Gather: Design for Impromptu Activity Support Utilizing Social Networks

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Abstract. This project examines impromptu gathering of 20-30 year old urban dwellers. We examine current products in the space, and look to Voice User Interfaces to provide highly interactive interfaces in the mobile context. We summarize data from a diary study and focus groups into a set of design principles for this product space. Finally, we propose our design for Gather, a system that meets the communication and coordination needs for impromptu activity planning. By utilizing multiple interaction modes, this system facilitates and rapidly promotes the formation and commencement of activities.

1 Introduction

Urban innovations, such as public parks and transportation, have helped people gather at social activities for most of the modern age [13]. Communication innovations such as the telephone have further assisted activity planning. In our system, we focus on 20-30 year old North American urban dwellers as our target user group. Since this group is often on the go, they rely on many different communication channels including email, instant messaging, mobile phones, and text messages, although email and phone conversations are the primary method of planning social activities [5]. They also, on occasion, use invitation systems such as Evite to manage social activities.

We define impromptu gatherings as activities that are planned less than two days in advance. These social gatherings can place a large burden on the activity organizer. For example, when plans change the organizer is responsible for contacting all involved parties [8].

We begin this paper by examining existing products and technologies used in activity planning to find opportunities for improvement. We then present the results of a diary study in which informants were asked to make notes each time they communicated about an event. We use the data gathered from the diary study along with the results of two focus groups to develop a role-based model of the impromptu gathering process. We distill the data and resulting model into a set of design principles for building systems to support impromptu gathering. Finally, we present Gather, our design for an activity planning system.

1.1 Product Space Analysis

Several available products meet some of the needs of our user group. They are similar in their fundamental model of activity creation and notification. Most of these products function in the stationary context [1,11]. For example, Evite [4] is a popular Web-based service that helps people plan events and manage a guest list. It uses a customizable invitation form that generates email notifications. It also provides a central repository for invitees to view details of the event, see who is attending and get directions. Evite is useful when planning a concrete event several days in advance. But since its notification method is based solely on email, the interaction is much too slow to support impromptu events.

Some new products focus almost completely on the mobile context. Dodgeball [3] is a location-based service that allows users to share their location while mobile. When Dodgeball users "check-in" at a venue, the system notifies friends in the same urban area who are also checked in. Dodgeball also provides a mobile broadcast method to rapidly disseminate location information to a social network. Dodgeball's mobile interaction is handled through short message service (SMS) and as a result, is not capable of sustaining a high level of interaction with the user. While Dodgeball encourages gathering of users already involved in activities, it does little to aid users before they begin a night out. Also, Dodgeball users have control over who they are notifying, which helps with individual privacy concerns, but also forces the user to SMS the system whenever they change locales [15].

During our user research, we did not find any products that manage both advance activity planning and aspects of coordinated group communication. Similarly, we have not been able to find any products that offer highly interactive interfaces in both the stationary and mobile contexts.

1.2 Communication Channels

Activity coordination systems today typically use email for notifications and a Web site for interaction [7, 6, 12, 11, 4], although the Dodgeball service [3] uses mobile text messages for both notifications and interaction.

There is now a large population of users who have access to a variety of communication methods. The most common of these include mobile phones, mobile text messages, instant messages (IM), email accounts, and Web access. To design a system for use in this context, it is important to understand the strengths and weaknesses of each communication channel available to users.

Context of Use. With the popularity of mobile phones, voice calls and SMS messages are clearly available in the mobile context. While mobile email, IM, and Web access are becoming more widely available [1], these communication channels are typically available only in the stationary context for our target user group.

Interactivity. Graphical Web interfaces, with access to large displays, multimedia content, and fast response times, are clearly the most efficient interaction method. Limited interaction can be accomplished through text messaging such as SMS [3], IM

[6], and email, but these systems have the disadvantage of requiring the use of text-based grammars to communicate. While often cumbersome, this type of interaction becomes valuable in the mobile context where small screens make GUIs a less attractive option. Voice user interfaces (VUIs) have a higher level of interactivity because they allow for this grammar-based interaction without the need for cumbersome mobile text entry.

Cost of Interruption. Notification systems must provide enough updates to be useful, but not so many that they annoy or overwhelm users. The cost of interruption changes as notifications are delivered through different communication channels. Voice interaction creates the highest cost of interruption since immediate user action is required to handle an incoming call. Web and email interactions have a very low cost of interruption because the user typically initiates the interaction with the system.

Synchronicity. Voice and IM interactions uniquely allow for synchronous communication between users. Such interaction is particularly useful in impromptu activity planning where information must be exchanged quickly. SMS communication is useful in the mobile context when the user either does not want to be interrupted by a phone call, or cannot communicate synchronously. Even though SMS is suitable medium for communication, users often end SMS conversations by switching to another medium [9].

Voice User Interfaces (VUIs) offer a high level of interactivity in the mobile context, with the ability to place out-dials for synchronous communication with other users. However, voice remains an underutilized modality for interaction in the mobile context. As the I/O capabilities scale down on mobile devices, the efficacy of interaction decreases [17]. In a mobile context, the user often does not have the ability to attend to visual output and tactile input at the same time. It may be easier to attend to an auditory modality for information, and handle input with speech. Another advantage of using an auditory I/O design is the ability to attend to multiple information channels at once. For example, if a user is physically moving from one location to another while attending to the visual and auditory information in their environment, they can still use a VUI with ease. When in the mobile context, users are often strained for time and attention need an interaction style that is unobtrusive such as a VUI [14].

2   User Research

For our design research, we wanted to utilize methods that would both collect quantitative, in-context data as well as qualitative design feedback. We used a journal study and two separate focus groups to gather the data needed to drive our design.

2.1 Journal Study

To better understand how our target user group plans impromptu events, we conducted a journal study with seven informants. They were between 20 and 30 years of age and from cities across the United States. Informants were asked to carry around a small journal for 10 days and record all communications leading up to social activities.

We wanted information about several components of activity formation in order to inform our design for impromptu gatherings, including the time and location of informants during planning, the various communication channels used, and the factors influencing their decision to participate in activities.

Fig. 1. Journal attached to a mobile phone and a sample completed entry

Each journal page was divided into several areas:
- *Event* – a short description of the event and when it will take place
- *Now* – current time and location while communicating
- *Communication* – the type of communication channels used
- *Factors* – forces that positively or negatively affect the decision to participate in an activity
- *Interest* – the level of interest in an event
- *Comment* – free form comment area describing the content of the communication

There were several interesting findings from the study:
- 83% of activity communications happen either the day of or the day before (16%) the activity
- 41% of event planning happens over the phone, 25% by email, and 19% in person
- 44% of activity planning happens at work
- 24% of activity planning is done in the mobile context
- 68% of activity communications cover four main activity types: dining out, organized at-home parties, movies, and gatherings at bars
- The most common positive factor is the people, 28%, followed by the activity 23%
- The largest negative factors are scheduling, 43%, then distance 22%

2.2 Focus Group

We conducted two focus groups with participants representative of our target users. Since social activities can involve many people, our storyboards would naturally contain many characters. However, we were worried that participants might find it difficult to follow an extended narrative through a storyboard. Because of this concern, we chose to use a comic-book format [2] to show several ways a system could assist in planning and forming activities.

Fig. 2. Focus group scenarios

We presented six concept-validation scenarios to generate needs and breakdowns from our high-level designs. The scenarios involved using an activity notification system to:
- See what friends are doing
- Add new friends to a social network
- Organize an activity
- Bring more people to an in-progress activity
- Express the desire to participate in an activity later
- Plan an event while mobile

Many ideas resonated well with our focus group participants. One of the strongest responses was projecting status. Participants liked the idea of seeing other people's availability, and the idea of broadcasting their own desire for/interest in a social activity. Participants also reacted positively to the idea of planning and modifying events in a mobile context. Participants felt these needs were not currently met in their daily lives.

Although we discovered many positive needs, we also received a very good sense of designs that would not work well for our user group. For instance, participants were concerned that a system would automate to the point of becoming impersonal or unnatural. They liked the idea of cutting down on the time and effort involved in coordinating, but were wary of the system getting in the way of human communication.
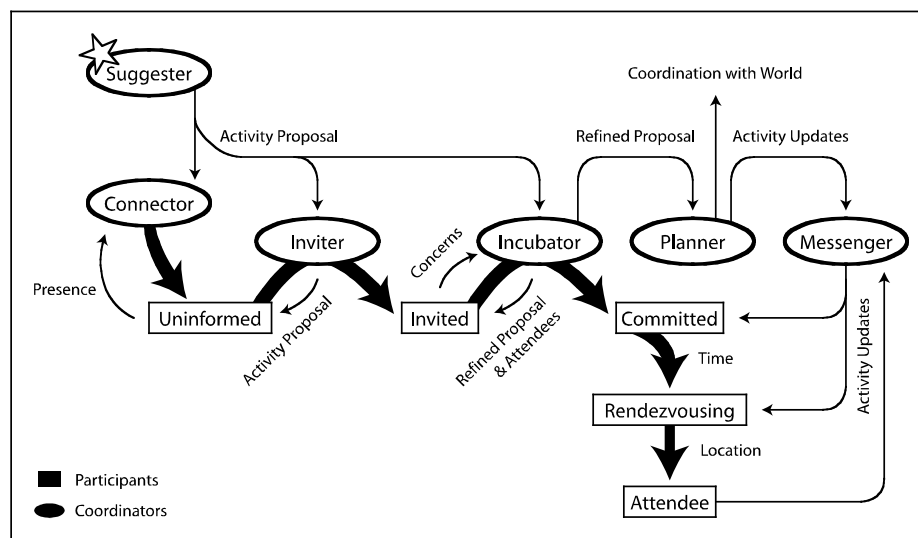
3   Conceptual Model of Impromptu Gathering

Fig. 3. Conceptual model of impromptu gathering

Since the process of gathering is quite varied, we took a social role model of interaction and broke apart roles. First, we divided the roles into two categories: participants and coordinators. In general, participant roles were passive while coordinator roles were active. Coordinator roles focused on moving participants from one role to the next; from *uninformed*, to attendee.

Although the diagram flows in one direction, the gathering process is by no means linear; at any point in time all parts of this process may be taking place. Participants may be invited or suggest an activity idea at any time.

In our observations, many of the coordinator roles were handled by the same individual. In other cases, the effort was distributed across several people. Any given person may handle one or many of the roles in the model.

Table 2. Participant Roles

Uninformed	May want to hear about activities
Invited	Must make the decision whether to attend Needs activity details (time, location, etc.) Needs to know who is attending
Committed	Needs notification of activity changes
Rendezvousing	Needs notification of activity changes Needs directions to the activity location
Attendee	Acts as a source of information for other participants

Table 2. Coordinator Roles

Suggester	Needs information about local activities [10] Forms the activity proposal
Connector	Needs to know which friends are available for activities (presently done with tacit knowledge of others' schedules)
Inviter	Needs to deliver the activity proposal to many participants Faces a fear of rejection
Incubator	Listens to participants' concerns Modifies the activity proposal Informs participants of who is planning to attend Creates buy-in for the activity
Planner	Handles logistics, reservations, and tickets May need to know the number of participants attending Creates activity updates when plans change
Messenger	Delivers activity updates to other participants Often does work in the mobile context

We used this conceptual model of impromptu gathering to focus on user needs throughout the design process.

4 Design Principles

We developed nine fundamental design principles based on our model of impromptu gathering, diary study conclusions and focus group feedback.

Support Both Advance Planning and Coordinated Group Communication. Most communication for activities happens the day of or day before the event, with some communication taking place in the hours before the event.

Communicate Presence. Providing presence information aids the connector role in finding people who are available for an activity. Our focus group responded well to this idea, and already used IM presence for this purpose.

Categorize Activities. Activities can be separated into several categories, each with unique needs that can be supported. Additionally, focus group participants liked the ability to express availability by event category.

Allow Control Over Invitation. In some cases, users want strict control over who to invite. In other cases, the invitation may be more general and open.

Encourage Incubation. Attaining buy-in for an activity involves the communication of many individuals. This process works best when participants are co-located, and able to easily share ideas and concerns. The system under design should support this same incubation process through both synchronous and asynchronous communication.

Communicate Commitment. In both the journal study and focus group we saw that invitees most wanted to see who else was interested in attending an activity. The system under design should communicate users' interest in attending an activity.

Support Stationary and Mobile Context. Communication surrounding activities frequently happens at work, at home, and while mobile. The system under design must support a high level of interactivity in these different contexts and allow for easy movement between them.

Use the Appropriate Communication Channel. Each communication channel has different characteristics of interactivity, interruption, mobility, and synchronicity. Notifications goals should be matched with communication channel to provide the best fit.

Support Broadcast Communication. Both the inviter role and the planner role need to send the same message to many participants. Allowing for broadcast communication eliminates the messenger role.

5 Gather Design

Gather is designed to be an activity notification system particularly suited for impromptu activities. We accomplish this goal through two main strategies. First, we support a high level of interactivity between the user and the system in both the static and mobile contexts. Second, we deliver notifications to users through a dynamic system which chooses the appropriate communication channel. At all times, Gather can be the most up-to-date repository of information about a specific activity.

5.1 Scenario

To introduce the Gather, we present this short scenario illustrating how several users interact with the system throughout the course of a day:

It's 3 p.m. and Andrew is at work. He feels like going out with some friends for dinner, so he logs on to Gather and sets up a "dining out" event for 7. He leaves the location unspecified and indicates that he wants at least 3 people for dinner. He invites Bonnie and Elizabeth and keeps the event "open" so they can invite others.

Across town, Don also checks in with Gather. He indicates that he's up for dinner if anyone else is, but doesn't care enough to create a new event. He knows that now, when any of his friends create or join an event they'll see that he's interested.

Gather sends email to Bonnie and Elizabeth with the activity details. Elizabeth is out shopping so she doesn't see the email, but Bonnie sees it and follows the link to the Gather activity page. She sees that the dinner is tentative and needs 2 more people, so she posts a message suggesting that they try the new bistro and checks "I'll go!". She also sees that her good friend Don is up for dinner, so she invites him to come along too.

Since Don's status is "active" on instant messenger, Gather sends him a message with an invitation to the dinner event from Bonnie. Don clicks on the link and reads over the event to see what's going on and who's coming. He adds a comment to the message board saying that he had wanted to try that bistro for a while, and checks "I'll go!"

Now that 3 people have agreed to go to dinner, the event is confirmed and Gather sends an email to Andrew and Bonnie to let them know the event is happening. Andrew looks over the messages and updates the location of the event with the bistro where Bonnie and Don want to go.

At 4:30 p.m. Elizabeth still has not checked her email from Gather. Since Andrew explicitly invited her, Gather follows up with a phone call telling her about the activity. She likes hanging out with Andrew and Bonnie, so she says she'll go and tells Gather to invite Felix.

Felix is a student and wants to hear about what's going on but doesn't want to get calls while in class, so he has set Gather to try contacting him via text message first. He's in class and receives a text message saying Elizabeth has sent him an invitation. As Felix is walking home from class, he calls Gather to hear the details about dinner and tells Gather that he'll go.

At 5:15 p.m. Andrew leaves work. He realizes that the bistro may be crowded and he should make reservations, so he calls Gather to see how many people are coming. There will be 5, so he has Gather connect him to the bistro to make a reservation. The bistro doesn't have a table at 7, but they have one at 7:30, so he makes the reservation. After he's done with the bistro, Andrew's call is routed back to Gather. He changes the time of the event and Gather automatically notifies everyone else about the change.

Bonnie, Elizabeth, Don and Felix all receive a text message about the time change.

At 7:15 Elizabeth and Felix are heading to the bistro but get a bit lost, so Felix calls Gather to get directions. They meet up with the group at 7:30 and enjoy having dinner with friends.

5.2 Design Overview

Our system has three main conceptual elements: Users, Activities, and Notifications. In the most basic form, users interact with the system to create and modify activities. Activities then generate notifications that are delivered back to users.
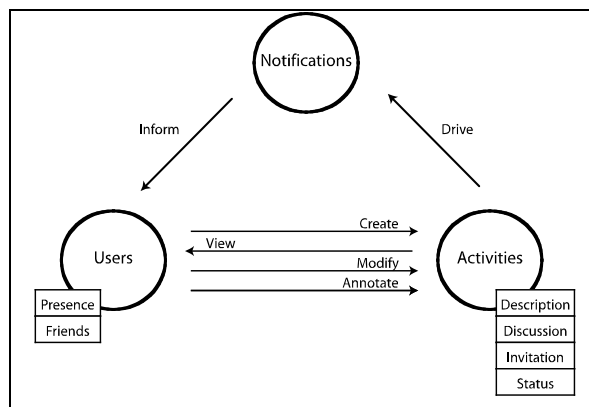

Fig. 4. Gather system overview

Users. Users interact with the system either through a website or through a voice portal. We build upon the assumption that users have access to a social network through our system. Acquiring friend-relationships may be accomplished by piggybacking on other well known social network systems [6, 7, 12], or by forming new relationships using Gather. One benefit of our system is that new friends can be added to a social network while in the mobile context. For this interaction, users' phone numbers become both the identification and authentication necessary to add a friend-relationship.

Additionally, Users have the ability to "check-in" to the Gather system in order to communicate their desire to attend an activity. Users who have checked-in are more likely to be invited to activities. To check-in, users express the event type of interest and the time of availability. For event type, we allow the four most popular categories from our user research: dining, movies, parties, and bars.

Activities. Activities have four main components: Description, Discussion, Invitation, and Status. The description contains basic information such as a title, time, location, and type of activity. Any user may edit the description information. However, users are encouraged to discuss the changes first.

Discussion can take place through direct phone call or email between users, or it can be supported by the activity's discussion feature. Gather provides simple message board capabilities for each activity, where users can post text comments for others to read later. Additionally, users may post and listen to audio comments created through the voice portal. This discussion board is meant to provide asynchronous communication across both the stationary and mobile contexts. However, there are some cases where users cannot wait for others to check the discussion. In this case, Gather allows users to mark messages as "important", which triggers notifications to committed participants.

The invitation portion controls which users can commit to attend, and keeps track of *invited* and *committed* participants. We recognize that users often need to make a partial commitment ("maybe"). We allow users to express that they might go to an event, and consider these users as committed for the purposes of notification.

When an activity is created, the user has the option to explicitly invite others, and to set the invitation as "open" or "closed".

Closed Invitation
• Only those who have been explicitly invited may commit to attend.

Open Invitations
• Anyone already committed to an activity may invite others.
• Friends who have "checked-in" will be notified and may commit to attend.

The last part of activities is the concept of threshold. When an activity is created, the user may specify whether it is confirmed or tentative. Activities that are tentative automatically become confirmed when they reach a threshold of participants committed to attend. The creator of the activity may set the threshold as desired to ensure that activity has enough participants to be successful.

Notifications. Changes to the state of activities drive the creation of notifications. The two types of notifications, Invitations and Activity Updates, are generated in the following cases:

Invitations are sent to users
• Who are explicitly invited to an activity
• When their check-in status matches an activity a friend is committed to

Activity Updates are sent to users who have committed to attending an event
• When an activity changes from tentative to committed
• When an activity is canceled (either explicitly, or from lack of interest)
• When the activity description changes (time, location, etc.)
• When an messages marked as "important" is posted to the discussion

Gather uses a dynamic and adaptive subsystem to deliver notifications to users. Users may receive information via IM, email, SMS, or voice. Gather routes notifications to the appropriate communication channel based on a number of criteria:

User preference. Users choose which channels of communication they would like to be contacted thorough.

Time of activity. Notifications for activities later in the day use less interruptive methods such as email. If the activity starts soon, Gather favors communication channels that are available in the mobile context.

Content of the message. Gather tries to deliver notifications that require interaction through channels that support interaction. Also, not all messages on gather can be delivered as text. Activity discussions posted as voice must be delivered on a channel that can handle voice (i.e. email or phone).

Receipt Acknowledgment. Gather notifications are created to allow the system to detect if they have been received. Notifications that have not been received on one communication channel, may be later resent on another channel as needed.

5.3 Design Significance

The Gather system aids impromptu activity planning by reducing the coordination burden placed on the coordinator roles. Roles that are typically filled by one or two people can be spread across several participants.

Suggesters have a low-cost mechanism for making an initial suggestion, and they can leave the details up to the other participants. *Connectors* and *inviters* can see who is interested in an activity, and can easily invite as many or as few people as they wish. The message board capability supports the *incubator* role by allowing participants to discuss an activity in a common area, and the *messenger* role is effectively eliminated since Gather distributes important notifications. The *planner* has access to the latest information and can make reservations or other arrangements accordingly.

For participants, Gather uses a sophisticated notification system designed to provide the right information at the right time and through the right channel. At any time, participants can call Gather to find out who else is coming, get directions, or get in touch with another participant.

6   Future Work

At this point in the project, our team has produced an overview of how the system will operate. We have specified flows of interaction across each communication channel. Future work involves validating our final system design with users. We also plan to detail UI wireframes and VUI call flows in order to build a prototype. We would like to do a Wizard of Oz study to validate that the interactions are appropriate.

5   Conclusion

This work has presented our design process and final concept: Gather, a system designed to support impromptu activity planning. Our user research, including diary studies and focus groups, led us to develop a set of design principles that drove our system design. We believe this set of principles can be useful to others who are designing for impromptu gathering. Gather was formed around this set of design principles for impromptu activity planning. As such, we believe it meets most of the needs of our target user group.

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