short timespan before resolution. The presence of a high number of impromptu gatherings among our events could be explained by the adoption of a light-weighted decisional process in our app, which distributed the workload better among participants. That both types of behaviours, rendezvousing and impromptu gathering, could be observed during the evaluation period shows the versatility of our approach.

Last, our study included a participating couple who used our tool to set dates. This behaviour can be described as an appropriation of the service for the maintenance of their “being together”, their “dwelling” with each other [17]. That this particular form of relationship engagement was represented in our tool signals a successful integration of existing social behaviour.

LIMITATIONS, FUTURE WORK AND CONCLUSION

We presented an application designed to provide an informal and synchronous way to scheduling events, particularly suited for negotiation. This application derives from a generative study, which identified a gap between professional meeting-scheduling programs and informal scheduling using open-channel communication tools. To achieve agreement on scheduling decision beyond that of simple majority (as in existing systems), a consensus-building process was embedded in the application workflow. Further, to speed up scheduling, the application allows users to define positively their attitude toward negotiation.

Some planned features, especially the choice of a negotiation profile, were not fully or correctly implemented, and could not be evaluated in our study. Further, the instrumentation set in place for the evaluation turned out to be too coarse to draw conclusions on the consensus-building process. The different durations (expected and real times to event, duration of negotiation) were not tracked accurately.

A small-scale field evaluation showed a positive adoption in a bimodal group of 14 people, even in limit cases, such as rendezvousing and 2-person groups. This evaluation is seen as a first step to iterate on the design of our application and on its evaluation itself. The next step is to implement correctly the missing features and provide a finer tracking of the participants actions. The application can then be evaluated again, using a larger group, before full-scale deployment.

Last, some features have been suggested during the interviews, which would be interesting to implement:

- longer events do not usually need a *time* parameter, but a start date and end date. The app could propose whether the second parameter is a time or a date.
- closing the negotiation period could be automatised (based on the options proposed), to avoid attributing this decision to a single user.

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