Chapter - 4

Groupware as a Modern Tool for Collaboration

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Groupware as a Modern Tool for Collaboration

Developments in the field of Computer Science and Information Technology (IT) have undoubtedly supported almost all walks of our life. Business is no exception. The very style of doing business has been changed because of the technological capabilities provided by the IT. One of the very important aspects of the successful business organizations, as discussed in the previous chapters, is the effective collaboration among the group / team members. Today, there is a modern tool called Groupware, which is helpful in making group activities better collaborated, coordinated and timely communicated. Groupware is a computer supported tool that is being used to enhance the performance in group work environment in almost all kinds of business organizations and even in different kinds of social interactive environments. There are various kinds of Groupware and all of them may have same or different types of capabilities to support group functions. Thus there is a need to clearly understand the term for the purpose of this research. Following paragraphs in this chapter will elaborate all the necessary aspects of this modern tool of collaboration called Groupware.

4.1 Understanding and Defining Groupware:

Groupware can be understood as application software with network technology. It is defined as “Software designed to facilitate collective working by a number of different users.”

“A computer application that allows its users to collaborate with each other”

Peter and Trudy Johnson-Lenz have first used the term ‘Groupware’ as they claim while responding to an enquiry from Oxford English Dictionary in April 1994 “We first coined the term "groupware" in our research notes on October 4, 1978 during our work with Murray Turoff and S. Roxanne Hiltz on the Electronic Information Exchange System (EIES) at the New Jersey Institute of Technology.”

The same is claimed by them in their paper “Rhythms, Boundaries, and Containers: Creative Dynamics of Asynchronous Group Life” where they have given one of the oldest definitions of the Groupware as “Intentional group processes plus software to support them.” They further extended their definition to include cultural factors such as myth,
values and norms as they say “The computer software should reflect and support a group’s purpose, process, and culture.”

There are large numbers of definitions for the Groupware. Webopedia.com defines the Groupware as “A class of software that helps groups of colleagues (workgroups) attached to a local area network organize their activities. ...Groupware is sometimes called workgroup productivity software.” PC magazine encyclopedia defines the term as “Software that supports multiple users working on related tasks in local and remote networks. Also called "collaborative software," groupware is an evolving concept that is more than just multiuser software which allows access to the same data. Groupware provides a mechanism that helps users coordinate and keep track of ongoing projects together.”

Early researchers in the field of collaborative work have somewhat same approach to understand the groupware. Today, the term has the broad perspective which includes many group environments where there is no need of cooperation. Early researchers have also fore sought this kind of groupware. As Ellis C.A. et al defines “We propose a somewhat broader view, suggesting that groupware be viewed as the class of applications, for small groups and for organizations, arising from the merging of computers and large information bases and communications technology. These applications may or may not specifically support cooperation.”

In general, any hardware and/or software that can be used to communicate, co-ordinate, and effect collaboration among the members of any group according to their roles in the group, is called the Groupware. For the purpose of this study, the Groupware can be defined as computer software aided with networked technology that is used to support collaborative needs in group environment.

From the above discussion it is understood that Groupware is a tool that helps in collaboration among team members. There are two dimensions to collaborative needs: ‘Place’ and ‘Time’. People working on shared goals may be situated at the same or at distant locations. Technology has enabled the members of group to work for common goal without being co-located. Another dimension for collaborative needs is ‘time’. There may be requirement of information sharing in real time or it can be done even at
later time that is in non-real time. For example, if there is need to exchange / share information among two or more members working in the same project immediately, it can be termed as real time or synchronous collaboration and if the requirement of collaboration is not immediate it is termed as Asynchronous or non-real time collaboration. The time is very critical in some functions of group work environment. Thus, we can classify the collaborative needs based on time dimension. Accordingly, the Groupware which is used to fulfill the collaborative needs can be classified into two categories:

(a) Synchronous

(b) Asynchronous

“Groupware applications are commonly classified as synchronous or asynchronous depending on the type of interaction they support. Synchronous applications support closely-coupled interactions that allow multiple users to synchronously manipulate the shared data. During synchronous manipulation, all users are immediately notified about the updates produced by other users.…..Asynchronous applications support loosely-coupled interactions that allow users to modify the shared data without having immediate knowledge of the modifications that are being or have been produced by other users.”

The classification of Groupware on two dimensions – Time and Space; is better understood when both dimensions are merged to get four quadrants (a 2×2 matrix). Through literature review it is clear that R. Johansen in 1988 introduced Time – Space Matrix for the first time to understand the different needs of collaborative systems in his literary work titled “Groupware: Computer Support for Business Teams.” A software to be qualified as Groupware must be able to support all the four kinds of collaborative needs –

(i) Same Time & Same Place

(ii) Same Time but Different Place

(iii) Different Time but Same Place

(iv) Different Time & Different Place
Following is the Johansen’s Matrix as cited at many places in Collaborative literature:

<table>
<thead>
<tr>
<th></th>
<th>Same Time</th>
<th>Different Time</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Same Place</strong></td>
<td>Face to Face interaction</td>
<td>Asynchronous Interaction</td>
</tr>
<tr>
<td><strong>Different Place</strong></td>
<td>Synchronous Distributed interaction</td>
<td>Asynchronous Distributed Interaction</td>
</tr>
</tbody>
</table>

Exhibit 4.1: Johansen’s Time space Matrix

The Groupware tools are thus divided into synchronous and asynchronous categories and the designers have developed variety of software to meet the different needs of group/teams under both the categories. These will be discussed in detail in coming paragraphs.

One important aspect of groupware is that it maintains the social structure of the groups. It integrates the social requirement with technological support. It is a kind of software that arranges the activities of different members in such a way that each is well aware about each other members and their roles in the group. “Awareness support is an essential part of Groupware”¹¹ says Tom Gross in his paper “Supporting Effortless Coordination: 25 Years of Awareness Research”.

“Groupware is distinguished from normal software by the basic assumption it makes: Groupware makes the user aware that he is part of a group, while most other software seeks to hide and protect users from each other (…) Groupware (…) software that accentuates the multiple user environment, coordinating and orchestrating things so that users can “see” each other, yet do not conflict with each other.”¹²

Today, there are numbers of social software that are fulfilling the definition of Groupware; for example, Facebook, Twitter, Whatsapp etc. They support large number of people to form different groups and share information among them. “Social Software refers to technology that typically offers flexible support for multifarious activities and types of social interaction for diverse social settings ranging from small groups to large communities.”¹³
4.2 Evolution of Groupware:

In today’s business and social environment there are number of tools that falls under the category of groupware. Almost every person in the social environment is used to this technology either having understood the technology as groupware or even without having such knowledge. So today there is vast usage of groupware not only in the area of business but also in other social environments such as Facebook, Twitter, Blogs, Whatsapp etc. But the question is, how has this journey started and who should be given the credit for it. Through the literature review it is traceable to Douglas Engelbart who is being termed as the father of this modern tool of collaboration called Groupware.

Douglas Engelbart published a paper “Augmenting Human Intellect: A Conceptual Framework” in October 1962 as a document for the Director of Information Sciences of the U.S. Air Force office of Scientific Research. In this paper his collaborative concepts were known to the world for the first time. He had a vision for people to work together in complex and urgent situations in vast information space with computers. He says “Our culture has evolved means for us to organize the little things we can do with our basic capabilities so that we can derive comprehension from truly complex situations, and accomplish the processes of deriving and implementing problem solutions. The ways in which human capabilities are thus extended are here called augmentation means.”

He defined four such basic classes:

(a) Artifacts
(b) Language
(c) Methodology
(d) Training

For the first time in world, in 1968, Douglas Engelbart presented a live demonstration of a kind of tool which can be termed as Groupware. “Far ahead of his time, Douglas Engelbart flabbergasted his audience in a special session at the 1968 Fall Joint Computer Conference in San Francisco with a live demonstration of NLS (oNLine System; later commercially available as Augment), an integrated prototype
that featured on-screen video teleconferencing, shared-screen collaboration and telepointing between Engelbart on the podium at the conference and Bill Paxton from the SRI lab in Menlo Park."

In computing literature at many occasions Douglas Engelbart has been recognized as the person who invented the Groupware. “Engelbart's many innovations include the computer mouse, multiple on screen windows, groupware and linked hypermedia, as well as on line publishing.”

Various group support tools kept on developing according to the need of computing generations. But the interesting journey of groupware can be traced to the development of PLATO in 1960 for the purpose of education at University of Illinois. Professor Don Bitzer founded the Computer-based Education Research Laboratory (CERL) and along with other engineers developed a system called the PLATO. It became a platform for the ‘PLATO Notes’ which was released on 07 August 1973. In 1976 PLATO Group Notes was released and it became popular and remained so up to around 1982 before the introduction of IBM PC and MS-DOS by Microsoft. Since PLATO systems were based on mainframe architecture, it became a costly affair to continue with them. This has given an opportunity and a requirement to the development of ‘LOTUS Notes’, the first organized commercial Groupware.

The first release of Lotus Notes was launched in 1989. Ray Ozzie who had learning experience in CERL was working independently to develop a ‘Notes’ product on PC environment. It was Mitch Kapor, the founder of Lotus development Corporation who decided to invest money in Ray Ozzie’s efforts. In 1984 Ozzie founded Iris Associates Inc. under the contract and funded by Lotus and thus first release of the first commercial groupware became possible in 1989. Apart from Ray Ozzie the other developers were Tim Halvorsen, Len Kawell, and Steven Bekhardt.

Lotus Notes with network technology was the first groupware which was not only based on PC but has all the requirements to be called as Groupware. “The original vision of Notes included on-line discussion, email, phone books, and document databases… as networking became more capable, Iris began to speak of Notes as groupware. The term groupware (which eventually grew virtually synonymous with
Lotus Notes) refers to applications that enhance communication, collaboration, and coordination among groups of people.”

Lotus Development Corporations was purchased by the IBM in July 1995. This given financial strength to the developers of the Notes. Now Lotus had the capability to invest for long time projects for the development of the software. In November 2012, IBM decided to launch Notes/ Domino 9.0 Social Edition with IBM brand and dropping the Lotus brand.

Murray Turoff is one of the main contributors to the development of groupware. He, at New Jersy Institute of Technology, developed one of the earliest computer conferencing systems called EMISARI and EIES in 1976.

4.3 Various Tools that can be termed as Groupware:

There are number of IT tools that have been developed for the support of group work environment. These tools may be termed as Groupware but commercially available Groupware includes most of them as component in the large system. Some popular Groupware are Lotus Notes (now IBM Notes), Groupsystem, Windows for workgroup, Xerox’s Live Board etc. Some important tools or component of Groupware are discussed below:

(a) Computer Conferencing Systems: This is similar to popular messaging system- email. In case of email, it assists in interpersonal communication between two or more persons whereas the computer conferencing systems are meant to send a message to a uniquely identified place in cyberspace where the particular topic is to be discussed. EMISARI (The Emergency Management Information Systems and Reference Index) is considered to be the earliest known computer conferencing system. It was developed in 1976 by Murray Turoff. Other popular systems are Usenet, GIBIS etc. GIBIS supports four type of messages: Issue, Positio, Argument and other and relations between messages such as questions, suggestions, objection etc.

(b) Chat Systems: Chat systems provide text based computer mediated discussions between users. These systems are similar to email and computer conferencing
systems with small difference in purpose and implementation. In chat system, each letter that is typed is immediately observable at the other person’s screens. The chat system provides rapid turn taking in discussions. UNIX ‘Talk’ is the one of the earliest known chat systems. Now it is available at almost all messaging and social media platforms.

(c) **Workflow Management Systems:** These systems are developed to coordinate the actions of users in the group. The workflow management systems are meant to support & motivate and up to some extent impose on the users for their effective contribution at right time. These systems are embedded with the cooperative work environment. Users get support from others work through this system and are being monitored by every significant user. Some of the workflow systems are:

i. COSMOS  

ii. AMIGO  

iii. GRACE  

iv. DOMINO  

v. Staffware  

vi. InConcert  

vii. FlowMark

(d) **Electronic Meeting Systems:** These systems are installed in meeting rooms with a large common screen which is connected to a number of interconnected computers or terminals used by individual participants in the meeting. The meeting systems are designed to support in brainstorming, idea- generation, evaluation of ideas etc. The electronic meeting systems are advantageous in terms of providing parallel typing on the terminals and accumulating the ideas for discussion. These can be easily forwarded for sharing with others on the common screen. Some of the systems provide the opportunity for participants to remain anonymous while giving some ideas. The electronic meeting systems facilitate not only the text but also the designs, graphs etc for the meetings. Group Systems and COLAB were early systems developed by the Xerox.
(e) **Application Sharing Systems:** These systems allow multiple users to use the single user applications simultaneously without any modification. It takes output from the applications and presents it to the screens of the multiple users. The earliest system was NLS/Augment developed by Douglas C. Angelbart. It was the first system which could be called as groupware. It does not have any private space, the entire screen was shared and thus each user could see the same on his screen.

(f) **Shared Whiteboard:** This facilities object to be immediately visible on all users screen which is drawn on the shared work space. Then users can view the object and interpretations and suggestions can be made on it. These come either as bit based or vector based whiteboard systems.

(g) **Co-authoring Systems:** These systems are developed to support creating a document by multiple users. There are some documents which are created jointly by few members of the group. These systems are especially designed to support such shared efforts. There may be different phases in authoring a shared document such as brainstorming, planning, research, content writing, reviewing the contents, amendment by users etc. These systems support at all such phases in authoring. The shared documents can be edited by the users either simultaneously or sequentially. These systems also provide annotations and versions on the documents. They support coordinating all the activities in the authoring process. Some popular authoring systems are Quilt, GROVE and SEPIA.

(h) **Group Scheduling Systems:** These systems provide scheduling of meetings and other important activities of the group. Some early and well known systems are RTCAL, PCAL, Microsoft Schedule+, Lotus calendar and Novell Groupwise Calendar. These systems are based on email working system. The working of these systems involves the exchange of special type of messages such as invitation, acceptance, decline and acknowledgements.

(i) **Audio Conferencing System:** The telephone system allows two or more users to interact each other by voice over the distance. Therefore, these can also be termed as groupware.
(j) **Video Conferencing Systems:** Like audio conferencing systems video conferencing systems also allow two or more users to interact each other over the distance but unlike to audio only systems it allows audio as well as visual experience in conferencing. In these systems users can feel sitting together as they not only enjoy talking to each other but also can see to each other while talking on visual display systems.

(k) **Collaborative software Engineering Systems:** Software engineering needs a high degree of collaboration among team members. Jim Whitehead has categorized collaborative software engineering systems into four broad categories in his paper titled. “Collaboration in Software Engineering: A Roadmap”, these are:

   i. Model based Collaboration tools
   ii. Process Support tools
   iii. Awareness tools
   iv. Collaboration Infrastructure

(l) **Multi-user Hyper Media Systems:** Hypermedia is about building systems for information representation and management around a network of multimedia nodes connected together. Charles W. Balilsy Jr. has explained the hypermedia systems as “Hypermedia systems typically allow users to create and edit component multimedia nodes and links as well as to import multimedia information from external sources.” Today there are large numbers of multi user hyper media systems.

4.4 **Research and Development in Groupware Technology as CSCW:**

CSCW (Computer-Supported Cooperative Work) and Groupware are the two terms which are closely related and at many places in Collaborative literature has been used as synonyms. Both are definitely closely related to each other but are not the same. The difference can be understood as “Groupware is considered to be the enabling technology, be it hardware, software, services and/or techniques, which allow people to work in groups. CSCW, on the other hand, focuses on the study of tools and
techniques of groupware as well as their psychological, social, and organizational impact.” 27

For the first time, the term CSCW was used by the Irene Grief and Paul Cashman in 1984 when they organized a workshop and invited participants 28. They invited people from different disciplines to discuss how people work and how technology can support them and coined the term “Computer Supported Cooperative Work” to describe the same 29. After this workshop, CSCW workshops were organized in USA and Europe on regular basis. For the first time, the workshop with CSCW label started in USA (Austin, Texas) in 1986 and in Europe as ECSCW workshops in 1989 in London. 30

The 18th ACM conference on CSCW, being held from 14 March to 18 March 2015 in Canada describes the term as “CSCW is the premier venue for presenting research in the design and use of technologies that affect groups, organizations, communities, and networks….CSCW encompasses both the technical and social challenges encountered when supporting collaboration” 31

Ronald M. Baecker defines the CSCW as “We define computer–supported cooperative work (CSSW) as computer –assisted coordinated activity such as communication and problem solving carried out by a group of collaborating individuals. Groupware is the multi-user software supporting CSCW systems.” 32

The CSCW is basically concerned with the continuous development of tools and technologies such that the growing need of support to group work environment can be made available. “The field of CSCW aims to achieve a deep understanding of work and other types of social interaction and to develop adequate technical concepts and tools for social interaction in groups and communities.” 33

With the above discussion on CSCW it is clear that CSCW is the area with interdisciplinary approach to provide a common platform for the study and research on group, group process and design & development of technology to support them. CSCW is concerned with the design and development of tools for collaboration and Groupware is the tool that is being used for the collaboration.
4.5 Implementation Issues:

The implementation means using the groupware for the purpose of collaboration. Each and every organisation has requirements of different kinds of collaboration and may be different at different levels. There is a need not only to select proper groupware but also to understand the implantation issues which may help in proper usage of the system. It is important for the success of Groupware that most of people in the organisation realize its usefulness and accept working on it. This problem is highlighted by the Saul Greenberg in his paper “Personalizable Groupware: Accommodating individual roles and group differences”. In his paper he writes “…the differences present between groups as whole are a serious obstacle to achieving uniform acceptance of the groupware product, especially when the product treats all people and groups identically.” The implementation issues are important to understand because they may result in failure of the system. Some of the important issues are discussed in following paragraphs:

(i) **Design Challenges and Implementation Issues:** The developers of Groupware are having two kinds of challenges; the first is the understanding of technical tools for design and development of the collaborative software and secondly, integrating the technical knowledge with the social needs for which they need to understand social group processes that are to be supported by the technology. Thus, the first issue for the effective implantation is the design of the Groupware that should not only be technically capable to support collaboration but also must be in accordance with the social group processes.

(ii) **Customization of Groupware:** The members have different roles and responsibilities in the organisation, they need the software for collaboration to be customized according to their role and responsibility. The implementation of the Groupware will be more effective if the Groupware is capable of being customized as needed in various roles. Saul Greenberg has emphasized on the personalizable Groupware to which he defines as “....groupware whose behaviour can be tailored to match the particular needs of group participants
(i.e. each member of the group may observe a different behaviour), and the particular needs of the group as a whole (i.e. each group may observe a different collective behaviour).”

(iii) **Awareness of the Technology:** The implementation should be facilitated with the training needs of the operating procedure and adjustment between the technology and social processes.

This chapter has included detailed study on the Groupware based on the available literature on the subject. The enhancement of basic understanding of Groupware has been the main objective behind this chapter. The groupware can be defined as integrated application software which is especially designed to meet the collaborative needs of the organisations at all levels of management and is supported by network technology. The chapter has also tried to explain the similarity and difference between the terms groupware and CSCW which are used as synonyms at many places in literature. The tools that are used for collaboration are also discussed in this chapter. These tools were developed at different times according to the need of time and interest of developers. Today, majority of such tools are combined together to make a Groupware. Each computer supported tool that can be used for any collaborative activity can be called as a groupware. For the purpose of enlarging usefulness and commercial needs, the developers have combined various such tools to make an integrated system. At the end of this chapter, implementation issues are discussed. These are necessary to be included in this chapter because without proper implementation the very objective of groupware installation may fail and organisation may land in wastage of resources without getting any desired result.

**References**


Ibid.


Gross T. op. cit. p. 426


Ibid.


Ibid.

Ibid.


Schmidt, K., & Bannon, L. (2013). op. cit. p-346


Gross T. op. cit.p-425


Ibid. p-3