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## A Survey of Asynchronous Collaboration Tools

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**Abstract:** This study surveys current asynchronous collaboration tools and their features. Asynchronous collaboration tools, that allow users to collaborate at different times, have evolved from email, discussion board, weblogs and Wiki to advanced tools that integrate multiple functions to make collaboration more powerful and convenient. A great number of such tools have been developed that provide a variety of different features. This study investigates the available features of these tools, the meanings of these features and identifies common and key features. We organize features by four major functional categories: communication, information sharing, electronic calendar and project management. We tested ten asynchronous collaboration tools that present different ways of collaboration and different sets of features. Data collected in this study come from our experiments and online documents. This study will help users gain knowledge of what current asynchronous collaboration tools have to offer and help them select right tools based on their needs.

**Key words:** Computer-supported collaborative work, usage experience, collaboration tools, client-server, groupware

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### INTRODUCTION

Collaboration refers to all processes where people work together to achieve results. With the advent of computers and the Internet, many collaboration tools have emerged. Examples of early collaboration tools include e-mail, bulletin board, Internet Relay Chat (IRC), whiteboard and desktop sharing. In a collaborative environment, a team may be spread out in different locations and work at different times. The tools need to facilitate collaboration by making communication among distributed participants as easy and efficient as possible. Synchronous collaboration tools require a team to work at the same time. Examples include instant messaging, application sharing and whiteboard. Asynchronous tools allow teams to work at different times. Examples of early tools include email, bulletin board and web logs. In this study, features of asynchronous collaboration tools are investigated, which are also often called groupware. Differences between synchronous and asynchronous collaboration tools and how to integrate them are investigated by Li *et al.* (2000). Case studies of collaboration tool applications are explored by Bageron *et al.* (2001), Peden *et al.* (2000) and Lefebvre *et al.* (2003). The scope of E-collaboration is discussed by Kock and Nosek (2005).

People have been collaborating asynchronously for many years using email, newsgroups, bulletin board, web

logs and more recently group calendars and Wikis. Riboulet *et al.* (2002) investigated a new set of tools for collaboration. Many tools have emerged that make collaboration more powerful and convenient. These tools usually integrate existing methods of collaboration and add some new features. Wikipedia has a partial list of collaboration tools. These tools present a wide range of different features. To just list a few, the features include email, announcement, instant messaging, chat, discussion board, Wiki, calendar, file sharing, folder synchronization, tasks, time sheet and Gantt chart. These tools provide a different set of features. Most of the tools use client-server architecture where collaboration related data are stored in a server. There are a few hybrid architecture collaboration tools that use servers for directory service and the collaboration data is stored in individual collaborators. Questions arise as more and more of these tools emerge. The goal of this study is to identify common and key features in asynchronous collaboration tools. This study will help professionals gain knowledge of what current asynchronous collaboration tools have to offer and help them select the right tools based on their needs.

To gain first-hand experience, we tested ten asynchronous collaboration tools: WebEx WebOffice, Microsoft Office Groove, 2007, Zimbra, Collanos Workplace, ZOHO Project, PHProjekt, eGroupware, Basecamp, Bluetie and Microsoft SharePoint Server. We tried to cover a wide range of tools with different

characteristics. The tools we selected range from client-server to hybrid architecture, from freeware to paid subscription, from email centered collaboration to file sharing, to project management.

### SYSTEM OVERVIEW

Most of the tools we tested have client-server architecture with the exception of Microsoft Office Groove and Collanos Workplace. In the client-server architecture, collaboration related data are stored on the server. The clients usually log on to the server by java-enabled web browsers. The advantage of client-server architecture is data is considered more secure because it is stored on a well-maintained server. However, there is also a single point of failure at the server. The client also needs to have the network connection to the server to be able to access collaboration related data. In a peer-to-peer collaboration, collaboration data are stored in the computers of collaborating users. Therefore, multiple copies of the same documents may exist in these collaborating computers. Synchronization is needed to make all the computers have the most up-to-date copy. Because peer-to-peer collaboration tools allow users to update the data offline, the latest version of data may not be able to propagate to other computers immediately, potentially causing data conflict. The problem is usually solved by creating a new copy of the file and notifying the users. Another problem with the peer-to-peer collaboration is synchronization traffic between computers may be blocked by organizational firewalls because the port numbers used are not as well recognized as the web protocol. The non client-server collaboration tools we tested are actually hybrid of client-server and peer-to-peer. In Collanos Workplace, the server provides directory service similar to Instant Messaging tools. Users log on to the server to find out if other collaborating users are online and check if there is a need for synchronization. The Collanos server does not store the collaboration data. Therefore, although users can edit the data offline, synchronization happens only when multiple users are both logged on to the server at the same time. In Microsoft Office Groove 2007, the server provides a caching service. The update is cached at the Microsoft Office Groove server temporarily and transmitted to the collaborating computers when they become online. The data transmission between users and the server is through web traffic that bypasses most firewalls. When multiple users are online at the same time, the synchronization is carried out directly among the users.

Some of the collaboration tools require users to install their own servers. Free collaboration tools like eGroupware and PHPProjket runs on web server that

Table 1: System overview of asynchronous collaboration tools

Asynchronous collaboration tools	Server	Client	Architecture
Microsoft Office Groove	Hosted	Microsoft Office Groove	Hybrid <sup>a</sup>
Collanos Workplace <sup>c</sup>	Hosted	Windows/Max/Linux	Hybrid <sup>b</sup>
eGroupware	PHP enabled web server	Web browser	Client-server
WebEx Web Office	Hosted	Web browser	Client-server
Zimbra	Mac/Linux	Web browser	Client-server
Zoho Projects	Hosted	Web browser	Client-server
Blue tie	Hosted	Web browser	Client-server
Basecamp	Hosted	Web browser	Client-server
PHPprojekt	PHP and MySQL enabled web server	Web browser	Client-server
Microsoft Share Point Server	Hosted	Web browser	Client-server

<sup>a</sup>Server serves as a relay of shared documents. Direct transfer of documents between clients is given higher priority, <sup>b</sup>Server is only for directory service. All document transfers are between clients, <sup>c</sup>Use special port number that may not bypass organizational firewall

supports PHP with database connection. Zimbra's server can be installed on Mac and Linux. As for the rest of tools, the tools' vendors host the server. The clients are usually web browsers for client-server collaboration tools. Some of the tools provide support for Microsoft Office applications as clients. Collanos Workplace's client is a multi-platform tool. The system overview of the tools we tested is shown in Table 1.

### FEATURES

We found a variety of features in asynchronous collaboration tools. The common features we found include email, calendar, chat, shared documents, polls, wikis, to-dos, Gantt chart and many more. Some tools implemented many features that are very loosely integrated and independent from one another. Zimbra, on the other hand, is an email-centered collaboration that has tight integration with calendar and search functions. To have a clear understanding of what these tools can do for users, we need to organize the features into functional categories. Wikipedia's article on Collaborative software divided collaboration tools into three levels: electronic communication tools, electronic conferencing tools and collaborative management tools. This classification includes both synchronous and asynchronous collaboration tools and the classification does not reveal details of features in asynchronous collaboration tools. Based on our review of collaboration tools and hands-on experience, we propose the following four categories for the features: communication, information sharing, group calendar and project management. The idea comes partly from Wikipedia's article on collaborative tools.

**Communication:** The communication features enable users to collaborate by sending messages to one another.

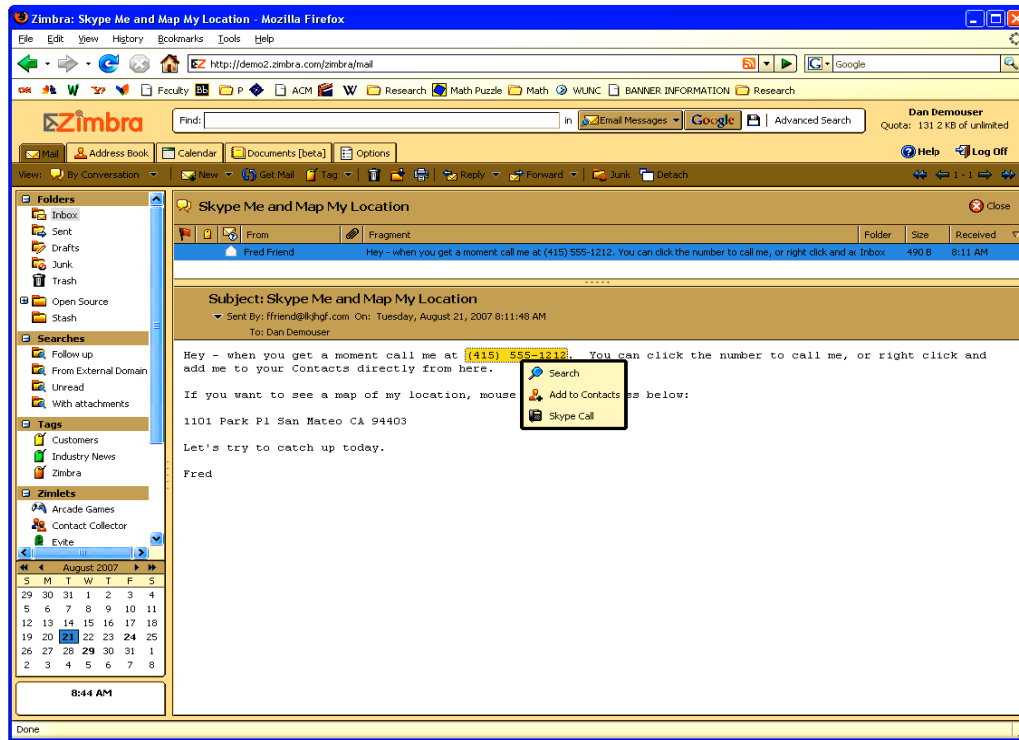


Fig. 1: E-mail features of Zimbra. A phone number is identified and associated to search, add to contacts and Skype call features

The common communication features include email, announcement, chat room and instant messaging. Email is still a very important way of collaboration. The tools with email feature either host or install POP/IMAP mail servers. The tools that have the email feature also provide contact list or an address book feature that allows users to store their contacts online. Announcement is usually a simple web-based feature that enables a user to post time-sensitive information to be shown to the other users. Although asynchronous collaboration tools provide mainly features of collaboration at different times, some of them provide basic but handy synchronous collaboration features including chat room and instant messaging. A synchronous collaboration tool provides more advanced features like application sharing and document presentation.

Zimbra has the most advanced E-mail feature. Zimbra parses email messages for phone numbers, address, time and name and link them to Skype call, maps, calendar and address book. A screenshot of Zimbra is shown in Fig. 1.

**Information sharing:** Information sharing features enable users to collaborate by sharing various forms of information. The common information sharing features include file sharing, discussion board and Wiki, where,

ideas are exchanged using discussion threads. Wiki allows users to collaborate on topics file sharing is also often called document sharing. In file sharing, users share their files either by uploading them to the server in client-server collaboration tools or mark them as files that need to be synchronized in peer-to-peer collaboration tools. In client-server file sharing, files are checked in or checked out to update the changes to the files. In peer-to-peer file sharing, changes are automatically detected and synchronized to other computers. More differences between client-server and peer-to-peer collaboration are stated in the system overview. A screenshot of Microsoft Office Groove is shown in Fig. 2. It is a hybrid of peer-to-peer and client-server collaboration tool that has automatic file and folder synchronization features. Discussion board, also called forum, is another common way of collaboration by directly editing the contents of a web page. Changes to the content can be viewed easily using built-in features of Wiki. Other information sharing features include database sharing, address book sharing, bookmark sharing, calendar sharing and polls.

**Group calendar:** Group Calendar is one of the most common collaboration features. Calendar stores upcoming events and the participants of the events. Some tools

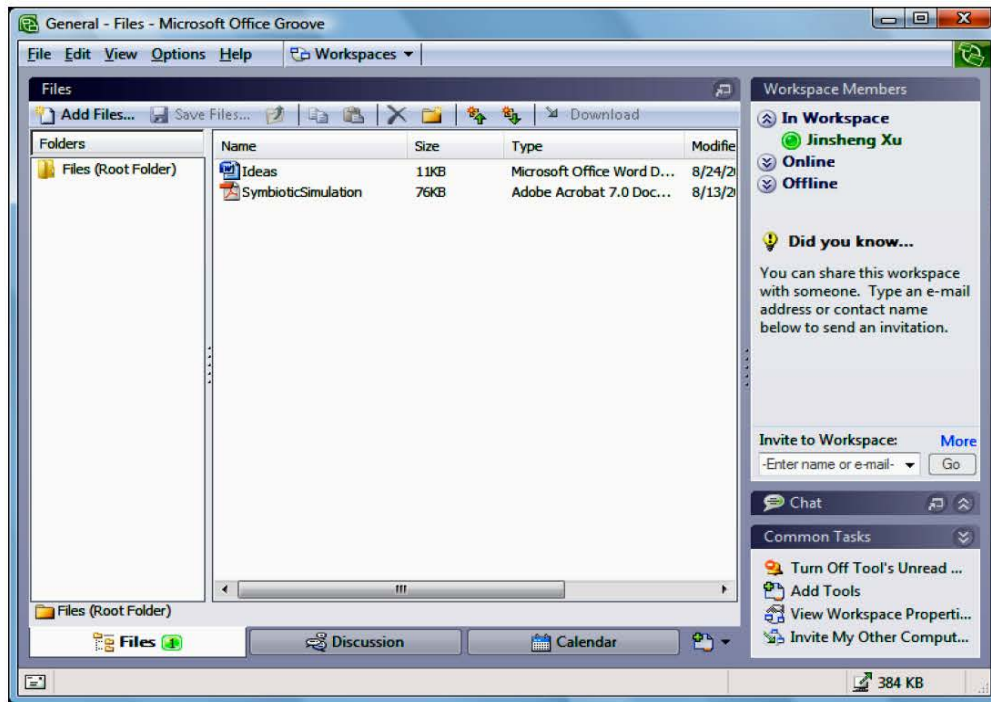


Fig. 2: File-sharing feature of Microsoft Office Groove. It is a client-server and peer-to-peer hybrid collaboration of tool that has other features including simple calendar, discussion, folder synchronization and more

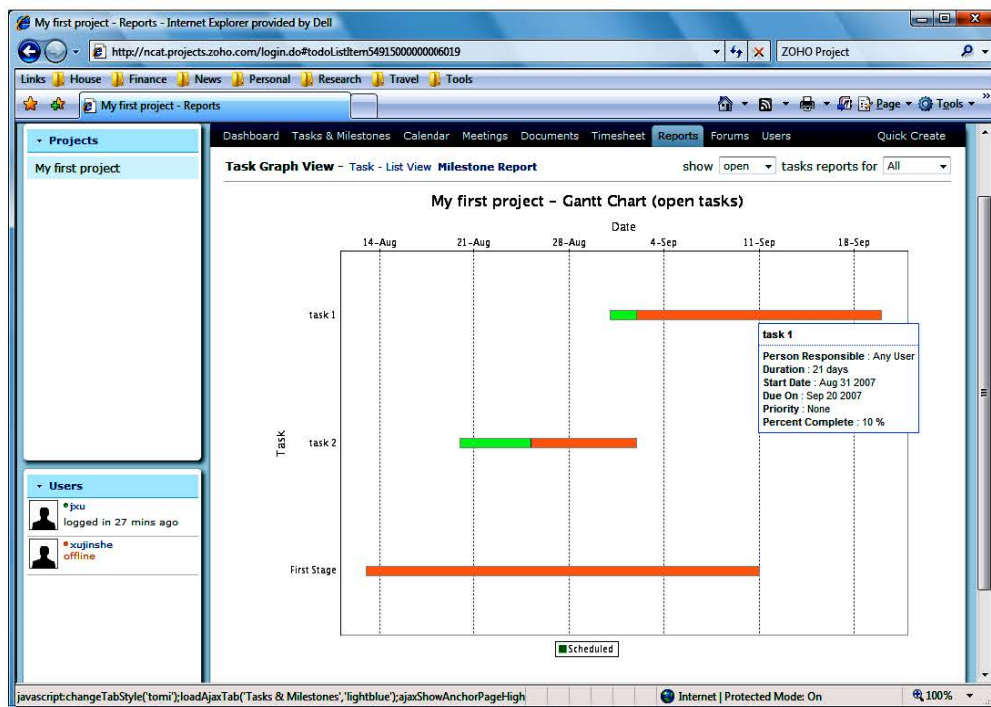


Fig. 3: Gantt chart report feature of ZOHO Project. This tool also has other features including: tasks, milestone, time sheet, calendar and file sharing

remind participants when a new appointment is scheduled or an upcoming event is imminent. The common method of reminding is typically by email for web based collaboration tools. With desktop integration the reminder could be a popup message box. Calendar sharing allows users to see others' schedules and make group-scheduling decisions. Some tools can automatically detect scheduling conflicts in the users' calendars.

**Project management:** Project management is a complicated process. The tools we tested provide only a part of project management requirements. The common features include tasks, milestones, time sheet and Gantt chart. A task is also known as a to-do. The properties of a task usually include a start date, end date, progress, status and participants. Users can update the status of a task in by the percentage completed. Important events in a project can be marked using the milestone feature. A milestone may consist of multiple smaller tasks that achieve the goals of a milestone. Time sheet allows user to record the amount of time they have worked on a project. Some of the tools provide Gantt charts to represent activities of a project. A screenshot of ZOHO project showing Gantt chart is shown in Fig. 3. ZOHO project is a collaboration tool that is targeted to project management.

**FEATURE TABLE**

The features of the ten collaboration tools we tested are shown in Table 2. Microsoft Office Groove 2007 is a very convenient tool for collaborators to work on the same documents. Compared to web-based file sharing where files have to be checked-in and checked-out, Microsoft Office Groove 2007 provides user-transparent automatic file synchronization. It can also file a folder by folder synchronization that makes it possible to

automatically share newly created files inside a folder. It provides a simple Instant Messaging interface for users to communicate. Unfortunately, the calendar feature does not provide automatic notification. There is no project management feature for Microsoft Office Groove 2007. Collanos Workplace is free software that is similar to Microsoft Office Groove 2007 in file sharing. However, it is a little less convenient than Microsoft Office Groove 2007 because the shared files have to be put into a specific directory and has no server caching of changes as described before. It does not provide the important calendar feature. It has a simple task feature in project management, but it lacks other important project management features. Zimbra is an email-centered collaboration tool that has one of the most powerful group calendar features. The web-based email client identifies some keywords such as phone number, date, location and email address, which lets users conveniently launch different actions by clicking on them. There is a tight integration between email and calendar. It has relatively simple file sharing and it does not provide project management features. Basecamp, Blue Tie, ZOHO Project and WebEx WebOffice are commercial web-based collaboration tools. PHPProjekt and eGroupware are free web-based collaboration tools. Basecamp provides relatively strong project management but it lacks calendar support. ZOHO Project has one of the best project management supports with an easy to use interface. Project management and calendar are tightly integrated. Blue Tie has strong communication features but weak project management features. WebEx WebOffice, PHPProjekt, Microsoft SharePoint Server and eGroupware are the most comprehensive collaboration tools, as they provide more features than other tools and support more ways of collaboration. However, except for Microsoft SharePoint Server, these features are rather independent which makes the software lack the central theme.

Table 2: Feature table of asynchronous collaboration tools

Asynchronous collaboration tools	Communication		Electronic calendar		Information sharing				Project management		
	Email	IM/ Chat	Shared calendar	Automatic notification	File sharing	Discussion	Wiki	Polls	Tasks	Time sheet	Gantt chart
Microsoft Office Groove		X	X		X	X					
Collanos Workplace		X			X	X			X		
Zimbra	X		X	X	X						
Basecamp		X			X				X	X	
ZOHO Project			X	X	X	X			X	X	X
Blue tie	X	X	X	X	X				X		
WebEx WebOffice	X		X	X	X	X		X	X		
PHPProjekt	X	X	X	X	X	X		X	X	X	X
eGroupware	X		X	X	X		X		X	X	X
Microsoft Sharepoint Server	X		X	X	X	X	X	X	X		X

## CONCLUSION

We identified common features of asynchronous tools based on this experiments and online documentations. We organized the common features by four major functional categories: communication, information sharing, group calendar and project management. The best collaboration tool is the one that meets users' needs. This study helps readers in making the right choices. Improving the quality of features in terms of ease of use, stability and performance is very important for collaboration tools. Integrating seemingly independent collaboration features and improving ease-of-use can make a new and more powerful way of collaboration.

## REFERENCES

- Barger, D., A. Gupta, J. Grudin, E. Sanocki and F. Li, 2001. Asynchronous collaboration around multimedia and its application to on-demand training. 34th Annual Hawaii International Conference on System Sciences, Maui, Hawaii. January 3-6, IEEE Xplore, London, pp: 10-10.
- Kock, N. and J. Nosek, 2005. Expanding the boundaries of e-collaboration. *IEEE Trans. Prof. Commun.*, 48: 1-9.
- Lefebvre, E., L. Cassivi, L.A. Lefebvre and P.M. Leger, 2003. An empirical investigation of the impact of electronic collaboration tools on performance of a supply chain. Proceedings of the 36th Annual Hawaii International Conference on System Sciences, Big Island, Hawaii, January 6-9, IEEE Computer Society, Los Alamitos, CA., pp: 178-178.
- Li, S.F., Q. Stafford-Fraser and A. Hopper, 2000. Integrating synchronous and asynchronous collaboration with virtual network computing. *IEEE Internet Comput.*, 4: 26-33.
- Peden, J., W. Burleson and C. Leonardo, 2000. The multimedia online collaboration architecture: Tools to enable distance learning. Proceedings of IEEE International Conference on Multimedia and Expo, Vol. 2, NY, USA, 30 July-2 August, IEEE, Piscataway, NJ., pp: 593-596.
- Riboulet, V., P. Marin and J.C. Leon, 2002. Towards a new set of tools for a collaborative design environment. 7th International Conference on Computer Supported Cooperative Work in Design. September 25-27, Rio de Janeiro, Brazil, pp: 128-133.