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Kent Sandoe
The Claremont Graduate School

Lorne Olfman
The Claremont Graduate School

Munir Mandviwalla
The Claremont Graduate School

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MEETING IN TIME: RECORDING THE WORKGROUP CONVERSATION

Kent Sandoe

Lorne Olfman

Munir Mandviwalla

Programs in Information Systems

The Claremont Graduate School

ABSTRACT

This work investigates the concept of organizational memory within the context of face-to-face meetings. We begin by exploring the theoretical and practical implications of both organizational memory in general, and meeting memory in particular. We propose that meeting memory can be constructed from temporally-structured speech-acts. This proposal is investigated through a case study of an existing meeting memory leading to the development of a meeting memory prototype system. The paper extends current research in the application of speech-act theory to collaborative work in two directions: 1) the support of face-to-face meetings and 2) the recording of group memory.

1. INTRODUCTION

Organizations have integrated information technology into their transactional, decision-making and communications functions. Transaction-based systems are common-place in today's organizations. Decision-making and communication systems are being developed and used with increasing frequency to support teams and groups during face-to-face meetings. As experience begins to reveal the strengths and weaknesses of these applications, possibilities emerge for the development of new organizational support tools. One such tool is meeting memory.

Meeting memory is a record of the activities of a group. While the benefits of meeting memory appear great, a group clearly must expend resources to enable its recording. Many groups record their activities in meeting minutes or other forms, but such memories are often cumbersome to record and difficult to interrogate.

With its vast storage and rapid retrieval capabilities, information technology promises to be an appropriate vehicle for the creation of meeting memory. Any attempt to design a viable tool based on information technology must be preceded by an examination of fundamental questions, such as: What activities of meetings should be recorded? How should these be structured? How can the memory be used during and between meetings? What would the ideal meeting memory tool look like? Do memory requirements vary across types of meetings, groups, and organizations?

Answering such questions is difficult because there exist few applications of information technology to the problem of meeting memory. Since the objects of study cannot be existing meeting memory tools in genuine organizational contexts, this paper focuses on theoretical constructs,

organizational analogs, working models, and prototype tools.

The paper is organized as follows. The first section describes existing perspectives on organizational memory. Meeting memory is one component of organizational memory and can be analyzed using a transactional perspective. Speech-act theory is described and speech-acts are proposed as building blocks for memory. In the second section, properties of meetings are analyzed to uncover recordable items. The criteria of completeness, accessibility, and relevance are introduced and used to evaluate the viability of speech-acts as building blocks of meeting memory.

A description of a city council's recording and use of its meeting memory are presented in the third section. The analysis of this process leads to some guidelines for devising a meeting memory system. The fourth section reviews a design for a prototype meeting memory system. Design principles, system architecture and memory structure are described. This is followed by a discussion on usage and outcomes. The paper concludes with a discussion of the limitations of the current work and directions for further research.

2. ORGANIZATIONAL MEMORY

Although psychologists have defined and refined the concept of human memory, organizational theorists have had little success in describing the memory of a group. The concept of collective memory can be traced back to Durkheim (1938) and his student, Halbwachs (1950), who proposed the notion of a collective way of thinking which transcends that of an individual. Simon (1948) and Mintzberg (1975) refer to organizational memory as a

resource that can be drawn upon or scanned for the successful management of organizations.

Despite these and many subsequent calls for the development of a theory of organizational memory, most theorists agree with Walsh and Ungson (1991) who note that "extant representations of the concept of organizational memory are fragmented and underdeveloped" (p. 57).

In an effort to draw together and organize these fragments of theory, we propose the following conceptual framework. First a caveat: the categories presented are neither mutually exclusive nor exhaustive, and the apparent dichotomies are in fact continua. The purpose of the framework is merely to see whether there are discernible patterns or directions to current research on organizational memory.

Like any object of study, memory can be described by both its function and the form it takes. Investigations of the function of memory seem to center on epistemological questions, such as: Does memory serve to *represent* reality in a context-free, symbolic, and centralized manner? Or, is memory a means to *interpret* reality in a situated, interactive, and emergent way? Researchers studying the form of memory are asking ontological questions, such as: Is memory *concrete* with formal, particular, and precise qualities? Or, is memory *abstract* with an informal, ubiquitous, and equivocal nature?

Figure 1 presents a framework for categorizing conceptualizations of organizational memory. Previous research clusters around two dominant perspectives and the differences among them reflect the orientation of the disciplines from which they have emerged.

Information scientists, who have a decidedly data-oriented view of memory, have focused on *concrete-representation*. For them, organizational memory is conceptualized as frameworks (Minsky 1981), stored information (Dretske 1982), indexed documents and hypertext (Johansen 1988), formalized knowledge and expertise (Carlson and Ram 1990; Ackerman and Malone 1990), and stored data and expertise (Huber 1990).

Huber, for example, argues that organizational memory exists in three forms - humans, paper, and computer-resident - and that humans need the support of information technologies ranging from databases to expert systems. In Huber's model, the mechanics of memory are laid bare, its components are concrete and tangible, and the results can be operationalized.

A recent attempt to operationalize organizational memory is Ackerman and Malone's "Answer Garden" (1990). By growing "organically" in response to questions, this dynamic expert system captures and formalizes "knowledge" previously stored informally throughout the organization.

Sociologists and organizational behaviorists view memory as embodied in the structures and language of institutions. They have tended to pursue *abstract-interpretation* (and to a lesser degree, *abstract-representation*) with a focus on conceptual lenses (Allison 1971), cognitive maps (Argyris and Schon 1978; Weick and Bougon 1986), social structures (Douglas 1986; Shotter 1990), and stored stimuli and responses (Walsh and Ungson 1991).

According to Walsh and Ungson, it is generally recognized that "organizational memory consists of mental and structural artifacts that have consequential effects on

		FUNCTION	
		Representation	Interpretation
Concrete F O R M		data documents and hypertext formalized knowledge formalized expertise frameworks information	organizational device policies standard operating- procedures
	Abstract	cognitive maps conceptual lenses frameworks	culture ecology language social structures

Figure 1. Conceptualization of Organizational Memory

performance" (p. 58). They refine this definition by describing organizational memory as decision stimuli/responses preserved in individuals, culture, transformations, structure, and ecology.

Explicitly omitted from the Walsh and Ungson model are archives: neither internal nor external archives are part of the memory of an organization. Thus, the role of information systems is at best participative in (e.g., as "memory aids" for individuals, p. 63), rather than constitutive of, organizational memory.

For the purposes of this paper, we will adopt what is primarily a *concrete-interpretation* view of organizational memory that we call a "transactional perspective." Like most information scientists, we acknowledge that important aspects of memory are concrete and particular. However, we believe that its chief function is interpretative, and not merely the passive representation of reality. For us, activity and interactivity are of primary importance: we view interpretation as a fundamentally active process. Furthermore, we subscribe to the notion that organizations are "interpretation systems" (Daft and Weick 1984) that are best studied through an interpretive process (Denzin 1983). The concrete-interpretation view of organizational memory has largely been neglected by researchers. Notable exceptions include Cyert and March's (1963) early conception of memory as policies and standard operating procedures and, more recently, the El Sawy, Gomez and Gonzalez (1986) view of memory as an "orientation device."

Thus, the transactional perspective on organizational memory is concerned with the formal and precise aspects of localized practices and social interactions. This is because it is within these practices and interactions that memory resides, triggering interpretation and reinterpretation of those practices and interactions, which in turn shapes and re-shapes the collective memory.

Of all the activities we engage in socially, conversation is the most memory-reproducing. As people interact with each other conversationally, they do so on the basis of their shared interpretations of reality, by remembering together. In the following section, we will discuss conversation and one of its basic components which happens to fit squarely within our transactional perspective: the speech-act.

2.1 Memory, Conversation, and the Theory of Speech-acts

According to German social philosopher Jürgen Habermas (1983, 1987), social organization occurs within the domain of language; organizations, therefore, are linguistic entities. Using this view, we could say that an organization is a conversation – its complex structure emerging from the shared goals and commitments of its participant-members.

Within the vast body of philosophical work on which Habermas draws for his theory of communicative action is

speech-act theory, first proposed by J. L. Austin (1962) and further developed by John Searle (1969). This theory focuses on a class of utterances, speech-acts, that are distinguished from statements which simply describe or represent an objective reality, in that they perform actions.

According to Searle's modified taxonomy, speech-acts include assertives ("I object to..."), directives ("I hereby request that"), commissives ("I promise to"), expressives ("I apologize for"), and declarations ("I quit!"). In the organizational conversation, speech-acts occur frequently and include such acts as issuing a paycheck (commissive), making a request (directive), and negotiating a contract (includes all types).

There is a growing body of research on the application of speech-act theory to the study of information systems, including planning systems (Allen 1983), coordination of commitments (Winograd and Flores 1986), office communication modeling (Auramäki, Lehtinen and Lyytinen 1988), contracting networks (Dewitz and Lee 1989; Lee and Dewitz 1990), and conversation management (Shepherd, Mayer and Kuchinsky 1990). Some of this research has developed into commercial applications and research tools, such as the Coordinator (Winograd and Flores 1986), CHAOS (De Cindio et al. 1986), and SACT (Woo 1990).

Some researchers have taken issue with the political implications of imposing a structure upon inter-personal communication (Johansen 1988; Bowers and Churcher 1988; Nagasundaram 1990). They argue for careful selection of groups and settings in which structuring of communications is appropriate. In the following section, we will investigate meetings as a possible setting where speech-act based structures may be appropriate.

3. MEETING MEMORY

This section begins with an analysis of the properties of meetings to gain a practical understanding of the range and type of items that constitute the memory of meetings. Completeness, accessibility, and relevance are introduced as criteria for evaluating meeting memory. Next, the trade-off between completeness and accessibility is discussed in terms of possible recording methods. Relevance is also discussed as it pertains to a variety of meeting types. Finally, speech-acts are evaluated against these criteria to determine their appropriateness as building blocks of meeting memory.

3.1 Properties of Meetings

One way to describe the properties of meetings is in terms of their physical and social components, their spatial and temporal dimensions, and their extrinsic and intrinsic functions. While the physical and social components of meetings are well understood, the spatial/temporal dimensions and extrinsic/intrinsic functions have only recently been seriously studied.

COMPONENTS	PROPERTY	RECORDABLE ITEMS
Physical	Humans	attendance roster
	Documents	agenda, reports
	Furniture	map, layout
Social	Roles	hierarchy chart
	Norms	policy manual, rules of order
	Language	reports, minutes, transcripts, tapes
DIMENSIONS		
Spatial	Space	meeting location
Temporal	Synchronous	meeting time
	Periodic	calendar
	Recurrent	similar meetings/topics
	Historic	archives
FUNCTIONS		
Extrinsic	Charter/Mission	charter/mission statement
	Projects/Tasks	project/task list, milestones
Intrinsic	Producing	tasks accomplished, ideas generated
	Decision-Making	votes taken
	Coordinating	commitments made, dates set
	Reporting	reports given

Figure 2. Recordable Items by Meeting Property

Spatial/temporal dimension of meetings: Although the dream of the distributed/asynchronous meeting has been discussed in academia and industry for years, such systems have yet to emerge from research laboratories (Johansen 1988). Current research indicates that meetings are commonly periodic. The findings of one study show that 79% of meetings are regularly scheduled. "Meetings rarely occur in isolation. More typically, they are part of a meeting system that contains a series of meetings" (Monge, McSween and Wyer 1989, p. 23). In addition, many activities that occur in these periodic meetings are recurrent in nature.

Extrinsic and intrinsic functions of meetings: Meetings form a significant portion of the activity of most organizations. According to Huber, meetings are "an important component of organizational decision processes and occupy a good deal of time of managers and other professionals" (p. 55). The organizational purpose of meetings is defined by its charter or mission and is accomplished through projects and tasks.

For a group, meetings serve as central places where producing, decision-making, coordinating, and reporting activities take place. In their recent work on the social psychology of time, McGrath et al. propose that "group activity requires coordination of multiple functions on multiple projects that overlap in time, place, and members" (1989, p. 122). The major temporal functions of group work include scheduling, synchronization, and allocation of temporal resources.

3.2 Recordable Items

One common way that organizations preserve the memory of meetings is through minutes. Minutes are rarely verbatim transcripts. A secretary or clerk typically chooses items to include in the minutes based on a combination of subjective, norm-based and policy-based criteria. Other than minutes, several items pertaining to the activities that occur in meetings are sometimes recorded. These may include items pertaining to their physical and social components, their spatial and temporal dimensions, and their extrinsic and intrinsic functions. (See Figure 2.)

Organizing meeting records makes them available and useful to participants and others. This is often accomplished through the imposition of a structure or format (e.g., agenda) prior to the meeting. Sometimes, post-meeting structuring occurs as records are manually cross-indexed or databases are maintained to provide referential access.

3.3 Completeness, Accessibility, and Relevance

At an elementary level, we can conceptualize the memory of meetings as records of the activities that occur within meetings. This raises important questions such as: which activities should be recorded, who will decide, and how will the records be retrieved? One solution is to record everything, or as much as is practically possible. Yet, undifferentiated or ill-structured recordings of all activities in meetings seem to have dubious value. Also, records of

almost everything quickly become irrelevant if they fail to capture those items of greatest concern to the group.

A seemingly endless list of criteria could be developed in order to evaluate meeting memory. As a starting point, we have settled on three criteria: completeness, accessibility, and relevance. *Completeness* measures the degree to which the system captures sufficient details of a group's activities to provide a useful picture of the group's history. *Accessibility* means the memory is structured to be easily interrogated from a variety of perspectives, most of which are unknown in advance. *Relevance* is an indication of the significance of the captured memory with respect to the context in which its capture took place.

These three criteria are neither mutually exclusive nor independent. There is an obvious trade-off between completeness and accessibility: the bigger the haystack, the harder it is to find the needle. Also, the criteria of completeness and relevance overlap to a certain extent: do irrelevant details count toward completeness?

If we were to videotape a meeting using several cameras positioned about the room, the resulting tapes could be said to comprise a fairly complete memory of the meeting. Alternatively, it could be argued that the lack of structure (i.e., sequential access only) makes the tapes a relatively useless form of memory. At the other extreme, a one-word synopsis of a meeting ("Boring!"), while very accessible, will almost never provide a complete record of the activities of the meeting.

Between these two extremes, several methods for recording meeting memory provide a greater or lesser degree of completeness and accessibility. (See Figure 3.) A simple and tried-and-true technique for mitigating the effects of the completeness/accessibility trade-off is the imposition of structure. For a meeting memory, such a structure would retain those activities of greatest concern to the group close to the "surface" while permitting "in-depth" analysis of the details of those and other activities.

METHOD	COMPLETENESS	ACCESSIBILITY
Multiple Video Tapes	very high	very low
One Video Tape	high	very low
Audio Tape Recording	high	low
Transcript	high	low
Annotated Transcript	high	medium
Individual Notes	medium	medium
Minutes	medium	medium
Structured Minutes	medium	high
One Paragraph Synopsis	low	very high
One Word Synopsis	very low	very high

Figure 3. Completeness and Accessibility of Meeting Memory Recording Methods

As alluded to above, a partial record of relevant items may comprise a more serviceable memory than a complete record of irrelevant items. Obviously, recording those items that are most relevant is a necessary condition for a useful meeting memory. Unfortunately, the determination of relevance is a difficult and politically sensitive task. Relevance varies according to the type of meeting and the situated practices of particular groups. For example, the kinds of activities that are significant in an official ceremony are not the same as those in an informal committee meeting. Clearly, it does not make sense to be normatively prescriptive about the activities that are recorded in a memory.

This is why leaving the determination of relevance up to a secretary or clerk is problematic. Even with clearly-stated norms and policy guidelines, the most fair-minded secretary or clerk will from time to time make determinations which are at best arbitrary, if not strongly biased by personal prejudices and values. At its worst, a biased account of the activities of a meeting can have a leveling effect on even the most open discussion and democratic debate (Dryzek 1990).

3.4 Appropriateness of Speech-Acts for Meeting Memory

In terms of completeness, Austin (1962) felt that speech-acts were a super-class of statements which encompassed propositions or statements of fact. While most speech-acts have propositional content decidable as true or false (truth functional), they are also bound to the context in which they are uttered and can only be judged as appropriate or felicitous to that context (success functional). As basic units of conversation, speech-acts have expressive power. They are able to enhance clarity of communication by capturing mood, tone, and emphasis (all aspects of illocutionary force) of the speaker.

In terms of accessibility, speech-acts are semantically rich enough to provide multiple entry paths or access points.

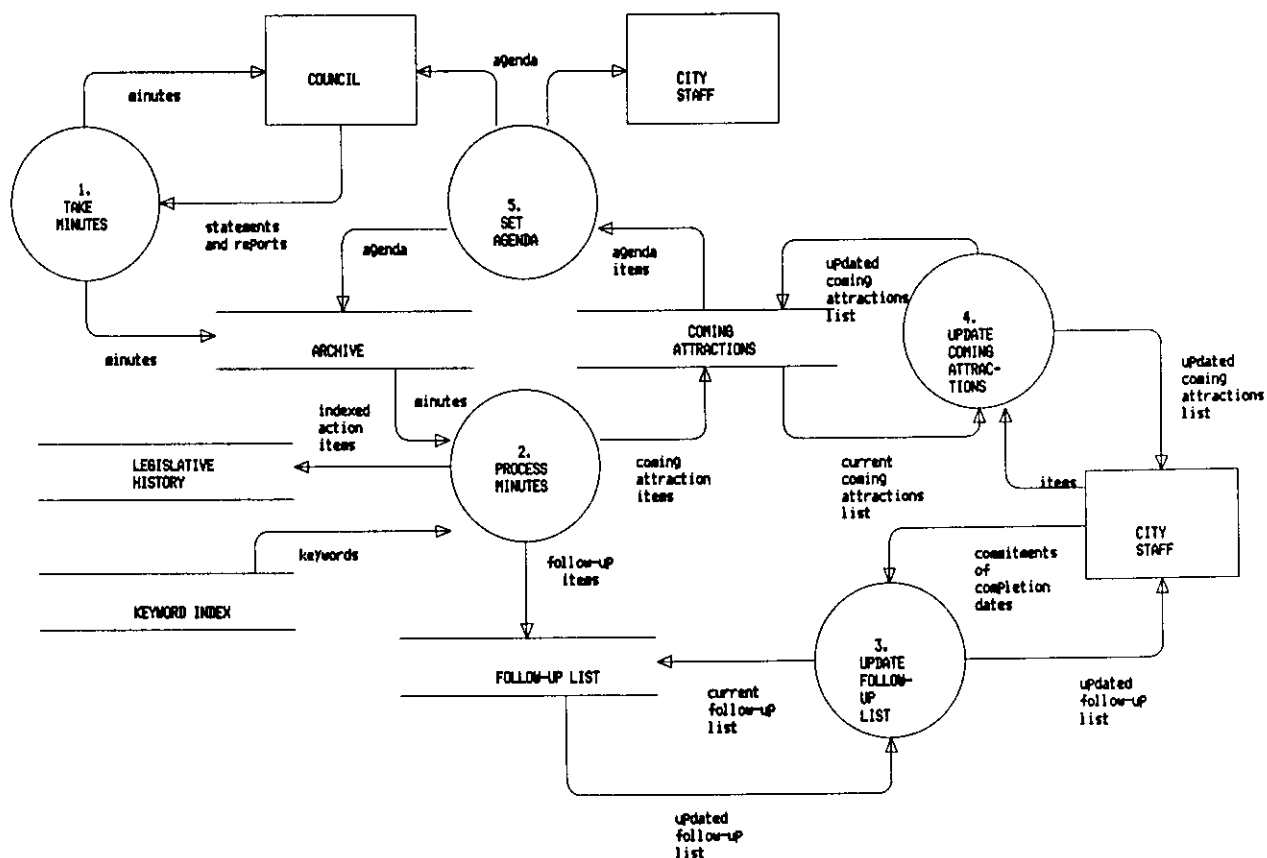


Figure 4. City Council Meeting History Maintenance Process

Rarely occurring in isolation from "ordered speech act sequences" or conversations (Searle and Vanderveken 1985, p. 11), each single act has multiple ties to action (prior and future), time (absolute and phasic), people (speaker, hearers, others), and background (topics, decisions, presuppositions, terms and conditions).

Speech-acts are highly context-dependent. This makes them very relevant to the settings in which they occur. Obviously, speech-acts are not necessarily an appropriate building block for meeting memory in all settings (e.g., where action is not important such as ceremonial briefings). Overall, their context-dependent nature makes them an ideal candidate for most meeting situations where past, present, and future action is important.

The use of speech-acts as the basic components of meeting memory appears to satisfy the general criteria of completeness, accessibility and relevance. In addition, unlike their application to private, interpersonal communications, their use in a public setting should not raise the same concerns regarding conversational coercion.

4. CASE STUDY

We provide here a discussion of the maintenance of an ongoing meeting history in order to analyze the potential role of speech-acts as a basis for meeting memory. The discussion is based on the work of a City Clerk's office in its ongoing role of formulating a City Council agenda and recording minutes of council meetings. The choice of a city government as an exemplar was made because of its legislative mandate to meet regularly and to maintain complete, accurate, and cross-referenced minutes. This enabled us to analyze a process with accessible structures and data.

The City Clerk uses a rigorous five-step process to maintain minutes and plan meetings (see Figure 4). This process begins with the capture of minutes of the current City Council meeting. It is followed by processing of minutes to determine various items for future business, updating of old and new business items, and preparation of the agenda for the next meeting. A detailed description of this process follows.

Take Minutes: The City Clerk records the statements and reports of City Council members, city staff, city residents, and special guests during each council meeting. The meeting is conducted based on an agenda prepared by the City Clerk. The record of the meeting is a set of minutes that are given to council members for review and are then archived. Typical agenda items include (1) routine administrative items requiring formal approval; (2) other administrative items, such as resolutions, that require approval or adoption; and (3) receipt and review of reports and recommendations. In (1) and (2), formal motions are stated and voted on by council.

Process Minutes: The raw minutes, which are taken in shorthand, and an annotated agenda (showing the status of each item of business) are further processed after the meeting. Keywords are attached to each item and the items plus keywords are stored in the City's legislative history archive. Items are extracted and put on either a *follow-up list* or a *coming attractions list*.

Update Follow-Up List: The follow-up list contains action items that will be referred back to council for later consideration. The list of directives is sorted by the council meeting date in which they were made. Most directives do not have a specific completion date. These items are generated from reviews of reports and recommendations as per (3) in "Take Minutes." The updated follow-up list is forwarded to appropriate members of the city staff. The staff use this list to decide when they can complete action items. Their commitments to completion dates are integrated into the coming attractions list.

Update Coming Attractions: The coming attractions list contains items that have an anticipated or specific date for presentation to council. It is sorted by council meeting date. The list is updated by reference to assignment of commitment dates on follow-up items, to new items passed to the City Clerk by city staff (for example, a request for approval of a zoning variance), and to items that have an ongoing requirement to be heard by council (for example, review of the local cable TV operator).

Set Agenda: The City Clerk uses the current coming attractions items, and a standard template of business items (such as approving minutes from the past meeting and from commission meetings) to set the agenda for the upcoming council meeting.

The official minutes of the city council meetings are not sufficient for the tracking of directives and commissives made during these meetings. A substantial amount of effort is made by the City Clerk and staff to coordinate the fulfillment of these speech-acts. Our analysis of the maintenance of meeting history for the city council reveals recurrent activities and standardized conversational process. The case study shows that a meeting memory system based on speech-acts could enhance the productivity of the council in relation to the coordination of commit-

ments. Furthermore, processes of the city council as reflected in its minutes are compatible with the transactional perspective that we have adopted. A prototype meeting memory system that addresses the needs of a city council and similar groups is presented in the following section.

5. PROTOTYPE

This section reviews the development of a meeting memory prototype. Principles guiding its design are discussed, followed by a brief description of the system architecture and memory structure. Next, an overview of the operation of the prototype is provided, including examples of recording methods and recall procedures. Finally, potential outcomes from the use of the prototype are presented.

5.1 Design Principles

Heisenberg tells us that any recording of events necessarily interferes with the events themselves. Therefore, we must acknowledge that a system designed to record group memory will intervene in the practices of that group. Rather than attempt to ignore or avoid it, our goal is to orient this intervention in a positive direction through attention to design.

We previously described the general criteria of completeness, accessibility, and relevance as applied to meeting memory. The investigation of the meeting memory practices of a city council provided us with insights that guided the design of a prototype. In this section, we describe three additional design principles: convenience, flexibility, and public/private memory distinction.

Convenience: The system should be both easy to learn and easy to use, so that its operation does not disrupt the normal functioning of a group. Furthermore, the memory's current state should be available at all times for a participant to browse with minimal effort from a variety of viewpoints.

Flexibility: Successful adoption of a memory system by a group demands that it be consistent with the meeting practices of that group. Because meeting practices vary widely, a normative approach to design clearly has limits. A memory system must be flexible enough to handle a range of meeting types (from informal briefings to deliberative assemblies), governance styles (from democratic to autocratic), and participation modes (from non-facilitated to chauffeur-driven).

Public/private memory distinction: Drawing a clean line between an individual's memory and the memory of a group in which that individual participates is a difficult task. Originating in the actions of its individual members, group memory is built as these actions are approved and adopted by the group. Thus, the ability to determine when

participants speak for themselves versus for the group can be critical. In addition to providing public and private memory, the system must manage the transition from private to public in such a way as to preserve the important distinction between an individual and group action.

5.2 System Architecture

The system architecture is composed of the meeting memory architecture embedded within a meeting system architecture. The meeting system architecture is based on the CGS Environment (Mandviwalla et al. 1991) and is described further below. The meeting memory architecture which is the focus of this paper is composed of the following layers: participation, commission, acknowledgement, and physical (Figure 5).

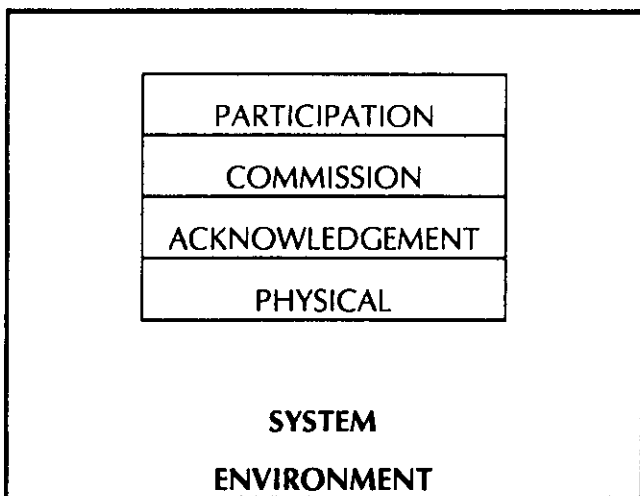


Figure 5. Meeting Memory Architecture

The *participation layer* is the layer through which the meeting participants interact with the system. It consists of customizable templates with defined attribute links to the underlying layer. Templates are bundled according to meeting type, governance style, and participation mode. Multiple template bundles can coexist and participate with the same underlying memory system; for example, allowing a group to have a single memory for its regular meetings, subcommittees, and task forces. The layer serves to provide sufficient flexibility for different meeting practices of different groups in different contexts while enforcing the consistency required by the underlying layer.

The *commission layer* is the intermediate layer which commits the participants actions, captured by the previous layer, to memory. The layer consists primarily of integrity constraints that validate each act against an illocutionary logic rule base. The purpose of this layer is to ensure the coherency of conversations (e.g., a request followed by a promise is legal, while a request followed by another

request is not; cf Searle and Vanderveken 1985) and set up links between acts for an underlying layer.

The *acknowledgement layer* responds to validated acts from the commission layer by updating and maintaining the state of a hypertext-based memory structure. This layer also performs tasks related to the control and distribution of the structure across public and private workspace and memory boundaries.

The *physical layer* is the underlying structure upon which the other layers are based upon. The structure is composed of memory, topics, conversations, and speech-acts. Essentially, the memory is a hierarchical outline with lateral links that give the memory the flexibility of hypertext. The viewer can elect to follow the outline or hypertext their way to the associated links.

The CGS Environment (CGSE) is a group support system for conference room meetings (Mandviwalla et al. 1991). CGSE is a Windows 3.0 application that supports recurring meetings which include briefings and decision-making. CGSE includes group interaction tools and functions that help individuals manage their group and personal work. Examples include access to previous meetings, on-line minutes, file-viewing by context, voting, and public/private mailboxes. The objective of CGSE is to provide support for the basic functions that are generic to meetings. The needs of particular groups, meetings, and individuals are supported by customizing the above functions and by adding in new functions through specialized applications. The base multitasking environment and hooks built into CGSE enable the system to serve as a "meta" environment for these specialized applications. CGSE assumes that meetings are planned and that meeting planners will customize the system to their requirements.

The meeting memory is incorporated into this environment at different levels depending on the requirements of the particular group and the available technology. For example, one scenario is that the memory system is used as a structured minute taking module that records meeting memory as described in this paper. Another scenario is that the group interaction tools become memory recording templates. This is the most active form of support, in which the speech-acts form not only the basis of the meeting memory but of meeting interaction. The next section describes a scenario of usage based on the latter strategy.

5.3 Operation Of Prototype

Commemoration – committing acts to memory: At the beginning of the meeting, participants have displayed an agenda which lists the order of business for the meeting. The agenda is just one view of the group memory. It includes those topics and conversations which have been pre-selected for the meeting. During the meeting, the agenda is updated by the acts of participants and is gradually transformed into minutes.

Participants may draft notes and proposals and attach these to the agenda (see Figure 6). These notes remain private and differentiated from the public agenda by color until they are submitted (at the discretion of the author) and approved by the group. In addition, all participants are free to bring additional materials (including documents, spreadsheets, and images) to the meeting and attach them to the agenda within their private workspace.

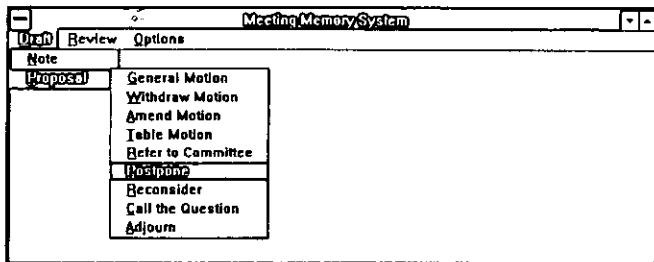


Figure 6. Example: Selecting a Parliamentary Template

To submit acts for consideration by the group, a participant selects and fills in an appropriate template and marks it for submission (see Figure 7). If the act is part of a new proposal, the system initiates a new conversation and the topic defaults to the current agenda item. If the act is part of a continuing conversation, the participant selects the conversation from a list.

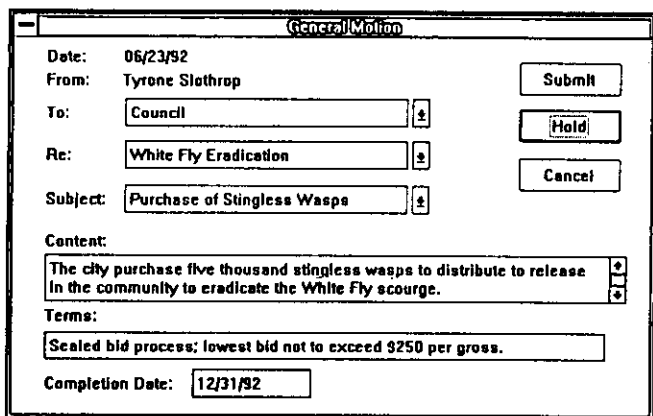


Figure 7. Example: General Motion Template

Depending on the governance style of the group, the act is either automatically distributed to all participants from a FIFO buffer or, alternatively, selected by the group leader for distribution. Following the discussion of the proposed act, participants may choose to endorse the act (through encrypted signature) or not. Providing enough

participants endorse the proposed act in accordance with the group's approval process (e.g., majority, consensus, etc.), it is commemorated and is automatically displayed on the public agenda.

It is important to note that the memory is constructed of acts in which the group is either the speaker or hearer. Therefore, the system distinguishes whether participants are acting for themselves (e.g., responding to request of group) or proposing a group act. Furthermore, it is possible for the group to speak to or hear from others (individuals or groups that are not meeting participants) as well as past and future instances of itself (e.g., postponement of item to future meeting).

Recollection - drawing on memory: As mentioned above, the agenda is just one view of the memory. During a meeting, participants may choose to look at the memory in other ways. It is conceivable that a participant may wish to have four or more views of the memory open at one time.

To accomplish this, participants simply open another window and change the view to either a pre-defined view (e.g., past minutes, future agenda, status reports) or a view created and saved earlier in this or a prior meeting. Alternatively, participants can create a new view using a query-by-example form.

The hypertext-based memory structure of the acknowledgement layer allows a participant to navigate within any view through the links. For example, when viewing a status report on a conversation, the participant might wish to trace the history of that conversation back to its initiation. This would be particularly useful if the participant was new to the group and needed to understand the background for current actions.

The recollection features of the memory are available both during and after the meeting. Immediately following a meeting, minutes of that meeting are accessible to participants as well as reminder or "to-do" lists. Between meetings, the memory can be drawn on for task force selection or to create a "balance sheet" that summarizes the group's actions into assets (requests-pending, reports-due to group), liabilities (promises-made to others), and capital (tasks-accomplished).

5.4 Potential Outcomes from Prototype Use

Meeting memory, as described in this paper, can serve as a reference document that is the organizer for all the information that is associated with group work. Other forms of memory can record many of the components of the memory associated with groups. The system described in this paper is unique in two respects. It records components of group memory that are ignored in other approaches (e.g., interactions), and addresses the all important issue of convenient access to meeting memory. The

meeting memory can benefit teams involved in ongoing meetings, managers who must form teams, and planners who access the outcomes of team work. Benefits to a team include agenda formation, avoidance of redundant work, tracking of performance and analysis of performance. Data about the performance of team members could be used as a basis for forming new teams. Moreover, team members who are assigned to an ongoing team can use meeting memory to "catch up." A database of meeting memory would allow analysis of team work that would be used to provide information about expected outcomes of future (to be assigned) teams.

6. CONCLUSION

In this paper, our review of contemporary theories of organizational memory led us to identify an understudied area which we termed a transactional perspective. In developing the practical implications of this perspective, we proposed using speech-acts as the basis for a memory of face-to-face meetings. We investigated this proposal through an analysis of the memory practices of a city council, which led to the development of a meeting memory prototype.

Further research on this topic is clearly indicated in both theoretical and practical directions. Investigation of existing forms of organizational memory in general and meeting memory in particular is needed. Prototypes, such as the one described, should be further developed, tested, and refined. Specific research questions which are called for include: How can we integrate meeting memory with organizational memory (e.g., to provide between-meeting support, to enable links to a broader organizational perspective during meetings)? How do requirements differ for face-to-face versus asynchronous and/or dispersed meetings? Is it possible to incorporate structured voice and video into a meeting memory?

While such research is important, it is also necessary to remain sensitive to the political and social consequences of systems which attempt to structure the communication of individuals. As Nagasundaram (1990) has suggested, message structuring systems have the potential to become so overly prescriptive and normative as to fail in attempts at their broad application. Furthermore, we must proceed with caution and sensitivity to the rights and privileges of individuals as we venture into such sensitive areas as interpersonal communication.

Systems for capturing the memory of groups have tremendous potential, in both positive and negative terms. On the downside, such systems may prove to be overly cumbersome, intruding in and disrupting the practices of the group. Even worse, they may be perceived as coercive, forcing participants to communicate in ways they would rather not. Alternatively, a meeting memory may lead to greater effectiveness by ensuring commitments made by

and to participants and the group are completed as intended. Clarity in communication, demanded early in conversations, may result in less redundant efforts later on. Finally, carefully designed and constructed meeting memory systems may engender greater democratic participation in the emergent historical practices of the group.

7. REFERENCES

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