GROUPWARE: A KEY TO MANAGING BUSINESS TEAMS?

Christine V. Bullen
Robert R. Johansen

May 1988

CISR WP No. 169
Sloan WP No. 2013-88

Center for Information Systems Research
Massachusetts Institute of Technology
Sloan School of Management
77 Massachusetts Avenue
Cambridge, Massachusetts, 02139

GROUPWARE: A KEY TO MANAGING BUSINESS TEAMS?

Christine V. Bullen
Robert R. Johansen

May 1988

CISR WP No. 169
Sloan WP No. 2013-88

Center for Information Systems Research
Sloan School of Management
Massachusetts Institute of Technology

GROUPWARE: A Key to Managing Business Teams?*

I. Managing Business Teams

Business teams are becoming a way of life in many organizations. Business teams tend to be deadline driven and focused on specific tasks. The participants in a business team typically are assigned because of their ability to contribute, rather than on the basis of bureaucratic obligations. Thus, unusual combinations of people are usual within business teams. Business teams are cross-organizational, cross-divisional, and sometimes even cross-company. They are small in size and fast on their feet.

Business teams are seen by many as a wave of the future. Peter Drucker, for example, expects that, in the organization of the future, "Traditional departments will serve as guardians of standards, as centers for training, and the assignment of specialists; they won't be where the work gets done. That will happen largely in task-focused teams." (HBR, Jan-Feb, 1988). Robert Reich urges managers to "honor our teams more, our aggressive leaders and maverick geniuses less." (HBR, May-June, 1987, Page 78).

*Parts of this article are adapted from Dr. Johansen's new book Groupware: Computer Support for Business Teams (The Free Press, 1988)

The authors wish to thank Tom Malone, Judith Quillard and Ken Lyon for their helpful suggestions regarding this paper.

The vision of business teams, however, is often not easy to implement. Business team approaches do not provide instant answers to management's problems. In fact, there are basic management questions to resolve with regard to business teams. How do team members communicate, especially if they are geographically separated? How will team planning and coordination occur? How do results get pulled together? How can unproductive duplication of effort be minimized? How can managers contribute leadership to the team, without holding it down? How do the activities of business teams match up with conventional departmental activities?

These are very difficult questions which raise important managerial issues associated with the concept of business teams. The focus of this paper is on concepts, tools and techniques that can help to answer such questions regarding the organization and management of business teams. It is logical to expect that information technology will be able to relieve some of the pains of organizing and conducting business teams. In particular, can the ubiquitous personal computer help business teams?

Unfortunately the personal computer has been TOO personal to be of much use to business teams. But this situation is beginning to change.

The dramatic growth of the personal computer as a manager's tool has been fueled by individual needs to carry out

structured tasks. Spreadsheets were the key to the first set of applications, followed by other financial analysis tools, word processing and database management. Slowly, communications tools such as electronic mail have been accepted by users. But individual applications are still the norm. Even in the case of timeshare computing (where a number of users can share a central computer resource), the central computer views each user separately. Timeshare computing is typically an aggregation of individual users, rather than teams of people working with each other through the system.

As powerful a tool as the personal computer has been, it was not designed with the notion of business teams in mind. In many basic office tasks, the typical worker - manager, professional, executive or secretary - needs to communicate all or some portion of what he or she is doing to someone else. In the majority of instances, such collaborative needs were not considered when creating the personal computer hardware and software tools. As a result, much of the software (and hardware in many cases) actually hampers a user's ability to share or communicate the work.

Recently it has become clear that users are frustrated by the inability to collaborate with their co-workers through the computer tools they have become accustomed to using. And therein lies a major motivation for a new development in information technology.

Gradually, single-user software is giving way to "groupware," a generic term for specialized computer aids designed for the use of collaborative work groups such as business teams. Groupware is not a thing. Rather it is a perspective on computing that emphasizes collaboration - rather than individual use. Groupware is a step in the transition from the personal computer to the interpersonal computer.

As Peter Drucker has pointed out, there is a strong current trend in organizations to use teams; in the future, teams are likely to be a primary way work is carried out. There is in fact a natural tendency for work to be done by more than one person. Most business tasks incorporate the need to communicate, show, report, get approval for, or otherwise involve others. This natural tendency has been a factor in the accomplishment of work for decades. In addition, faced with an increasingly complex environment, management has also consciously chosen to respond to problems through the use of specialist teams. At a minimum, business team approaches require the use of methodologies for project control and the facilitation of communications among team members. Because complex tasks must be carved up into smaller ones which can be carried out by individuals with the appropriate expertise, business teams create the need to manage, coordinate, and integrate the results of the individual work.

The emerging computer tools that support this kind of group work cover a wide range of capabilities. Therefore it is difficult to categorize and talk about them. An indication of the newness of this field is that there are many names used to designate it:

- "computer supported cooperative work" (CSCW)
- "technological support for work group collaboration"
- "computer supported groups"
- "collaborative computing"
- "interpersonal computing"
- "coordination technology"
- "group decision support systems"
- "augmented knowledge workshops"
- "flexible interactive technologies for multiperson tasks."

Most of these are awkward to say the least. Business users are settling on the generic term "groupware"* since it is short, easy to pronounce, and quite descriptive. Can groupware meet the needs of business teams?

*The first major business press use of the generic term groupware was a Fortune article entitled "Software Catches the Team Spirit" (June 8, 1987). Since then other mass market uses of the generic term have followed, including several articles in the Wall Street Journal.

II. Business Team Needs

TEAM MEETING NEEDS

Business teams rely instinctively on face-to-face meetings, which are today's most natural means for group communication. Typically, the need is for a meeting, where team members come together to express their personal views, discuss possible actions, and decide what the team should do. The meeting styles and leadership vary greatly, but the meeting - when it works - provides formal and informal links among the participants.

Face-to-face meetings, however, do not always work. For example, people often complain that business meetings are poorly organized and that participants leave the meeting with different understandings of what happened. Meetings may not allow everyone to say what they wanted to say. Team members may never reach the agreement they wanted to reach. How can a groupware perspective relieve some of these meeting pains for business teams?

Today's meeting rooms, even in high-tech companies, tend to be decidedly low-tech. The range of available equipment usually includes such advanced tools as a flip chart pad, an overhead projector, a white board, and perhaps a slide projector. Even business teams that are equipped with advanced

computing capabilities in their individual offices typically have very few technology resources in their face-to-face meeting rooms.

One possible first step is to bring a personal computer into the meeting room. Eastman Kodak, for example, now has a product called Datashow that connects directly to an overhead projector to allow projection of any PC image. Building on the existing conference room infrastructure (i.e., the overhead projector), this inexpensive device allows a team to look simultaneously at anything one of its members has created on a PC. Such a system lends itself to presentations as well as to discussions of draft reports or even brainstorming sessions.

Taking a further step, a small company called Meeting Technologies provides a facilitation service, where their people come into a team meeting with a variety of computer aids in order to support the meeting activities. They have lashed together three Apple Macintosh computers and developed their own software for recording discussion high points in formats similar to those used on flip charts in today's meetings. Graphics capabilities allow the linking of ideas and the exploring of various relationships. Projection devices, such as Datashow described above, are used during the meeting so participants can see what the facilitator is typing and make additions as appropriate. A laser printer (usually in the back of the room) allows all team members to leave the room with a written record of what has

happened. This ability to have comprehensive notes is proving very attractive to team members who have experienced misunderstandings over who said what, or who promised to do what, by when.

In this example, all of the information technology tools are carted around by Meeting Technologies - like a rock group on tour. Such equipment also can be permanently installed in an organization's conference rooms. One such room has been created at Prudential Insurance in Boston.

Some experimentation is being done with hand-held polling devices that allow team members to vote on key items. This suggests an even more technologically advanced concept for a meeting room - one where each team member has his/her own workstation. At Xerox's Palo Alto Research Center, such a room is now in operation for a team of artificial intelligence researchers. The room, called Colab, was motivated by a realization that the team members had elaborate information technology support in their individual offices, but when they went into a conference room to meet, they had only a whiteboard. Colab seeks to move beyond the whiteboard.

Colab is a room where six workstations are interconnected with a projection screen that displays output from all the screens, or from some selected subset. Specially designed software facilitates common tasks with which this team is

involved, such as brainstorming and proposal review. In the case of brainstorming, all the participants can type in ideas at once (unlike a normal face-to-face meeting where only one person can talk at a time), with each idea projected on various parts of the screen. At the next stage, the software assists the team in exploring relationships among the ideas, defining them in more detail, and setting priorities for them.

Such software assistance in recurring group tasks is also being explored in a series of research laboratories as "group decision support systems" (GDSS). In the late 1970's the notion of decision support systems was introduced as the use of computers to "(1) assist managers in their decision processes in semi-structured tasks; (2) support, rather than replace managerial judgment; (3) improve the effectiveness of decision making, rather than its efficiency."* If the word "team" were substituted for the word "manager" in the above definition, it would perfectly describe the idea of group decision support. The concept of GDSS is being explored at research centers such as the University of Arizona, Claremont Graduate School, University of Minnesota, University of Michigan, and the Microelectronics and Computer Technology Corporation (MCC). This ongoing research is exploring specific team support tools that might contribute to supporting tomorrow's teams.

*Keen and Scott Morton, Decision Support Systems, Addison-Wesley, Reading, Ma., 1978, page 1.

Business teams are often under intense pressure to perform effectively and perform quickly. The organization and conduct of team meetings is a logical place to start the search for ways to help satisfy these critical demands.

ADMINISTRATIVE, FILING & FILTERING NEEDS

Business teams must also administer, file and filter information that often exists in a variety of different forms. Administrative needs include the preparation of information for team meetings and the multiplicity of tasks that make up project management. Filing is simply the storing (and, the team hopes, retrieving) of key information that may be important to the team's work. Filing cabinets and manilla folders are the base technology for filing, although computer databases and (less frequently) text bases are also used. Filtering is the sifting process that is inevitably involved in making sense out of large amounts of information. Filtering is most often done by individual people; many people, for example, tend to read only those articles that are recommended by a colleague. Bulletin boards also perform a piece of this function by highlighting items of interest for a team. For a business team, administrative, filing and filtering capabilities need to be shared at some level so that team members can benefit from each others work, avoid duplication of tasks, and avoid making mistakes that others have already made. Can the groupware

perspective bring the power of information technology to bear on this category of team needs?

One straightforward (though often not simple) team administrative task involves calendars for the team members, as well as their collective calendaring concerns, such as deadlines. Electronic calendars have been slow in gaining acceptance, most probably because they have been awkward to use and not nearly as portable as a trusty old black book. In addition, our interviews have suggested that some significant proportion of people consider their personal calendars as their last bastion of privacy. There have been few incentives to formalize one's calendar on a computer system and share it with others.

This situation is changing, however. New calendaring software is much more graceful to use. For example, a general office system called Higgins from Conetic Systems Inc., maintains strict privacy on the details of individual calendars. In order to help the user organize the various details of business meetings, Higgins provides links to notations, tickler files, and a name, address and telephone directory. When an authorized person attempts to find a mutually convenient time for a team meeting, a composite calendar is displayed with previously scheduled times blocked out, but containing no individual details. Portability of electronic calendars still does not

rival the black book you carry, but the ubiquity of the PC is improving access considerably. And, significantly, the growth of business teams is making the advantages of at least some shared calendaring more evident. Anyone who has tried to schedule a meeting with a team of busy people will be attracted to group calendaring.

Beyond calendaring, business teams often use various project management aids. Traditional aids (such as Gannt and PERT charts) can be incorporated into software that helps a team plan for project tasks and track its progress - or lack of progress. Team budgets can also be tracked using group versions of speadsheets, which can be linked directly to expenditure reports for automatic updating. Such filing and exchange of project status can be critical to ontime performance of business teams.

One of the basic problems of filing and filtering is the frequent lack of common organizing and search procedures. Indeed, most people tend to rely on people as sources of information they cannot find. These are usually people who work closely with them*. This lack of integration is often very frustrating for business teams who need to share information frequently and easily.

*Allen, T.J., Managing the Flow of Technology, MIT Press, Cambridge, MA, 1977.

Metaphor Computer Systems is a company that is attacking this problem for brand management teams in the consumer products industry. Their system is highly integrated, with capabilities for database storage and retrieval, statistical analysis, spreadsheets, word processing, access to outside data (e.g., from Nielsen surveys), and ability to exchange messages and work in progress with other team members. Metaphor provides integration of functions, giving all team members access to common files and common tools for filtering and analysis. There is a tradeoff here, however - Metaphor has been a closed architecture (i.e., it does not allow communication with other systems, except in limited ways) and its individual functionalities are often less powerful than what is available as standalone systems. Still, business teams will often be willing to trade specific functionality for commonality of access. Team members MUST work together. Powerful individual tools will be of limited value if they hamper information and task sharing.

The Information Lens, a prototype system built by researchers at MIT, is aimed specifically at information sharing. Originally designed using expert systems rules to set priorities for electronic mail receipt (and thereby filter out junk mail as well as receive high priority mail first), this system is now geared toward internal and external bibliographic retrieval as well. Business teams often must track important

developments both inside and outside of their companies. Systems like Information Lens help to make this process both more efficient and more effective. The power of such a system depends on the rules that are given to it by the team members. To the extent that business teams can articulate these rules, such systems can be very useful.

Adminstrative tasks, filing and filtering are critical processes for most business teams, and often result in the "organizational memory" that is of enduring value to the business. The current information technology tools are just beginning to support these tasks. There is considerable room for exploration of groupware tools in this category of team activities.

CROSS-DISTANCE MEETING NEEDS

Business teams in today's business world are often stretched across many locations, some of which may be many miles and many time zones apart. Mergers, acquisitions, and the globalization of business are just three of the many factors that are fueling this trend toward geographic dispersion. Getting the specialists needed for a new business team will usually mean recruiting people from more than one site. Generally a team will still have face-to-face meetings, but there will be times when the meetings will have to occur across (sometimes large)

distances. Are there ways in which groupware can help business teams meet when the members are not at the same location?

The most common tool for such cross-distance communication is also the most common "terminal" in the office -- the telephone. Although the telephone is generally viewed as a person-to-person medium rather than a group medium, this perception is changing.

Quietly, with minimal fanfare, a fundamental change has taken place in the last couple of years in the U.S. telephone network. Previously, AT&T customers who wanted to place conference calls on the public network were greeted by an often-surly operator, who plugged them into an ancient bridge that left most participants straining to hear who was saying what. Today, conference call requests on AT&T's public network are routed through an advanced digital bridge, called Alliance, that allows team members to talk to each other with a very "hot" signal, where everyone can be heard well, and can even interrupt each other in very natural ways. In addition, Alliance can carry a computer signal in parallel with the voice conversation. Thus a team can share both dialogue and computer-generated information across multiple sites through the telephone network. Such advanced digital bridges are increasing in capabilities and in generality of access, both for public and private networks.

Optel Communications, Inc. has developed a personal computer-based graphics system that can be used over the Alliance bridge (or other communications systems) to allow exchange of either drawings or presentation graphics. Business teams can discuss a graphic and annotate it on the fly through such a system. Communications software for PCs is rapidly expanding its capacity to provide for the exchange of graphic information across telephone lines. This is particularly important since many teams tend to think, work and communicate with graphics. For example, Techtron Imaging Network provides pre-press color production work for advertisers and store promotional displays. Using the Optel system a team (often composed of people from Techtron, an advertiser such as General Foods, and an advertising agency such as J. Walter Thompson) can exchange draft layouts, make revisions and review final versions of advertisements.

The notion of personal computer screen sharing among team members is just getting off the ground. Where word processing systems are often described in terms of WYSIWYG ("What You See Is What You Get"), screen sharing provides what Xerox researchers refer to as WYSIWIS -- "What You See Is What I See". Team members at different locations can be tied together with a conference call while simultaneously viewing and manipulating graphics on the personal computer screens. The software keeps track of who makes which changes at what time and helps to organize the communication visually.

Most electronic meetings among teams still have to be scheduled in advance in order to be sure everyone is present. However, many important team meetings occur spontaneously, often around coffee pots or in other socially conducive settings. In an attempt to use technology to encourage spontaneous team communications, researchers at Xerox's System Concepts Laboratory built a 24-hour audio, video and data link between two locations: Palo Alto, California and Portland, Oregon. Experience with R&D teams has suggested that some of the most important ideas come out of unplanned meetings. The researchers at Xerox wanted to study this phenomenon, so they designed a communications link to simulate an informal "coffee pot" meeting zone, even though the two ends of the zone were 580 miles apart. This experiment has now ended because of a reorganization at Xerox, but it provided an early look at what is possible, and some early guidelines for how it might be done. Other groups are now pursuing these ideas although we expect that they will take some time to develop. The electronic coffee klatch for business teams is still not quite there.

We expect that business teams will become more geographically scattered rather than less. The tools to assist cross-distance collaboration, however, are becoming more powerful, more available and less expensive.

ONGOING COORDINATION NEEDS

While meetings of business teams are important, it is often what goes on between meetings (or what does not go on) that determines success or failure for the team. Ongoing coordination is a clean-sounding designation for the often-messy process of hustling business team members along in the same direction. This coordination process increases in difficulty for teams whose members are rarely at the same place at the same time. What relief can the groupware perspective bring to business teams wrestling with the pains of coordination?

One typical coordination problem for business teams involves the difficult process of joint authorship, editing and review. When a business team is located in the same building, group authorship is typically done via a series of scrawled marginal notes, gradually centralized onto one copy and rekeyed any number of times, until the final product emerges. Rarely easy, group writing is made more difficult when team members are not co-located and cannot reach each other easily. Several software packages are addressing this process directly. These software tools help to structure reviews and revisions by remembering who made which changes, at what time; by maintaining earlier drafts for review; by using windowing technology to "swap" suggested changes into and out of the text. While currently these tools exist as specialized products, we expect

that such functionalities will be built into word processing tools in the near future.

Group authorship is aimed toward generating a formal document of some kind, but many important team communications are informal. Today, hand written notes are the primary medium, with a great assist from the introduction of yellow sticky notes. Memos, shared working notes, or other devices are also used by teams. Electronic mail has become more common, although today's systems are typically designed for person-to-person communication. Distributions lists are possible and folder creation for storing messages on an individual basis help to organize these communications. Gradually we expect electronic mail to adopt group communication functionalities, such as storage of messages by group or topic. Such group capabilities have been available in some companies for years (usually called "computer conferencing"), but the concept has been slow to catch on. We think the installed base of personal computers and local area networks will provide a critical infrastructure for group-oriented messaging.

One category of groupware tools beginning to emerge incorporates the unusual approach of "conversational structuring" to facilitate team productivity. One example of this is "The Coordinator" (Action Technologies, Inc.), which requires the group members to adhere to explicit forms of communication which

are enforced by the software. Most groups are extremely casual during the process of team meetings. This product imposes strict rules on team conversations turning casual agreements into formal commitments. If such rules are too heavy handed for the taste of a particular team, there will be problems. But the general area of conversational structuring is very hopeful indeed.

Ongoing coordination needs are critical to business team performance and groupware tools are well positioned to help. Such help will not come easily, however, since all team members will have to be committed to the use of the chosen groupware tools and all will have to go through whatever behavior changes are necessary.

CATEGORIES OF NEEDS

The previous discussion has placed the needs of business teams into four basic categories. Figure 1 summarizes these categories and highlights each with a listing of illustrative groupware tools. The first category, "Face-to-Face Meetings" can be clearly defined as those occasions when the business team is present at the same time in the same place. The groupware tools which are listed here, all fall into the category of information technology which enhances the activities taking place during an in-person meeting.

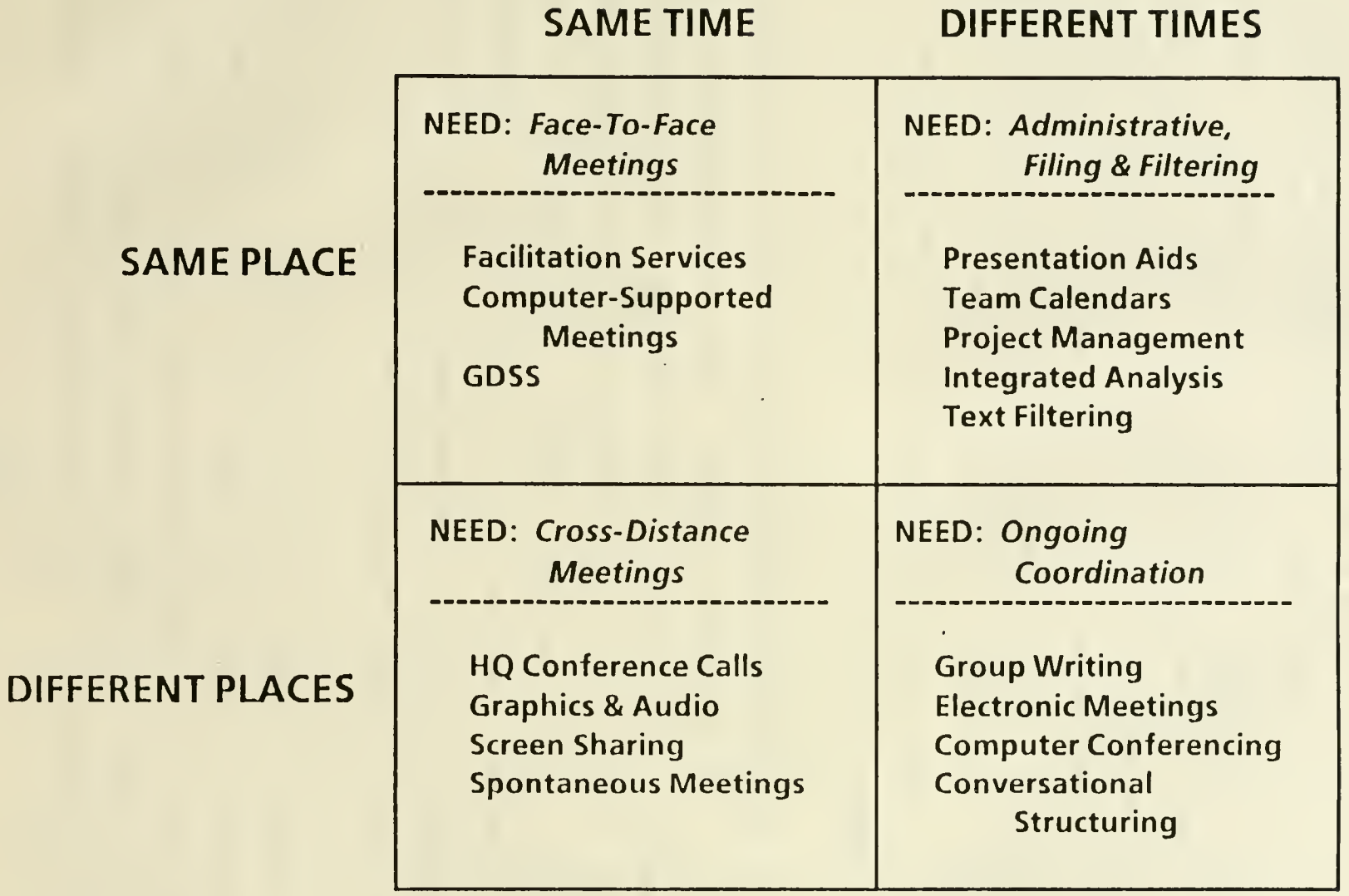

Figure 1: Basic Business Team Needs and Groupware Solutions

The second grouping, Administrative, Filing and Filtering Needs, can be thought of in two ways. First these are the activities that must take place in the background to support the work of business teams. Many of these tools are used to organize and manage information that will be used or referenced when the business team has face-to-face meetings. In this sense they can be viewed as needs that are carried out at different times, in support of team members that are at the same physical location. A second way of viewing these activities is that these are needs which are carried out at different times but in the same "virtual" place, i.e., the computing system supporting the business team.

In the third grouping we find the needs of Cross-Distance Meetings. As described earlier, these are instances when the team members plan to "meet" at the same time, but are located in different places. The valuable capabilities that groupware tools bring to these meetings include the ability to hold hastily-arranged meetings at a distance, view information simultaneously, manipulate text and graphics information from any location, and at times, see the other meeting participants.

Finally there is the grouping titled Ongoing Coordination. Here is where we find those electronic capabilities that to date have been most often used in support of business teams, specifically group writing, electronic mail and computer conferencing. As these examples illustrate, the power

of groupware tools in this category is the ability to keep the work moving in a productive manner when the team members are not actually in face-to-face contact.

We have found this two-by-two matrix very helpful in understanding current groupware products and in anticipating possible future directions. The examples we list are illustrative (not exhaustive), but they provide a taste for specific areas of need where groupware can make a difference.

III. Future Groupware Tools

Beyond current approaches to groupware, it is important to consider possible future directions that are worthy of pursuit. Building from the needs of business teams, we have developed a simple idea generation grid, shown in Figure 2. We start with two primary characteristics of group work:

- o process - the way the interaction is carried out and facilitated;
- o content - the subject matter being considered, discussed, or manipulated

We can look at groupware products and services which exist today and categorize each according to the extent to which the concept incorporates knowledge about the process and/or the content, and therefore, facilitates accomplishing the work. More importantly, this grid can be used to suggest new groupware tool ideas.

The lower left hand box represents the most general groupware products where there is no knowledge about process or content built into the tool. These products can therefore be used in any application areas. For example, unstructured computer conferencing provides a generalized environment for communications around topics without constraining how that communication takes place or what subjects are discussed.

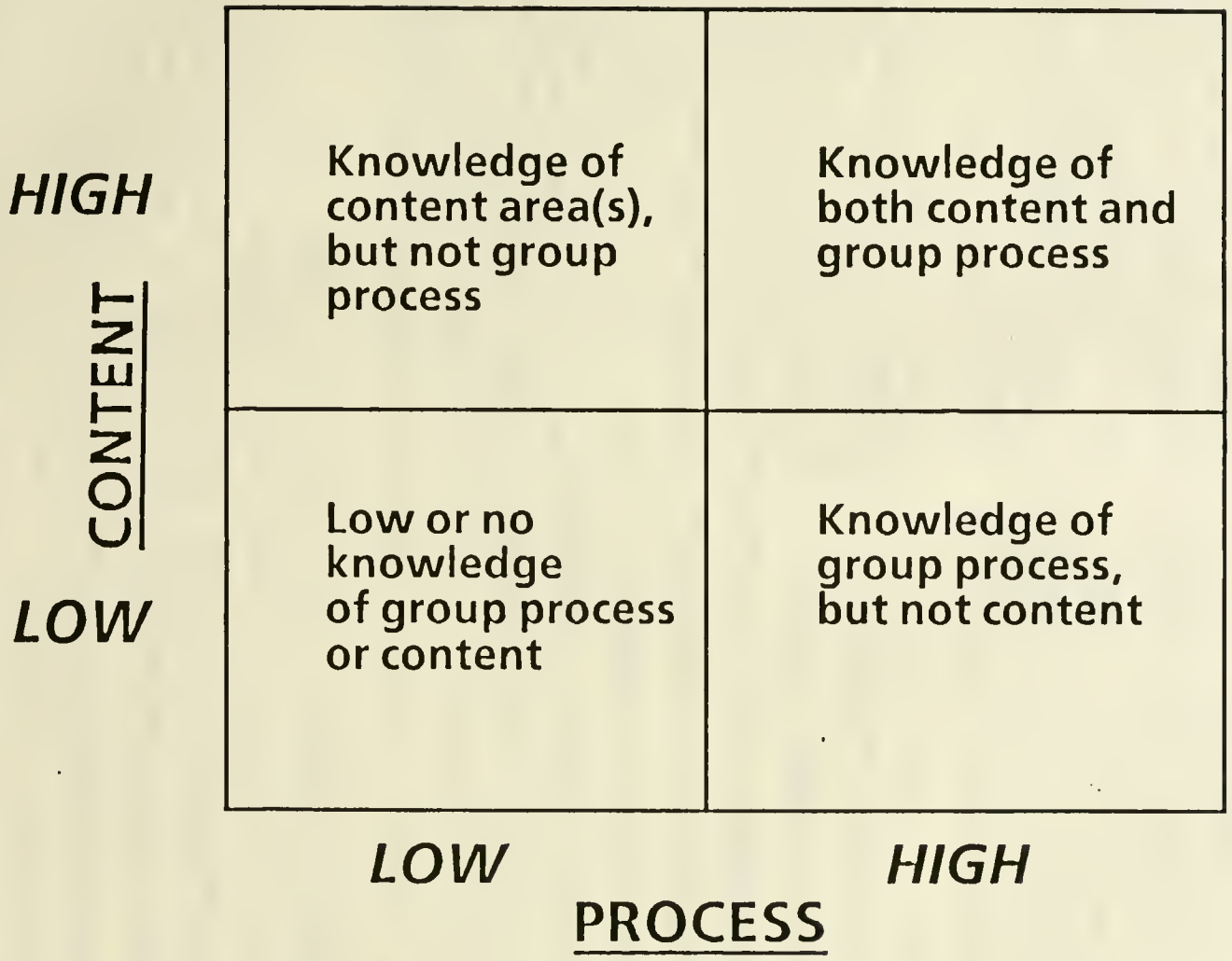

Figure 2: What Understanding Is Built In?

At the upper right hand corner are the most specialized products; those which incorporate knowledge about both content and process. One example of this category of groupware is Metaphor, the integrated system (referred to earlier) that supports brand teams. The calendering software described earlier might also be classified here in that its design incorporates knowledge about what kind of information and what procedures must be carried out to facilitate calendar management.

A third group of tools in this category are administrative software products which are directed at facilitating the standard office administration tasks. These tools provide one environment in which to perform various tasks such as calendar management, telephone directory maintenance, "things to do" lists, dated and timed "tickler" messages, electronic mail and reference notes. The best products in this class also tie all the entries together using database techniques. Some of the tools available in the marketplace include Higgins, from Conetic Systems, IBM's PROFS, and All-in-One from DEC.

Also here we find another class of products called design tools. Most of these existing today are quite specialized and used by teams of experts for systems design. These tools provide design environments to assist a team of people in carrying out tasks that range from modeling and documentation to communication and automatic generation of computer code.

Most groupware products today would not fall into the category of incorporating a great deal of knowledge about process and content. However, expert support systems (those which model the behavior of an expert in a particular situation), which are generally designed for use by one person would fit here if used by business teams. The Steamer Program, an expert support system designed to train people in how to operate a steam plant, is a good example of the type of tool that would be categorized here. This tool "has colorful graphic displays of the schematic flows in the simulated plant, the status of different valves and gauges, and the pressures in different places."* Teams of users manipulate the displays and learn the consequences of their actions from diagnostics provided by the tool. We see considerable potential for groupware spinoffs from the expert systems marketplace, particularly where small-scale applications of AI principles or techniques can have large-scale impacts on business teams.

The lower right hand box describes systems used to facilitate meetings, like Colab or GDSS, or software used for joint writing. In these cases the process (what goes on to accomplish the task) is built in, but content does not matter. Colab contains specific modules that help in structuring how each

*Luconi, F.L., Malone. T.W., and Scott Morton, M.S., "Expert Systems and Expert Support Systems: The Next Challenge for Management," CISR WP #122, MIT Center for Information Systems Research, Cambridge, MA, 12/84, pp19-20.

task is carried out in a face-to-face team meeting. For example there is a brainstorming module called Cognoter designed to help manage the organization of ideas, and another module called Argnoter, which is a tool to help organize and evaluate arguments when considering the presentation of a proposal.

ForComment, a collaborative writing tool, helps structure reviews and revisions but content is irrelevant. It imports files created in a word processing system; designates reviewers by code and color; uses windows for text comments and changes, leaving the document as is; and records date of change with every comment. Therefore ForComment provides a structure and process for the collaborative writing task.

Some groupware products are beginning to incorporate a great deal of knowledge about process. One example of this is "The Coordinator," discussed earlier, which is a conversational structuring tool used to facilitate group productivity. Another unusual approach is the "electronic hallway" described earlier which provided the process by which lab personnel in two different geographic locations communicated. Here again, content is irrelevent; the system's power is focussed on only the process.

It is clear from this view of groupware that the tools existing today cover a wide range of alternatives for supporting

business teams. The tools in each of these groupings contribute value; however, the question of where such tools should concentrate their power can be addressed.

One way of thinking about these tools is to divide them into those capabilities which should be provided for all members of the organizational community, and those that are more specialized and would be used by subsets of the organization. Looking at the matrix in Figure 2, the tools in the lower boxes are the most generalized and can be designated as those which all workers can employ as members of the "corporate team." Some organizations that we have been working with are addressing this issue of what information technology makes sense as a universal facilitating tool, and using these questions as part of developing an information technology strategic plan. Groupware developers should also consider the needs of the total organizational community in scoping the requirements for future products in this category.

The upper boxes in Figure 2 contain more specialized groupware tools which can be best employed in an environment where content knowledge is specific. If tools can be designed well to contain both content and process knowledge, they have the potential to be extremely valuable to specialized business teams.

IV. Pros and Cons

Groupware can assist in making business teams successful. As the preceding examples suggest, however, groupware tools can be applied to many facets of cooperative work involving a range of resource commitment. It is important for managers to weigh both the potential benefits and the possible pitfalls, before jumping to specific action steps.

The benefits of groupware are directly tied to the goals of business teams (see Figure 3). If it works, groupware helps business teams accomplish their objectives. More specifically, many groupware tools are aimed at saving what managers value most: time. Project and calendar management, for example, seek to organize time in such a way that a business team can accomplish its goals. Group writing seeks to make a difficult process less difficult by making it less time consuming. Text filtering and conversational structuring tools seek to organize data or communications so that they can be better managed within a team. While time savings is sometimes not the overt goal, it is an overriding theme, particularly in the course of coordination activities. Typically, teams have a big job to do within an almost-impossible time constraint.

Productivity of business teams is, of course, often related to time. What can be accomplished within the given unit

POTENTIAL GROUPWARE BENEFITS

- Time Saving
- Goal Accomplishment
- Improved Productivity
- Increase Quality of Decisions
- Increase Quantity of Creative Ideas
- Group Memory
- Depersonalization of Decision Making Process
- Facilitate Equality of Participation
- Embody and Enforce Management Values
- Improved Management of Business Teams

FIGURE 3: Summary of Groupware Benefits

of time? But there are also other aspects of productivity that can potentially benefit from groupware. For example, some group decision support systems are used to increase the quality of decisions or to produce more creative ideas. Productivity is often linked to both quality and amount of ideas produced by a team. As coordination needs are met with time-saving groupware tools, more effort can be concentrated on the "real" work, achieving overall productivity gains.

Groupware also seeks to provide group memory for a business team. The lack of such memory ("what was it we agreed to during that meeting again?") is often a major block to productivity. If meeting facilitation tools are used during a face-to-face meeting, everyone can see what is being agreed to and walk away with a copy of the notes. At the next meeting, or during electronic communications that might occur between meetings, the shared notes and agreements can be available to any team members. Thus a business team can have a permanent record of its progress (or lack of progress) and management can stay in touch with the proceedings without great investments of time. New team members can also come on board very quickly, since a history of the team is accessible.

Some groupware systems also seek to provide a kind of objectivity or depersonalization of the decision-making process. For example, some group decision support systems allow anonymous

voting on issues to be decided. Other groupware systems are designed to facilitate equality of participation among team members, where desired. Other groupware tools include an explicit decision-making process that is followed (more or less religiously) by the group, in order to ensure that objective steps are taken. In such cases, the groupware is embodying basic values that management (or someone else) wishes the business team to follow.

In addition to benefits, it is important for managers to consider possible pitfalls of groupware. Several such pitfalls are summarized in Figure 4. The first and last pitfall is a common disease within the computer industry: overselling. Groupware of various sorts is likely to be sold with the same zeal as many of its ancestors. Groupware products and services can be very useful to business teams, but they are only tools. Overselling such tools creates unrealistic expectations among team members and their managers, which can lead ultimately to disappointment.

Groupware tools open doors into the delicate domains of group process and structure. Such software can be used to specify who can talk to whom, in what way, with what resources, for what purposes. There is the potential here for overstructure or abuse of power. Groupware tools themselves are not inherently more democratic or more authoritarian than other media that business

POSSIBLE GROUPWARE PITFALLS

- Overselling
- Too much software rigidity for the tastes of a given user group
- Potential to discourage individual creativity while in pursuit of group creativity
- Potential for leaders to exert excessive social control through the use of specific groupware features
- Inability to coordinate activities among separate business teams
- Teams that are not given enough decision-making authority
- Aggressive introduction of business teams without comparable relief from other responsibilities
- Overselling

FIGURE 4: Summary of Groupware Pitfalls

teams might use. These tools do, however, increase the range of possibilities in both directions. There are serious issues to consider here regarding what types of group structure are most appropriate for a given business team, in a given corporate environment.

All the special software in the world will not replace the need for good management. In fact, business teams using groupware will require new forms of management leadership and expertise. While business teams provide a very flexible organizational structure that allows a company to respond quickly to change, a company can become awash in business teams. Such overzealousness can lead to coordination problems on a grand scale. Such problems are made worse, of course, if groupware systems used by different teams are not compatible with each other.

Another management pitfall related to the use of business teams is that in some cases teams are given assignments without the commensurate power to get the job done. Such assignments typically degenerate from excitement to frustration, resulting in either cynicism with management or with the team process itself. The creation of business teams must be accompanied by the delegation of appropriate powers, as well as the allocation of time to do the job well. If these prerequisites are not in place, no form of groupware will be adequate to help the team recover.

V. An Action Plan for Managers

This is a time for managers to actively pursue the possibilities for business teams and groupware to support them. The following specific actions suggest a structure for this pursuit:

1. BEGIN A PROGRAM OF TRACKING AND EVALUATING BUSINESS TEAM PERFORMANCE IN YOUR OWN COMPANY AND IN COMPETING COMPANIES.

The notion of business teams can be played out in a wide variety of forms, in spite of the fact that the basics of business teams are quite natural to most organizations. At this stage it is important to experiment freely and learn from that experimentation. In most companies business teams are happening haphazardly, with little documentation or sharing of experiences. Consequently, newly-formed business teams are remaking old mistakes. Cross-company learning is also possible, sometimes even when competitors are involved. The first guideline is simply to understand what is already going on within your company and elsewhere.

2. ENCOURAGE EXPLORATION OF NEW WAYS TO MANAGE TEAMS.

Beyond what is already underway, this is a good time to plant new seeds and give them the protection necessary to see how

they grow. The styles of managing business teams will often be as important as the groupware technologies that are employed. Some team leaders will be more effective than others and it will be useful to understand why. As these understandings emerge, it is important to share them within your company.

3. PILOT TEST NEW GROUPWARE PRODUCTS AS THEY APPEAR.

Many new groupware products will appear over the next few years, although most will be offered by small companies that have uncertain futures. These early products, both software and services, provide tools for experimentation within your company without major investment.

4. AVOID LARGE-SCALE INVESTMENTS IN GROUPWARE UNTIL SMALL-SCALE SUCCESSES HAVE OCCURRED.

Gambling on small software companies is always a high-roller game and groupware companies are no exception. It is simply too early to pick the winners. This is not all bad since business teams are still learning what type of tools will be most useful to them anyway. This is a time to focus on supporting specific business teams, not on company-wide efforts. This does not mean, however, that important or highly visible teams should be avoided. On the contrary, a small-scale groupware effort can still yield large-scale business benefits. The search should be

for high-leverage teams where groupware tools can be explored and evaluated without massive investment or risk.

5. EMPHASIZE GROUPWARE APPLICATIONS THAT BUILD UPON EXISTING INFORMATION SYSTEMS AND TELECOMMUNICATIONS INFRASTRUCTURE.

Consistent with guidelines four and five above, this is not the time to invest in expensive new infrastructure in order to deliver groupware capabilities. Beware of vendors who argue that their product is "completely new" and therefore requires its own new environment. Such closed architectures have their attractions and are justifiable within some narrow niche markets. In general, however, it is better to stay with groupware products and services that build upon existing infrastructures.

6. DEVELOP AN INCENTIVE STRUCTURE THAT WILL REWARD TEAM PERFORMANCE, NOT JUST PERFORMANCE OF INDIVIDUAL TEAM MEMBERS.

Too often new information systems have been introduced with little thought regarding why people would want to use them. It is important to distinguish here between corporate incentives and individual user incentives. In the early days of video conferencing, for example, there was a strong corporate incentive to use the technology (for example, overall cost savings or corporate image building), but little individual incentive

(particularly if managers wanted to keep their travel budgets). In the early days of the personal computer, there were strong personal incentives to purchase from your own budget and get going, while there was little corporate incentive, and most corporate DP groups resisted the personal computer - at first. With the growth of business teams and the introduction of groupware to support them, it is important to think through the specifics of just why team members will want to work this way. This is indeed a time to reward team performance, and to address the question of what type of rewards will be most effective.

V. Summary

The use of business teams is accelerating as management looks for keys to achieving success in an increasingly complex, global economic environment. Business teams require new managerial skills to facilitate and enhance the cooperative work of team members. Managers will have to learn new methods of both leading and working. Groupware provides an important new set of tools for unlocking the potential of business teams.