

Narrative and Social Tacit Knowledge*

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Abstract: This paper discusses the role of narrative in the expression and transmission of social knowledge as a specific type of tacit knowledge. Narrative is a central mechanism by which social knowledge is conveyed. Narrative provides a bridge between the tacit and the explicit, allowing tacit social knowledge to be demonstrated and learned, without the need to propositionalize it. Institutions can best maintain their stock of stories by providing occasions on which they can be told. Archival systems such as data bases, lessons learned systems, and video records are less effective, particularly when they attempt to store records or transcripts of oral stories. However, they can be improved by attention to key design dimensions, including appropriate allocation of the effort required from system administrators and users, and attention to translation between genres.

Keywords: Narrative, institutional memory, tacit knowledge, social knowledge, lessons learned systems, genre, knowledge management

This study analyses the central role of narrative in the expression and transmission of a specific form of tacit knowledge which I term social knowledge. Examples for the discussion of narrative in institutions is drawn from a study of a seventy year old American insurance company, which I shall call MidWest Insurance. My colleagues and I carried out a three year ethnographic study, which included observations of the training and work of insurance sales agents and their offices, as well as observations of ongoing training programs, sales conventions, regional meetings, special task forces and corporate meetings. MidWest Insurance initially commissioned the Institute for Research on Learning to address questions about agents' learning and their sales practices, and to assess the success of its new training program for agents.

TACIT SOCIAL KNOWLEDGE

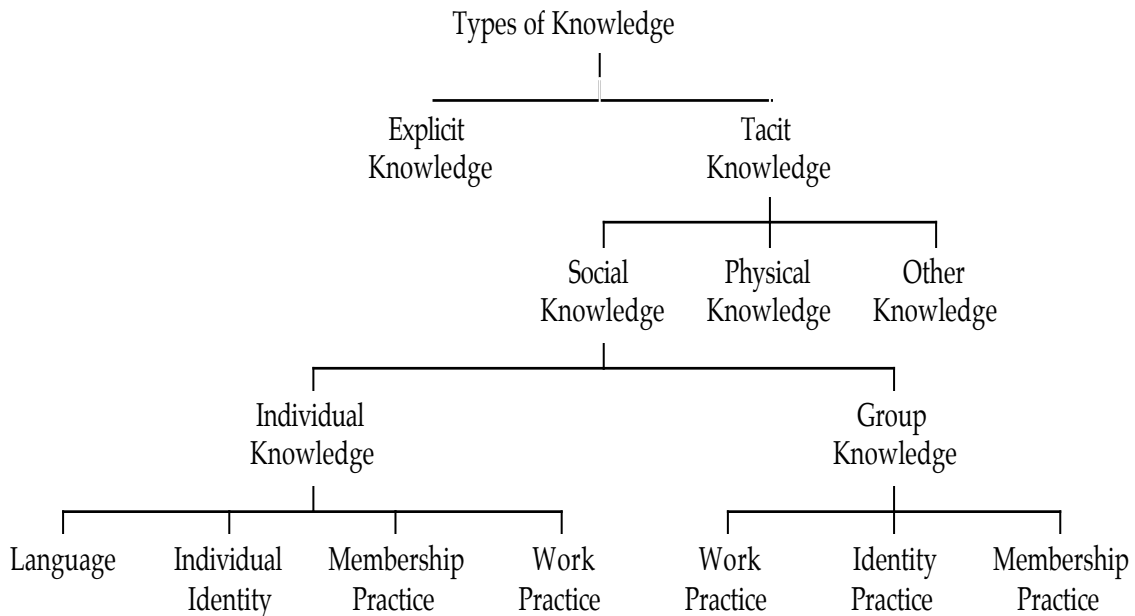
The term tacit knowledge is conventionally opposed to explicit knowledge, and is used to describe knowledge which cannot be explicitly represented. Clearly this covers a very broad range of meanings. Common examples of tacit knowledge include the knowledge of how to ride a bicycle, how to knead bread, how to use a word processor ((Polanyi, 1958), (Nonaka, 1995) (Goguen, 1997)). However, when the notion of tacit knowledge is used within the field of knowledge management, it is frequently used to describe any form of non-

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quantifiable knowledge, particularly the knowledge about social interactions, social practices, and most generally, how a group or an institution gets things done. This type of knowledge is considered particularly problematic for knowledge management, because it is difficult to represent as propositions or rules. At the same time, such knowledge is not unspeakable: it is commonly and easily conveyed by narrative, although narrative exemplifies rather than exhaustively describes such knowledge.

I suggest the following taxonomy of types of tacit knowledge, focussing on tacit social knowledge. Distinguishing social knowledge as a distinct subtype of tacit knowledge increases the precision of the discussion, since social knowledge is maintained and transmitted in very different ways than physical knowledge. In particular, aim of this paper is to examine the relation of narrative and tacit knowledge, and it is most particularly social knowledge which narrative is suited to convey. In addition, I include only types of social knowledge which are directly related to the problems normally addressed by knowledge management. However, I do not intend to claim that these are the only types of tacit knowledge. There are obviously many forms of tacit knowledge not included here, such as knowledge about emotions, aesthetic knowledge, ethical and spiritual knowledge, etc..

Types of Knowledge



This taxonomy focuses on two kinds of social knowledge: knowledge about social groups held by an individual, and knowledge held by the group itself. Individual social knowledge includes knowledge about what the identity of the group is, what it means to be a member, and how to be a member. This is the kind of knowledge which is most frequently and best conveyed through

narrative, and narrative induction: the process by which newcomers to the group learn to take on the story as their own. That is, part of becoming a member of an institution involves learning the stories about that institution which everyone must know, the appropriate times and reasons to tell them, and the ways in which one's own stories are shaped to fit a new institutional context.

Of individual tacit knowledge, language is perhaps the most tacit form of tacit knowledge: one knows how to speak, but can not articulate how one does it, or the rules which govern language use. (Except of course for linguists, whose professional activity lies exactly in attempting to make explicit these tacit regularities.) Part of the knowledge of language includes knowledge of discourse forms: how and when to tell a story. Knowledge about identity, who one is and what one's history has been, is a very important part of an individual's tacit knowledge. (Linde, 1993) describes the ways in which people use narrative to construct these identities. Knowledge about one's identity as a group member, and the practice of acting as a member of the groups one belongs to is also easily expressed in narrative. Knowledge about work practice, how one does one's job is also tacit, and can, under certain circumstances described below, be conveyed by narrative.

The second kind of social knowledge is knowledge which is held by the group or institution itself. Some social knowledge is explicit knowledge, for example, the knowledge expressed in forms, formal procedures, file cabinets, and data bases. However, in addition to procedures, there is also tacit knowledge which manifests as work practices, as well as the knowledge about how and when to use these knowledge resources. (See (Brown, 2000), particularly Chapter 4, for a discussion of the difference between process and practice.) This kind of knowledge is held by institution as a whole rather than of the individuals who comprise it. For example, in a large, bureaucratically organised institution, there may be a set of procedures for arranging business travel and obtaining reimbursements, and this set of procedures may be represented somewhere in the organisation. However, it is entirely possible that no one person understands the entire practice: the traveller may know how to get reimbursed, administrative staff may know how to process requests, people in the accounting department may know how to pay or deny reimbursements. Yet none of the people who deal with part of the process have a clear picture of the entire process. Such processes are knowledge held by the entire institution, not by any given member. Other types of group tacit social knowledge include the ways that teams and groups work together, how decisions are made, how communications flow. For example two organisations may have nearly identical organisation charts. Yet in one, it is appropriate and may even be encouraged for a worker to raise an issue to someone many levels above her in the organisation, while in another organisation, such a communication would be viewed as insubordination if not treachery.

Knowledge about the identity of an institution and the proper ways to be a member are very easily conveyed to new members by narrative, although it is almost impossible to represent such knowledge explicitly. A familiar example of failed attempts to make this kind of social knowledge explicit can be found in the

phenomenon of corporate mission statements and value statements. These are an attempt to convey the essence of an organisation to the outside world, and to socialise new members into the practices of the organisation, an issue which becomes of ever-increasing concern in a time of extremely high labour turn-over. Such mission and value statements are almost invariably vacuous failures. Partially this is because they are written by a committee process which usually makes any mission or values statement sound like any other: Microsoft's values become indistinguishable from Xerox's or Coca-Cola's. But more essentially, mission and values statements are doomed to failure because they attempt to state explicitly kinds of knowledge which are best conveyed indirectly, through example, and particularly through stories: the knowledge about what it is like to work at a particular organisation, and what kinds of behaviour are expected, required, or condemned there. MidWest Insurance conveys its values through repeated stories of its history, and the life and character of its founder. The story of the founder is known to everyone at MidWest, and is used by many managers and agents to explain their own history and values. The story includes the following points:

- The founder was charismatic, a hard worker, a brilliant salesman, and an honest man, who had a new vision for insurance sales: the idea that farmers of good moral character should be charged lower rates for auto insurance, since they ran lower risks than city drivers, and an exclusive relation between the company and its sales agents.
- The American rural and small town origins of the founder and of the company, which still shape its values. This point is still passionately held, even by company members who have spent their entire lives in large cities.
- The development of the company from selling auto insurance to a full service company offering fire, life and health insurance as well, presented as an ever-growing commercial and ethical success.
- The idea that the company is a family, and represents family values.

The story of MidWest's origin and growth gives a coherent account of the company's identity and values. For a member to know this story means to know what the institution is, and how that member must act in order to be a part of it. (See (Linde, 1998) for a detailed linguistic analysis of a story the founder.)

WHAT IS NARRATIVE?

A narrative is a representation of past events in any medium: narratives can be oral, written, filmed or drawn. In this discussion, I will mainly focus on oral stories, since these are extremely important and nearly unrecognised in every form of social institution from the informal group to the most formal organisation.

Stories provide a bridge between the tacit and the explicit, allowing tacit social knowledge to be demonstrated and learned, without the need to propositionalize ethics, specify in detail appropriate behaviour, or demonstrate why particular heroes of the past are relevant today. The reason for this is that stories do not only recount past events. They also convey the speaker's moral attitude towards these events: the protagonist of the story acted well, acted badly, is to be praised or blamed, can be taken as a model for the hearer's own behaviour. These evaluations are sometimes explicitly stated within the story, but more often are suggested through the use of a single word or phrase. Indeed, it has been argued in the study of oral stories, that the most effective stories are those in which the evaluation is the least explicit. ((Labov, 1972)) This argument is the equivalent of the familiar advice to novelists: Show, don't tell.

Further, telling oral stories is a group process. The hearers are usually not passive consumers. Rather, they may agree, or disagree, or modify not only the speaker's account of what happened, but also what it meant. ((Linde, 1993), (Polanyi, 1989), (Goodwin, 1986)) Even within a formal organisational context, for example an annual meeting of a corporation, although listeners may have no opportunity to dispute publicly the CEO's account of what happened to the company and the meaning of these events, they certainly have the choice of whether to agree with the account and retell it, to mock it among their peers, or to ignore it as just one more piece of corporate rah-rah. It is this participatory process which makes stories particularly effective as a way of transmitting social knowledge, because the hearer comes to participate in the construction of the story, and thus comes to have a stake in it.

Part of becoming a member of any institution, formal or informal, is learning to tell the stories of that institution, and learning to tell one's own stories in a way coherent with those of that group. Part of what one needs to know to be a member is what the stories of the group are, what events in the past are judged to have relevance to the present, what values the stories exemplify, and when it is appropriate to tell them. This is one very important way that people actually take on the values of the institution as their own (Linde, 2000). As part of the work of inducting new agents, inspiring existing agents, and representing itself to the public, MidWest Insurance works its past intensely, and much of that work is done by oral narrative. Agents tell stories about their early days, and the course of building their business. Managers tell stories about their own career, about the careers of exemplary agents, and about changes in the company. And everyone tells stories about the founder of the company. These narratives form a tightly linked system of first person and third person narratives, which convey both the history and the values of the company, at a national, regional and local level.

Thus, agents and managers at MidWest tell their own stories in a way that mirrors the values exemplified in the story of the founder. For example, entrepreneurship is always cited as a major virtue of the founder, and agents (who are contractors rather than employees) describe the building of their own agencies as the activity of independent business owners, who are willing to take the risk of basing their own income only on the business they can bring in, rather

than relying on a salary. At the same time, they follow the story of the founder in attributing their success to hard work and a good product, rather than to risk-taking or extreme measures.

THE LIMITS OF NARRATABILITY

It might appear that it is possible to tell stories about almost anything. But in fact, some kinds of knowledge are easier to convey by narrative than others.

Narrative is well suited to transmit the part of social knowledge that concerns history, values and identity. This is because narrative consists of events and evaluations: what happened, and what its moral meaning is. Thus MidWest Insurance maintains many stories about its founder, as an exemplar of the virtues which the company wishes its agents and managers to exhibit: entrepreneurship, probity, determination, skill with people, effective salesmanship. Local management teams also maintain inspiring stories about local heroes: examples of the kind of success which can be accomplished by an ordinary person who puts into practice the recommended virtues and actions of a sales agent. These stories serve as demonstrations to new agents of what kind of career they can hope to accomplish if they act in the recommended ways, and what the stages of that career are likely to be. The assumption is that the past can be used as a guide for the present and future. ((Linde, 2000) discusses the problem of exemplary stories in a time of changing economic conditions, when the old career track may no longer be achievable.)

Narratives function superbly to convey institutional identity through the deeds of corporate or local heroes. But what about the actual technical content of the work of a given group or institution? How does someone learn not only the virtues of a ideal MidWest agent, but also how to do the work of such an agent? As yet, there have been very few studies of narratives about the actual technical content of work. It appears that such stories are told and passed on only within the small and immediate group of people who do that particular work – a face-to-face community of practice. The most extensive study has been (Orr, 1996), an examination of the work of photocopier repair technicians. These technicians have a flourishing stock of stories about cranky machines and brilliant diagnoses of implausible problems. But these stories remain within the community of repair technicians. They do not reach the communities of designers of copiers or copier repair training manuals, where they could serve to provide feedback on unrepairable designs or incorrect diagnostic procedures. Similarly, I have observed, engineers and designers on a particular project may maintain stories about how and why particular design choices were made. But these stories rarely enter into the story stock of the institution; they live and die with the team members. (This claim is based on adventitious observations by myself and my colleagues of engineers and designers at a number of sites. A systematic study of this question would be extremely valuable for understanding the social ecology of technical knowledge.) One reason that stories about the specifics of the work remain local is that they require of their hearers a great deal of technical knowledge about the problem. Orr's examples of technicians' stories are

incomprehensible to an outside reader without his interpretations: moments of high drama, or extreme disgust are conveyed by a part number or the name of a procedure.

Turning to the work of sales agents, I have observed that agents frequently tell stories about sales triumphs and disasters. This is knowledge which it is easy to narrate: there are characters, there is the drama provided by the success or failure of the sale, there is a shared background of knowledge about what an easy or difficult or inappropriate insurance sale is. Agents even have a category called "power phrases," encapsulations of a sales strategy in a single phrase to be used with clients. Agents are always eager to learn new and more effective power phrases, which are almost always conveyed within a story illustrating a particular kind of difficult insurance sale or a new approach to a standard kind of sale.

In contrast, it is very difficult to narrate business processes: how to set up an office routine, how to train new staff, how to organise one's day and week, what kinds of activities to concentrate on. Yet research within MidWest Insurance has shown that the major difference between effective and ineffective sales agents comes in the nature of their business procedures. Without effective office routines, agents are so busy playing catch-up with the incoming demands of walk-in clients, mail and phone calls that they rarely have the time to try to make a sale, let alone set up a consistent marketing program. Yet agents do not tell stories about these structural matters, other than complaints about having lost a trained staff member, which all other agents instantly recognise as a story about a disaster.

There are reasons why processes are difficult to make into stories, while individual sales are easy. One constraint on narrative is that it describe reportable events: events which are unusual or morally consequential. (See (Linde, 1993) for a discussion of reportability.) Thus a narrative consisting only of routine events risks the worst possible response: "So what?" There is a class of narratives, called habitual narratives, which recount frequent or recurring events ((Labov, 1972), (Linde, 1975)). These are stories like: "When I was a kid, we always used to go to the beach in the summer, and my sister and I would always get carsick, so my mother would have us sing to distract us from throwing up. And we would sing ..." In an institutional context, such stories are sometimes used as training for new members, recounting a typical day in the life of Lee the Sales Agent, or Terry the Technician. But it would be oddly inappropriate for an experienced worker to tell another experienced worker a story about daily routine; yet there is much individual knowledge about routine work practice which could valuably be conveyed.

HOW TO USE NARRATIVE

The foregoing discussion of the importance of narrative might suggest that institutions should do their best to capture and pass on tacit social knowledge by collecting stories. Indeed, this is a current trend: the attempt to capture stories, in

a lessons learned system, a computer archive, a video record. These efforts are usually ineffective: the stories stay in their archive or database, without being brought out to be used by new members. (Aha, 1997) reports on lessons learned systems in a variety of industries, showing that a frequent error in developing such systems is putting in place a collection phase, but no analysis or implementation phase.

The reason for this failure is not human perversity in refusing to use these systems, or bad design details, although many such systems are badly designed. Rather, there is a fundamental flaw in the conception of capturing oral stories in static archives. Oral stories have a feature which has been analysed as “recipient design” (Sacks, 1992). That is, when someone tells me a story, even a story he has told many times before to others, he tailors the telling to me, to our ongoing relation, and to the particular point in our conversation he wishes to make. Often a story in conversation is formed as a response to a previous story, or as an indirect suggestion of a possible course of action for a problem described in a previous story. In contrast, a story in a data base of stories is inert. In order to make it useful, I have to do the work of knowing about the data base, accessing it, and making the connection between my situation and the situation being narrated, using a category system provided by the designer which may have no relation to my way of categorising the problem. (Anyone who has attempted to use a manual to diagnose and fix a technical problem will be aware of this problem of categorisation of problems; all serious technical writers break their hearts over it.)

In response to this problem, there are now some initial computer-based learning systems which attempt to present an expert’s videotaped story about a solution to a problem at a point in a simulation exercise which does appropriately occasion the story. (Johnson, 1999) These systems determine when a particular story may be relevant, rather than the person having to search for a relevant case. As yet, such systems have succeeded only in domains which are both tightly structured, and important enough to warrant the considerable expense of collecting the material, categorising it, and building the system which can track the user’s current state and suggest appropriate stories.

While simple collection of narrative is likely to be ineffective, I do not argue that oral storytelling is a wild flower which can never be cultivated in particular places for particular effects. Rather, I suggest that the most successful attempts I have seen by institutions to promulgate particular stories consist of the creation of occasions on which it is appropriate to tell these stories. That is, stories are told in social interaction, and it is possible to create opportunities for kinds of interactions which allow certain kinds of stories, or even specific highly valued stories to be told. I will give a single personal example of this kind of occasion or its absence, and then turn to a taxonomy of types of occasions for narratives. At the Institute for Research on Learning, we had a practice of doing project post-mortems, to discuss what had been done well, what we had learned, what we could have done better. These discussions were quite detailed, down to the level of exactly what in the project proposal was a mistake, the most effective way to prepare project budgets, how to deal with a re-organisation in the organisation

being studied, how to deal with the loss of a key team member, what desktop publishing program would have made producing the final report easier, etc. However, this occasion for reflection and storytelling was restricted to the project team members. Solutions for problems, templates for effective proposals, warnings about how to avoid common problems did not reach other colleagues at the Institute except through happenstance conversations, overhearing, or gossip. But this knowledge remained local to the team members, because there was no occasion at which these stories could be told so that every member of the Institute could hear them, and so that they could enter into the general institutional memory. Yet it would have been possible to set up a year-end project review of all projects, to tell these stories more generally. Such a year-end review meeting is common in many project-based businesses, and gives an opportunity for stories known only locally to enter into the more general story-stock of the entire institution.

By now, many organisations have learned to view “water cooler conversations” as valuable opportunities for knowledge sharing, rather than as down-time spent on gossip. But it is possible for organisations to go further in capturing the stories it wishes to have remembered by encouraging occasions on which valued narratives can be told. There are many types of occasions for storytelling. Below I give a taxonomy of types of storytelling occasions, and a brief description, with examples, of each type. The first axis of this taxonomy is the modality of the occasion: time, both regular and irregular; space; and artefact. The second axis is design intention: occasions specifically designed for remembering and occasions with some other primary purpose which have strong affordances for remembering. The table shows typical examples, although no cell gives an exhaustive list of possible occasions. I then discuss each cell in turn.

Table 1. Occasions for Narrative Remembering

	DESIGNED FOR REMEMBERING	USED FOR REMEMBERING
TIME: Regular occurrences	Anniversaries, regular audits, performance reviews, temporally regular ritual	Annual meetings
TIME: Irregular or Aperiodic	Retirement parties, roasts, problem-based audits, inductions, aperiodic ritual	Unexpected institutional problems, use of non-transparent lexical items
PLACE	Museums, memorial displays, place occasioned ritual	Sites of events, sites for waiting for events
ARTIFACTS	Memorial artefacts, designed displays, photo albums, object-occasioned ritual	Artefacts accidentally preserved

Temporally marked occasions: These are occasions with a regular time course: they occur every year, every Sunday, on the anniversary of an event to be commemorated, etc.. Some are specifically designed for remembering. For example, the 50th anniversary of D-Day was marked by ceremonies that were created and designed to allow for narrative remembering. For American corporations, regular audits are legally mandated occasions for remembering by accounting. They have a conventional pattern, requiring personnel within an institution to present specific records in a specific form to outside auditors. But they are also an occasion for new members of the institution, particularly those involved with record-keeping, to ask questions and share stories about why the records are as they are, and the events which they record. Performance reviews similarly have both a mandated written form for remembering, as well as providing an occasion for requesting and telling stories about accomplishments and problems in the past year.

Other temporally regular events can be used for remembering, although that is not their primary purpose. For example, MidWest Insurance holds annual sales conventions in each region and for national top selling agents, which form a regular occasion for narration. These conventions have formal talks by executives of the company, which regularly invoke the past to explain the present and future, as well as informal meetings of smaller groups of friends, who use them to exchange stories about the past year as well as past meetings of the group.

Aperiodic occasions: Aperiodic occasions are recurring events whose exact timing can not be predicted. Of then they require certain types of narration. Cases are designed for remembering are boundary markers, like retirements or good-bye lunches for old members, or inductions of new members. Inductions are a particular class of occasions on which a new person, or new group of persons is admitted into the organisation, or a new level of it. These occasions include orientation meetings, presentations, etc. For example, at MidWest Insurance, part of the training program for new agents and managers includes an account of the founding and subsequent history of the company.

There are also aperiodic occasions that can be used for remembering. For example, in committee meetings, someone may propose changing a policy. This is often, though not necessarily, the occasion for someone to object by recounting the story of previous problem which the policy was designed to prevent.

One small but important type of temporally irregular occasion is the use of non-transparent lexical items. Unusual words or acronyms may provide the opportunity for the narration of parts of the institutional memory. For example, MidWest Insurance uses the pair of terms: "MOC" and "SOC", pronounced "mock" and "sock," which stand for "Moveable Object Collision" and "Stationary Object Collision." Although all auto insurance now protects against both, initially MidWest Insurance only provided protection against MOCs, since the founder felt that someone who hit a stationary object was an incompetent driver who should not be driving. Stationary object coverage was added later.

These terms provide occasions for stories about how many changes the company has undergone, and about the determined and moral character of the founder.

Spatially marked occasions: Certain places form occasions for narrative remembering. Sites like historical museums or memorial statues or displays are designed to represent or elicit certain stories, such as the memorised stories told by museum guides or available in invariant form in taped tours. Even here, though, some freer and more personal stories may be occasioned. (White, 1997) describes tour guides at the Pearl Harbor museum, as part of the official tour, describing their own war experiences in relation to the bombing of Pearl Harbor.

Sites of notable events may allow for the retelling of those events, while not being specifically designed for memory: (Basso, 1996) has described the extensive use which the Western Apache make of places and place names as occasions for stories that function as moral instruction in how to behave. A corporate example comes in passing “the first building, where we started,” or “the old fire company.” This can occasion a story about the founding or the early days of the organisation. Such occasioning is also used for personally significant spaces: “That’s the office I used to have.” “Oh you have Cindy’s space.” These can occasion stories about the speaker’s history within the organisation.

In addition, there are sites in which members of an organisation wait either for their shift to begin, or for an event to require their attention. Such break rooms, crew rooms, etc., provide an opportunity for narrative exchange for crews or teams.

Artefacts: Artefacts frequently serve as occasions for remembering. Some artefacts are specifically designed for remembering, like photo albums, or the memorial artefacts described above. There are also less formal memorial artefacts: t-shirts, mugs, and baseball caps that mark local milestones or events. While there have been few studies of how such artefacts are used, we have observed cases in which they serve to establish commonality. For example, a person seeing a commemorative mug on someone’s desk may say, “Oh, I was at that meeting too.” Further, a collection of such artefacts can serve to establish a person’s history within the organisation (a life in mugs). At MidWest Insurance, over the course of a career, an agent may collect an array of memorial artefacts including plaques, model automobiles, pins and other memorabilia, all of which mark various levels of sales achievements. Such a collection is readable by insiders, and narratable to outsiders.

Some institutions, including MidWest Insurance, make a very deliberate use of space to display memorial artefacts. For example, the main lobby of the main corporate headquarters contains a small museum. This includes a Model A Ford built in the year the company was founded, the first rate chart hand-written by the founder on a piece of brown paper, posters of radio and television programs sponsored by the company, gifts given as sales performance recognitions, including top hat and white gloves, leather purses containing gold pieces, and old and new plaques, pins, and statuettes used as rewards for agents. Such artefacts are frequently used by official and unofficial tour guides as occasions

for stories about the history of the company. (See (Samuel, 1994) for a discussion of English banks which maintain “mini-museums” in their lobbies, containing photographs or wax models and memorial objects of famous clients, such as Florence Nightingale or Lord Nelson, or a letter from Lord Byron asking for an extension of credit.)

Another important form of maintenance of memory is the use of publicly displayed photographs and plaques, which serve to occasion stories. For example, MidWest’s main headquarters building contains low-relief bronze busts of the first five presidents in the main atrium, which are used by tour guides and training sessions as occasions for narratives about these men. Additionally, as we walked through MidWest’s headquarters to our next meeting, we passed a photo of a now-retired vice president, and were told that he was the father of someone we had met. These pictures occasioned stories about the careers of both men. Similar displays are found in regional and local offices, and are used in the same way.

WHAT WORKS AND WHY

Thus far, I have shown that it is valuable to distinguish social knowledge as one important form of tacit knowledge. Narrative is one of the most powerful means of expressing and transmitting such social knowledge. Recognising that narrative is fundamentally social, relying on interactions between people, suggests different ways to capture and transmit it effectively. Rather than focusing on archival storage, it is important to understand and create social mechanisms for narration. There are a wide range of occasions on which particular, highly valued narratives are told. It is important for institutions to understand and foster such occasions.

However, I do not argue that there is no way to capture and propagate narrative knowledge other than by face to face interaction. Rather, personal storytelling is the easiest way for narrative knowledge to travel in institutions; if narratives are to be effectively captured and used for lessons learned or other such systems, there must be a great deal of attention paid to a variety of design dimensions. These dimensions include effort required for capture, effort required for use, and genre issues. I will discuss these briefly, and then illustrate them with an example of a successful lessons learned system.

Capture and production effort

The first design dimension is the amount of effort required to capture the desired narrative knowledge, and use it to produce a narrative which can be useful in teaching the appropriate knowledge. Current knowledge management discussions contain the strong hope that lessons learned can be captured automatically, in the course of existing documentation of problems that arise within normal operations. This may or may not be usefully possible for other types of knowledge, but it is almost certainly impossible for narrative knowledge, except for the most routine of problems. Producing, collecting and editing narratives which are useful as teaching materials for others takes

dedicated effort: it can not be part of routine operations. This argues that there must be someone whose job it is to ensure that these narratives are collected and edited. Thus, narrative knowledge can not be self-collecting. (It might be argued that many problem reporting systems contain fields for narrative descriptions of the problem and solution, and these are indeed self-collecting: part of the routine process of filing problem reports. However, these narratives are usually so condensed and so conventional that they can be useful only for readers who are already members of the immediate technical community of the writer. And frequently they are not useful even for that community, since technical and institutional constraints prevent accurate descriptions of the actual problem.)

Use Effort

Perhaps even more important for the success of a narrative knowledge management system is the effort which it requires of its intended users. This design dimension is currently being discussed under a number of descriptions: active versus passive strategies, reactive versus proactive strategies, push versus pull technologies. One commercial description is "Hit them where they live": don't force learners to use new communications channels, but rather use the channels which they already use. However, such push strategies must contain information that the user actually wants. It may be valuable for me to receive an email telling me the status of my purchase order. However, if I receive too many email messages daily from my employer telling me about updates to various databases, I am likely to discard them as spam, without distinguishing the ones which might actually contain pointers to information I need.

The basic design dimension behind all these descriptions has to do with the amount of effort required from the user. In the high-effort case, the user must know that there is a knowledge management system, make the decision to consult it, do the work of finding it and logging in, and then find the appropriate entry for the problem which prompted the inquiry. In the ideal low-effort case, the knowledge would come to the user in the course of daily work, or prompted by the existence of a problem.

Genre Issues

A further crucial design dimension for computer systems which attempt to capture stories is appropriateness of the genre of the story. A videotaped story may or may not be effective, depending on the skill of the storyteller and the hidden skill of the archivist who created the index categories allowing one to find the story. An unedited transcript of a recording of an oral story is difficult to read, and is unlikely to aid or delight anyone but a folklorist or linguist who is accustomed to working with such hybrid texts. Such texts require a great deal of editing and framing before they are actually useable. (A successful example of this kind of selecting, editing and framing skill are Studs Terkel's popular oral histories (Terkel, 1972).)

Thus, an important design dimension for capturing stories has to do with the amount of translation from one genre to another. It appears that the more

successful lessons learned systems require a great deal of work to massage oral stories or written reports into useful written texts.

Case Study for Design Dimensions

In order to illustrate these design dimensions, I will examine NASA's Aviation Safety Reporting System (ASRS), particularly its newsletter, *Callback* (asrs.arc.nasa.gov/main_nf.htm). The ASRS is a program which collects, analyses and responds to voluntarily submitted aviation safety incident reports. Of its many outreach functions, its newsletter is often cited as a particularly effective example of communicating lessons learned. Measures of effectiveness include appreciative letters from readers, as well as its use in commercial, military and general aviation training programs.

Capture and production effort

The effort of capturing and producing lessons about aviation safety is spread between members of the aviation community, and the staff of *Callback*, who categorise, choose and frame the responses. Members of the aviation community voluntarily file ASRS reports of incidents in which aviation safety was compromised, both to obtain limited immunity from prosecution, and because of their own commitment to aviation safety.

A team of analysts reads and categorises these reports for ASRS's reporting functions, as well as to find appropriate examples for *Callback's* monthly edition. These analysts are highly skilled members of the aviation community: mainly retired pilots, air traffic controllers, ground crew and cabin crew members. A full-time editor, who is also a pilot, selects letters for publication which cover unusual or particularly important topics, and which are well-written. The letters are occasionally shortened, but are not rewritten. However, the editor usually provides a framing for the letters. The cost of capture and production is thus quite high, very different from the promise of automatic capture frequently promised by knowledge management firms.

Use effort

In contrast to the high level of capture and production effort, the effort required from users is quite small. *Callback* is available both in hard copy and on line. About 80,000 subscribers receive a paper copy every month, and an additional 15,000 download it from the web site. Note that the push distribution channel of mailing the newsletter has far more subscribers than the pull requirement of remembering to check the site each month. (ASRS is currently considering instituting a push strategy for the on-line version: emailing subscribers once a month with the URL of the latest edition.) Additionally, various commercial and military aviation organisations make an effort to distribute copies to pilots: a number of airlines obtain bulk copies and distribute them to employees, and copies are sent to all Aviation Medical Examiners for display in their offices, so

that any pilot going for an annual medical examination has an opportunity to see it.

Genre

In producing *Callback*, a great deal of attention is paid to creating its distinctive voice and genre. For over 20 years, the newsletter has maintained a folksy, mildly humorous tone, and has published letters which tell a safety story clearly and amusingly. This tone was determined by the first editor, Rex Hardy, a retired naval pilot, who drew on his experience of an effective column in *Naval Aviation News* by “Grampaw Pettibone.” (Grampaw is still flying: see www.history.navy.mil/nan/1999/junjul99/gramps.htm) While there were initial complaints that this tone was too vernacular for a government publication, eventually it became evident that the attention paid to making the newsletter readable meant that it was actually read by its intended audience. (Hardy, 1990)

CONCLUSION

The moral of this story is that while stories are extremely effective, and nearly universal, they are not a free good for the institution which attempts to preserve them. Although stories circulate freely and informally within organisations, it requires skilled work to provide occasions for storytelling, and even more effort to capture, record and make appropriate stories available in a usable and credible form.

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