# IBM Research Report

# Facilitating Emerging Collaboration through Light-weight Information Sharing

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## ABSTRACT

We are investigating and developing a light-weight peer-to-peer sharing service that helps people emerge their collaborative processes from ad hoc communication tools like email to more formal and long-term collaborative systems like shared team workspaces.

## Keywords

Peer-to-peer collaboration, shared workspace

## INTRODUCTION

Collaborative processes very often emerge from unstructured ad hoc communication activities to more structured types of formal collaboration [1]. Groupware has focused on the two extremes of this continuum but neglected all the possible stages in-between. Email at one extreme of this continuum can be considered as today's ultimate ad hoc communication support system. Recent studies indicate that email seems to be the place where collaboration emerges [2, 4]. While email is extremely flexible on the one hand, it also requires the user to do a lot of work on the other hand, such as manually keeping track of the organizational process. Email today is "overloaded" with functions it has not been designed for originally [4]. People are using the simple communication features of email to manage a variety of different collaborative processes with increasing structure and complexity.

Little work has been done in supporting the progression of collaboration from the inbox so that unstructured processes can be transformed to more structured ones. Our research aims at providing support within email to better manage the collaborative functions email is overloaded with, enabling users to cope better with the overload problem by "getting things out of their way" in their inbox. At the same time we also expect to help users move over to more sophisticated types of collaboration that are already supported in many

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special purpose groupware systems. Thus, our goal is to bridge the gap between ad hoc communication and more formal collaboration as indicated in Figure 1.
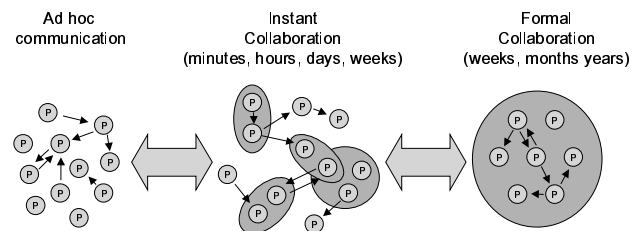


**Figure 1.** From ad hoc communication to formal collaboration

## DESIGN CONSIDERATIONS

We are currently investigating and developing a light-weight personal peer-to-peer sharing service that helps people emerge their collaborative processes from ad hoc communication tools like email or other application such as instant messaging. The design of our system has been influenced by recent studies on email usage [3]. These studies show that the outcome of email work activities is often unpredictable, that membership in activities is fluid, that email work activities often evolve from the informal to the formal, and that late-joiners of activities are poorly supported because they have no access to the history. We felt that these characteristics would be best supported by a peer-to-peer system for information sharing (or by a system that feels peer-to-peer from a user's perspective). Traditional shared workspaces usually require tedious setup procedures before any information can be shared, they often require centralized management within the organization, and they are very often disconnected from the rest of the productivity tools (e.g. email).

Our system attempts to model an email work activity by proving very light weight peer-to-peer shared workspaces that can be integrated into existing applications as a personal sharing service, thus allowing for contextual collaboration. Unlike traditional shared workspaces, our shared workspaces can be created on the fly on the local machine; they support dynamic membership, the notion of decay

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(limited lifetime), and history. However, a major difference to traditional systems is the granularity in which information can be shared. Collaboration might be very short-term and instantaneous and involve only little amounts of data, e.g. exchanging one or more files, setting up a meeting agenda with people, or jointly annotating a document (see gray areas in Figure 1). These activities might or might not become part of a larger collaborative work process. However, people usually do not create heavy-weight shared workspaces to perform these tasks. So unlike providing one persistent place for sharing multiple pieces of information, we have designed our system to be more fine-grained. Each piece of information, which we will call component, can act as a shared workspace that can contain other components. Components are the "building blocks" of collaboration; they can be combined to bigger collections of related activities as collaboration progresses. In that sense each component could be considered as a "seed" for collaboration that either decays or grows to more structured forms. We also do not distinguish between asynchronous and synchronous types of collaboration by modeling each component as an "infinite" (conferencing) session bounded only by the lifetime of the object. Thus, we require people to join a component prior to accessing or modifying the information contained. If other people are present at the time of joining, they can work synchronously, if not, work is automatically asynchronous. We call a persistent piece of information that supports the notion of both membership and session an *Activity* component.

## ACTIVITY TYPES

Our initial prototype implements a basic set of activity components, which reflect the immediate needs of sharing within an email client. We have implemented a *MessageActivity* that allows sharing and joint viewing of a single email message, a *FileActivity* that allows simple file sharing of a single file, a *ChatActivity* that provides a persistent chat, and a *ScreenActivity* that allows sharing and annotating arbitrary portions (still images) of the screen.

The peer-to-peer sharing service (which itself is an activity) can manage activities stand-alone but they can also be combined to form more complex structures such as sets or hierarchies (see Figure 2). If, for instance, the need arises to
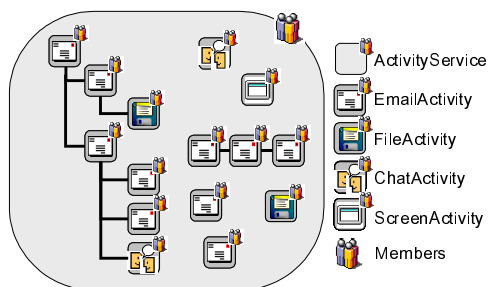


**Figure 2**. Managing activities.

share an email thread to start off a discussion or more advanced collaboration, the messages of the thread could be directly mapped onto a hierarchy of MessageActivities and FileActivities (as containers for the attachments) as indicated in Figure 2.

Group processes progress through structure [1]. The previous example illustrates that combining activities in various ways is one way of introducing structure. However, structure might also be added within an activity itself. For example, a FileActivity might provide mechanisms that help evolve it to more sophisticated document management with locking and versioning. As we start deploying our prototype, we expect to add more and richer activity types, e.g. TaskActivities that evolve from simple todo items to task management, or WorkflowActivities that allow us to add additional constraints to the combination and orderly execution of other activities (e.g. approval processes).

## APPLICATION AND PEER INTERFACES

To achieve utmost flexibility, we are not only using text based XML protocols between the peer ActivityServices but also between the client application (e.g. email) and the sharing service itself. XML interfaces permit an easier integration into existing applications, which allows sharing to be more contextual.

## CONCLUSION

We have sketched the design guidelines of a prototype that provides a personal peer-to-peer sharing service for lightweight collaboration. Many issues that we have raised here will need further investigation, such as the transition from private to shared information, or adding structure to activities. Yet we do not know much about the factors that determine the lifetime of an activity. When, for instance, have activities reached enough structure so that they can be moved to a traditional shared workspace? As we deploy our prototype, we expect to learn more about how people actually collaborate in email. Beyond existing empirical data [2, 3], we are also conducting additional studies to gain a deeper understanding of these processes.

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