

Design Considerations for Collective Remembering

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ABSTRACT

This paper identifies four design issues for Collective Remembering (CR). We first review the current main areas where CR is being explored, namely organisational memory, sociable sharing and reflective sharing, and for each identify key challenges. We apply Clark's (1996) Common Ground framework for communication to understand these different aspects of sharing. We use this framework to identify factors affecting collective remembering – specifically goals of sharing, relation between the sharing participants, that nature of the materials being shared and the situation in which sharing occurs.

INTRODUCTION

There has recently been much technological interest in developing digital tools to support memory. Both the US and UK research councils have launched Grand Challenges (LifeLog, Memories for Life) to create digital archives of one's life. An important recent focus for this research has been the high-profile Microsoft Memex project (originally known as MyLifeBits), which has developed an infrastructure for archiving vast archives of personal multimedia data, as well as tools for indexing and retrieving this (Gemmell et al., 2002, Wood et al., 2004). That work builds on technologies developed at Xerox EuroParc for creating and accessing digital diaries (Lamming and Flynn, 1994, Eldridge et al., 1992, Newman et al., 1991). More recently, a large number of prototypes have developed to support various aspects of personal memory: including images and video (Rodden and Wood, 2003, Mann et al., 2005), medical information (Cheng et al., 2003, Malavolti et al., 2004), speech (Dickie et al., 2004, Vemuri et al., 2004, Hayes et al., 2004), 'experience-mining' tools (Pentland, 1998, Rhodes, 1997), and reminding tools (Marmasse and Schmandt, 2000, Stifelman, 1993).

But most of this research has focused on *individual*

memory, where people are trying to reconstruct events from their own past, often in the context of work or productivity goals. Less attention has been paid to collective contexts where the emphasis is on sharing memories and experiences, in the service of social or cultural goals¹.

While there is a vast psychological literature on individual remembering, much less is known about collective memory processes. What has been done tends to focus on work-related instances of collective memory. For instance, studies have shown that groups can be more effective than individuals working alone when trying to remember an event (Stephenson et al., 1983). There is also evidence of distributed effort: group members build up knowledge of how expertise is distributed among different team members, allowing them to increase overall team efficiency by deferring responsibility for remembering to the most qualified individual. But, like many other social activities, collective remembering can also have negative effects; team members can engage in social loafing – where less active members rely on others to bear the brunt of group memory demands (Weldon and Bellinger 1997). Rather less research has been carried out in other contexts such as collective remembering and its implications for social and cultural identity (Wertsch, 2002).

This paper first reviews areas where collective remembering has been investigated, and then uses this analysis to identify general design issues for collective remembering.

CONTEXTS FOR COLLECTIVE REMEMBERING

There have been three main contexts for exploring technologies for collective remembering.

Sharing Work Knowledge and Expertise

This involves collective memories in the work context, exemplified by organisational memory applications such as

¹ One exception to this is the area of organizational memory which aims to develop tools to aid collective recall in a work context.

Gibis (Conklin and Begeman, 1988) or AnswerGarden (Ackerman, 1994) or various newer applications that aim to extract information from meetings (e.g. AMI).

Organisational Memory. The aims of organisational memory applications are to allow members of an organisation to share information or expertise. The key idea here is information reuse; important business processes are often repeated, so that systematic capture of these processes allows re-use and hence greater efficiency when they are re-encountered. Re-use can also take place across the organisation, where one part of the organisation employs processes captured by others - thus avoiding duplication of work across groups

Various systems have been developed that attempt to support organisational memory (e.g. Gibis, AnswerGarden). In the main, however, these systems have not been successful. One critical problem is 'bootstrapping'; to be viable the system must have both useful information and active users, and these take considerable effort to create content from scratch. A major problem is allocating rewards for contributions. These systems rely on participants 'seeding' the organisational memory with information that they anticipate will be useful to others retrieving later. However, such seeding requires some effort, in particular to structure information in such a way that it will be useful to others later on. And consistent with Grudin's (1989) analysis, the people who are building the organisational memory are not necessarily those who accrue direct benefit from it. In consequence they lack incentive to create useful content.

Communal Conversation Systems. One way of finessing the reward problem is to generate the content of organisational memories as a side-effect of other activities, such as conversations. This has been highly successful in discussion applications allowing expertise to be widely shared - for example in Usenet newsgroups (Whittaker et al., 1998) or in certain uses of Lotus Notes (Whittaker, 1996). That research shows that important topics are raised and repeatedly answered, allowing these to be summarised in FAQs (Frequently Asked Questions), to synthesise best answers to repeated questions. FAQs are also useful resources for neophytes attempting to understand key questions or topics in an area.

Another approach that finesses the incentive problem has been to build community systems that re-use existing private materials, e.g. that allow documents initially generated for private ends to be made available for group purposes. Hyams and Sellen (2003) describe a system which allowed peer-to-peer sharing of people's file systems within a workgroup. It allowed different members of the workgroup free access to others' information. The system was not successful for two main reasons. First, people found it difficult to locate relevant information in others' file systems because of: (a) differences in naming conventions (Furnas et al., 1987) and (b) different

perspectives on how data should be organised (Berlin et al., 1993). So for example different workgroup members might label documents about the same project in different ways and file them in different places. A second problem was that of *recipient design* - which refers to the process whereby materials such as documents or presentations are produced to meet the needs of a particular audience (Clark, 1996). One problem with general access to another's file system is that documents it contains may not all be comprehensible or useful. Some of the material in it may have been designed to meet goals that are different from those of the reader, and indeed, some materials, such as drafts or personal notes may not have been designed to be read at all.

Meeting Capture Systems. A new type of community memory application is meeting capture (AMI), and access to meeting records. Two common problems with meetings are: (a) important information is mentioned but later forgotten (b) there are often repetitions of prior discussions over a series of meetings.

Participants attempt to address this by creating meeting records - which are of two main types - public minutes and private notes (Whittaker et al., 2005). Public minutes act as a collective 'todo' list, as well as a record of what was said. Personal notes are more esoteric and tend to supply detailed information that allows people to carry out their personal 'todos' resulting from the meeting. However both public and private notes have the disadvantages of being costly to produce and distracting the record-taker from participation in the meeting.

Various systems have been designed to address these two problems - allowing people to capture and reuse information from meetings (see Tucker and Whittaker, 2004 for a review). Early systems developed methods for accessing records of meetings using manual annotation techniques (Moran et al., 1997, Whittaker et al., 1994). Others applied taxonomies to characterise different types of conversational acts in meetings, for example to capture design rationale (Moran and Carroll, 1993). More recent systems allow searching and browsing of rich meeting records including user notes, slides, video recordings and whiteboard notes.

These meeting capture systems have an advantage over organisational memory tools because the information meeting systems capture and manipulate is generated *as a side-effect of conversations*. As a result, there is no need to motivate or reward contributions, because content is created automatically. Nevertheless, some problems remain. The conversational record is extremely rich and current access tools are still rudimentary, although progress has been made into ways to search and browse complex speech and video data (Whittaker et al., 2002, Tucker and Whittaker, 2004). Other problems concern ethics and privacy. While careful design and a clear presentation of system goals can partially address ethics concerns, it is still obvious that users have

strong initial reactions to the idea of their conversations being recorded (Whittaker et al., 1994). A final technical consideration is that the technology for recording meetings is still extremely complex; and generating usable recordings often requires a dedicated instrumented meeting room – which limits the setting where information can be captured.

Social Sharing.

Rather less is known about sharing in social as opposed to work contexts. An early study by Frohlich et al. (2003) looked at photo sharing, finding that sharing of photos amongst friends and family is a mechanism for reinforcing social bonds. Current digital technologies are still rather limited however in their support for such social processes. For example, the form factor of physical photos is important in allowing people to distribute, discuss and scrutinise individual pictures. In contrast digital pictures are harder to distribute and share, because all participants have to orient to a shared screen to view pictures. An added problem is the lack of mobility of the display; in many homes, the computer may be located in an office or study – which is not a convenient place for relaxed social conversation.

Frohlich and others have also noted the importance of *interaction* to mediate sharing: ‘here we are at Jane’s wedding. Who’s that there? It’s Auntie Margaret over by the drinks table as usual’. Interaction is a key part of the social process – photos are not standalone products – and are considerably less compelling in the absence of the explanatory commentary and clarification questions. Such narratives are obviously absent from digital storage sites such as Ophoto (www.ophoto.com) – leading them to function as repositories rather than to promote active sharing. One interesting new development is Photoblogs such as Flickr – which stimulate social narrative by allowing participants to comment on pictures provided by others.

Sharing can also take place *asynchronously*, acting as a trigger for social conversation, e.g. a postcard to old friends may promote a social followup phone call to catch up with recent news (Frohlich et al., 1997). One important use of domestic email is now to share photographs of significant social events (births, birthdays, parties, graduations). Again this often serves a trigger for further email conversations and a way for people to keep in touch.

Reflective Sharing. Much less is known about reflective sharing – where people (or even societies) create artifacts that allow people to reflect and learn – perhaps building a new perspective on their lives. While the discipline of social history is highly dependent on the analysis of such artifacts, much less is known about how individuals create and explore personal collections in order to reflect on aspects of their lives.

FOUR DIMENSIONS THAT AFFECT THE NATURE OF SHARING AND THE TECHNOLOGY NEEDED TO SUPPORT IT

We now use the previous discussion to identify four key dimensions that influence the sharing process, and discuss research issues relating to these.

The Goal of Sharing

The purpose of sharing has a huge effect on the sharing process. We have seen that the demands for organisational memory are very different from those of social sharing both in terms of the technology needed to support it, and the processes that take place. People are engaged in fundamentally different activities when they share information about business processes than when they share family photos. More research is needed to better characterise the settings in which sharing occurs as well as the processes that have to be supported. This is particularly true for social and reflective sharing where we lack basic user data about how these processes take place. We need to develop a richer understanding of the set of contexts in which sharing takes place. Are there other functions for collective remembering besides the ones we have identified, and if so what are these?

Relation between Information Producer and Consumer (Sharer and Sharee)

Another important dimension affecting sharing is the relationship between the people who are producing the information to be shared (Sharers) and those who are the recipients of that information (Sharees). One important aspect of this relationship is the overlap in Common Ground - defined as the set of background facts, assumptions, and beliefs that conversational participants share (Clark, 1996).

Why is Common Ground important for sharing? According to communication research, the greater the overlap in Common Ground, the more implicit communication processes can be. In the context of sharing applications, if there is a large overlap in Common Ground, this means that the Sharer can be less explicit about the content and significance of the material being shared, because the Sharee already knows much about this material.

For example, compare the difference between sharing family wedding photos with a close family member with sharing the same information with a recent friend. The family member will almost certainly be party to information about the cast of characters in the photos, the relations between them, possibly also the location and time of the wedding. The Sharer will not therefore have to explain any of this. In contrast the recent friend is unlikely to have met other family members, and may not know situational facts about where and when the wedding took place. All of this will have to be explained by the Sharer in order for the event to make sense to the Sharee.

Another example from the work context might involve sharing a set of slides with a long-term colleague compared with a recent hire. The colleague is likely to be familiar

with the aims, background and objectives of the slides, so that explanation can be kept at a minimum. In contrast, the recent hire will have to have all this explained if they are to make sense of the material being shown.

Another crucial aspect of Common Ground concerns whether the Sharee was present at the time that the materials were created, and whether they participated in the original event. For example, being present at a wedding will mean a large overlap in knowledge about participants, location and context that are not available to a non-attendee, who will therefore need clearer explanations of the materials being shared. In the same way, we should not expect a meeting attendee to access a meeting record system in the same way that a non-attendee does, for the attendee has access to large amounts of contextual information about the agenda, participants and conduct of the meeting. Again Clark's (1996) account provides terminology for this. Non-attendees have the status of *overhearers* rather than participants. In the original meeting, participants strive to ensure overlap in assumptions and beliefs, interacting with each other to increase Common Ground, and guarantee mutual understanding. This obviously does not happen for non-attendees.

This can also be stated in terms of *recipient design*. If Sharer and Sharee share Common Ground, there is less need for recipient design of the shared materials, because the Sharee already has sufficient background knowledge to make sense of the material they are seeing. When there is little common ground, recipient design is needed to explain the materials – which may take the form of an explanatory interaction, by the Sharer.

Nature of the Materials Being Shared

The nature of the materials being shared has a large impact on the sharing process. Sharing pictures is clearly different from sharing text or complex audio-visual records, because of the different user interfaces and display devices required. We have already seen that there may be subtle effects at work here, with digital photos being harder to share than traditional ones because of the need to obtain and orient to a shared visual display. We also know from other research on sharing that it is important for participants to be able to point to, and in some cases jointly annotate shared visual materials – whereas this seems to be less important when sharing text (Whittaker, 2003).

And these differences in materials are magnified when comparing interfaces for sharing text with those needed for shared meeting records. For meeting records complex time varying data needs to be browsed, accessed and then played back – requiring careful design of the relevant interface. Techniques for accessing complex multimedia data are still in their infancy. Media such as video present enormous editing and production challenges. Home videos are generally poorly produced and unwatchable in the absence of explanatory narrative. Again there is an opportunity for

the development of new narrative techniques, as well as in better tools to allow end users to edit home videos (e.g. Whittaker and Amento, 2004).

A second important aspect of the materials concerns whether they were intended to be shared. Part of this relates to recipient design. Writing a document for a group repository is an intentional act - producing material to be read by a specific audience. In contrast, a meeting record is not constructed with the aim of being easily understood afterwards. In consequence it is much harder to understand.

So recipient design requires effort on the part of the Sharer and incentives have to be created to ensure that Sharers are motivated to create useful and interesting materials. There is therefore an important tradeoff between creation cost and utility for designed materials versus those such as meeting records that occur as a side-effect of another activity.

A final characteristic of recipient design relates to ethical concerns. If Sharers deliberately compile materials to be accessed by others, then there are fewer ethical issues, than if for example a meeting is recorded and permission has to be sought for others to access this material later. Currently there are no standard policies in place for meeting records: (a) informing participants that they are currently being recorded; (b) allowing them right to veto recorded materials when they see what these contain; (c) control over who can access recorded materials – for example limiting this to meeting participants only; (d) information about who has actually accessed meeting information. Again privacy policies may relate to Common Ground, as people are more likely to trust and share materials with others with whom they share assumptions and values.

Situational Characteristics of Sharing

A final important dimension for sharing is the situation in which sharing occurs. Key dimensions here are whether sharing occurs synchronously or asynchronously, and whether participants are collocated or not.

If participants are cotemporal and collocated they have many resources available for creating Common Ground, for example, they can mutually orient to, and point at, those materials, discuss them together and clarify differences of understanding by discussion. These interaction resources aren't as rich when participants are separated by distance, as it's harder for them to orient to and point at shared information. When participants share asynchronously the process of creating Common Ground becomes even harder - as it is not possible to have real-time interaction about the materials so that misunderstandings can remain unaddressed.

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