A favorite metaphor of NIC members to describe their task is to make the invisible work visible. As the layers of complexity involved in its architecture reveal, however, a light shining in the dark illuminates certain areas of nursing work but may cast shadows elsewhere: the whole picture is a very complex one. NIC is at once an attempt at a universal standardized tool with a common language; at the same time, its development and application is proceeding via managing and articulating the local and particular. It is in that sense a boundary object between communities of practice, with a delicate cooperative structure (Star and Griesemer 1989). At the same time, it is balanced in a given workflow and historical period that makes it a potential target for control. The fact that NIC researchers are carefully involving a huge web of nurses and nursing researchers and building slowly over time, with revisions, is key to this process. The conservation of work inscribed in the static list of concepts and activities that form a classification system will be inserted into a field of ongoing practices, negotiations, and professional autonomy disputes. These practices and the political field in which they occur form the architecture of intimacy, manageability, and standardization. The local and macro contexts of the classification system and its attendant practices determine in the final instance the extent of the displacement of nursing work. In classification systems, differentiation and dedifferentiation emerge as a continuous and negotiated accomplishment over time. The same lesson holds for the organization of nursing work through NIC as for the coordination of medical organizations of all kinds through the ICD as discussed in chapter 4: it is not a question of mapping a preexisting territory but of making the map and the territory converge.

8

Organizational Forgetting, Nursing Knowledge, and Classification

Introduction—Well do I remember . . .

The last chapter looked at the ways in which NIC operated within multiple agendas through strategies for balanced tensions and strategically protecting ambiguities. Here we turn to the question of what happens when the system is used to encode and classify current and past knowledge and store it for the future.

Classification schemes always have the central task of providing access to the past. They are used to order archives, libraries, and the presentation of knowledge. Indeed, Auguste Comte argued that a good classification scheme could supplant the need for detailed history, since it could encode all valuable knowledge. Thus, classification schemes are used for various kinds of recall. Recall is in general a problematic concept, however, even when one can assume that people are trying to tell the truth about the past. Studies of people's intensely remembered "flashbulb memories" (What were you doing when Kennedy was assassinated?) have proved them to be often false (Brown and Kulik 1982). White House Counsel John Dean claimed fairly total recall at the time of Watergate. Ulric Neisser points out in his analysis of the tapes made in the Oval Office, however, that Dean remembered neither conversations nor even gists of conversations. Rather, Dean encoded an ideal set of possible conversations that embodied his perceived truth of the situation and his fantasies about his own role therein (Neisser 1982, see also the excellent critique in Edwards and Potter 1992[43]).

People cannot generally remember accurately how they felt in the past. They take the present as a benchmark and then work from a currently held belief about change or stability in their attitudes. Thus, when asked how they felt six months ago about, say, a TV series, their

memories will necessarily be colored by what has happened since in that series (Linton 1982, Strauss 1959). It is hard to remember back past an act of infamy: my enemy today was always my enemy (I distrusted them when they appeared to be my friend, as I now recall). If on the other hand—as happens perhaps more often than inversely—my friend today was once an enemy, then I can tell you a conversion story that recasts their past, my past, or both.

If all history is in this sense history of the present, then one might surely think of memory as ineluctably a construction of the present. These studies from cognitive science and social psychology suggest that truth or falsity is not a simple concept when it comes to analyzing organizational memory in science or elsewhere (compare Hacking 1995: chapter 17 on the indeterminacy of the past). Thus Bannon and Kuutti (1996) stress that if "organizational memory" is at all a useful concept, it is so to the extent that it refers to active remembering that carries with it its own context. The memory comes in the form not of true or false facts but of multifaceted stories open to interpretation.

Neisser (1982), building on Tulving's distinction between episodic and semantic memory (remembering what versus remembering how) introduces a third kind of memory. *Repisodic* memory means remembering what was actually happening; by all accounts, including Neisser's own, this is an elusive positivist goal.

Against this increasing differentiation and specialization in the concept of memory, we find a single and undifferentiated definition of "forgetting." Forgetting is just "not remembering." Further, forgetting in all its guises has frequently been seen as necessarily a problem to be solved. Freud encouraged the recall of suppressed memories (see Hacking 1995 for a discussion of memory and veracity in Freud). Historians insist that we must learn the lessons of the past. Yrjö Engeström, in his paper on "organizational forgetting" (1990a) discusses problems raised by the ways in which doctors forget selectively and always linked with current exigencies. His activity theoretical perspective on the organic links between internal and external memory traces is particularly fruitful in that it provides a model for ethnographic studies of collective memory. But he still gives forgetting a negative spin. Bitner and Garfinkel (1967) are among the few to observe and describe a positive ecology of forgetting in their account of "good" organizational reasons for "bad" clinical records. Psychoanlysts do this as well to some degree—concepts such as repression and denial sound more negative than they are technically.

Total recall, in individuals or organizations, is neither desirable nor possible. There are indeed several good reasons for organizations to forget things about their own past. First, it might be the case that rediscovery is easier than remembering. This is especially so where the overhead of constructing a sufficiently precise archive, for a fine-grained situational memory, is high. For example, airline companies frequently do not retain a record of one's food or seating options. They process passengers anew each time they are encountered, which is easier from a data processing perspective.

Extending Chandler (1977), one can see the development of statistics as a filtering mechanism that allows a central office not to have to remember everything about a company's day-to-day running to make things run smoothly. The filtering works as proactive forgetting. Railroad companies do not need to know which particular piece of rolling stock is located where, but simply how many pieces of such and such a kind there are at any given location.

Another positive mode of forgetting occurs when an organization wants to change its identity. Here the argument that "we have always done things this way" stands in the way of breaking new ground. Hughes (1989 [1883]) described the change at Rugby school under Arnold in this light. He showed how Arnold imperceptibly changed the way things were done in this tradition-bound institution, such that group memory was never mobilized against the changes. Recent work in organizational theory has suggested that perhaps it is good on occasion to forget everything about the past to start over without being trapped in old routines (Wackers 1995). In general, if a set of archives indexed by a given classification scheme is being used as a tool of reification or projection, then it can have harmful consequences.

This chapter describes how organizations use classification schemes to selectively forget things about the past in the process of producing knowledge. We argue that there are two major kinds of organizational forgetting in the process of producing and then maintaining classification systems in the workplace:

- Clearance—the erection of a barrier in the past at a certain point so that no information or knowledge can leak through to the present.
- Erasure—the ongoing destruction of selective traces in the present.

Standardized classification systems may permit the organization to move from heterogeneous forms of memory operating within multiple frameworks to the privileging of a form of memory (potential memory)

operating within a well-defined information infrastructure subtended by classification systems. In this process, the decision of whether to opt in to an infrastructure, with its attendant memory frames and modes of forgetting, or to stay out of it is of great political and ethical import. We first follow this set of arguments through with a case study of the development of NIC and then broaden the discussion out to more general considerations of classification and memory.

Nursing Classifications and Organizational Forgetting

Nursing is particularly interesting with respect to forgetting. Nursing work has traditionally been invisible, and its traces removed at the earliest opportunity from the medical record. In general, the nursing profession has not been able as an institution to draw on an active archived memory. Rather, nursing has been seen as an intermediary profession that does not need to leave a trace; in accord with traditional gender expectations, nurses are "on call" (Star and Strauss 1999). As nursing informatician Castles notes, citing Huffman on medical records management, "the nursing records are the first to be purged from the patient records; there is thus no lasting documentation of nursing diagnoses or nursing interventions and no method of storage and retrieval of nursing data" (Castles 1981, 42).

There was a primal act of clearance in the very establishment of NIC. By clearance we mean a complete wiping away of the past of nursing theory in order to start with a clean slate (we draw here on Serres' (1993) work on clearance and origins in geometry). The nurses said that until now there had been no nursing science and therefore there was no nursing knowledge to preserve. One nursing informatician ruefully noted: "It is recognized that in nursing, overshadowed as it is by the rubrics of medicine and religion, no nurse since Nightingale has had the recognized authority to establish nomenclature or procedure by fiat. There are no universally accepted theories in nursing on which to base diagnoses, and, in fact, independent nursing functions have not yet gained universal acceptance by nurses or by members of other health professions" (Castles 1981, 40). Nursing, it was argued, had until now been a profession without form; nothing scientific *could* be preserved. There was no way of coding past knowledge and linking it to current practice. A conference was held to establish a standardized nursing minimum data set (information about nursing practice that would be collected from every care facility). It found that "the lists of

Clearance and the Past

Grand historiographer Sima Qin (1994 [ca 100 B.C.]), writing of the burning of the books in 213 B.C., notes that the chief minister advised the emperor that "all who possess literature such as the Songs, the Documents, and the sayings of the hundred schools should get rid of it without penalty. If they have not got rid of it a full thirty days after the order has reached them, they should be branded and sent to do forced labor on the walls. There should be exemption for books concerned with medicine, pharmacy, divination by tortoise-shell and milfoil, the sowing of crops, and the planting of trees." In response to this, the emperor ordered the famous burning of the books. Citing Qin, "the First Emperor collected up and got rid of the Songs, the Documents, and the sayings of the hundred schools to make the people stupid and ensure that in all under heaven there should be no rejection of the present by using the past. The clarification of laws and regulations and the settling of statutes and ordinances all started with the first Emperor. He standardized documents."

interventions for any one condition are long partially because nursing has a brief history as a profession in the choosing of interventions and lacks information for decision making. As a profession, nursing has failed to set priorities among interventions; nurses are taught and believe they should do everything possible" (McCloskey and Bulechek 1992, 79).

In the face of this view of the nurse as the inglorious other—doing everything that no one else does—should all previous nursing knowledge be abandoned? William Cody, in an open letter to the Iowa Intervention Team who produced NIC (published in *Nursing Outlook* in 1995) charged that this was precisely what would follow from widespread adoption of NIC:

> It would appear that the nursing theorists who gave nursing its first academic leg to stand on, as it were, are deliberately being frozen out. I would like to ask Drs. McCloskey and Bulechek, why is there no substantive discussion of nursing theory in your article? How can you advocate standardizing "the language of nursing" by adopting the language of only one paradigm? How do you envision the relationship between the "standardized" masses and those nurse scholars with differing views? (Cody 1995, 93)

The project team responded that indeed clearance was an issue. "The Iowa group contends that taxonomic development represents a radical

shift in theory construction in which the grand conceptual models are not debated, but transcended. We believe that, as a scientific community, nursing has moved to the point of abandoning the conceptual models of nursing theorists as forming the science base of the discipline" (McCloskey, Bulechek, and Tripp-Reimer 1995, 95). It is not just at the level of nursing theory that this act of clearance is seen as unsettling. Practicing nurses implementing NIC at one of four test bed sites had several complaints. They stated that learning to use NIC together with the new computer system in which it was embedded was like going to a foreign country where you had to speak the language; to make matters worse, you had to go to a new country every day. More prosaically, they said that they felt they were going from being experts to novices.[44]

The argument was made that there has been no comparative work done in the past. "The discipline of nursing has not yet constructed a cohesive body of scientific knowledge" (Tripp-Reimer et al. 1996, 2). There is a complexity here, however, that often arises in connection with the strategy of clearance. One wants to be able to say that nurses now do something that is valuable and adaptable to scientific principles. At the same time, they maintain that nurses have not yet (until the development of the classification system) been able to develop any nursing theory and thence any systematic, scientific improvement in practice.

This difficulty is a general problem when new classification schemes are introduced. New schemes effectively invalidate much previous knowledge by creating new sets of categories. Yet, they seek to draw on the authority of the outdated knowledge while simultaneously supplanting it.

This same article, concerning the dimensional structure of nursing interventions, tackles this problem directly. Tripp-Reimer argues that there must be a cycle of forgetting in the development of the new classification scheme. The article begins with a quote from Chung Tzu:

> The purpose of a fish trap is to catch fish. When the fish are caught, the trap is forgotten.
> The purpose of a rabbit snare is to catch rabbits. When the rabbits are caught, the snare is forgotten.
> The purpose of words is to convey ideas. When the ideas are grasped, the words are forgotten.
> Seek those who have forgotten the words. (Tripp-Reimer et al. 1996, 2)

The authors argue here that the traditional grand theories had a "certain limited utility beyond their historical importance" in that they

provided a structure for educational programs. In the field, however, expert nurses soon "forgot" these words and developed their own rubric to get at the deep structure of the nursing situation (there is indeed a reference to transformational grammar here). Using NIC categories as a research tool, one could uncover the three key dimensions of nursing work (the intensity, focus, and complexity of care) that experts already knew about without there having been a nursing science. Having passed through the purifying cycle of forgetting, one could finally "bring intuitive clinical decision making to a conscious level."

There is a double complexity to this cycle. The first is the fact that the first author, Toni Tripp-Reimer, is a cultural anthropologist turned nursing informatician well versed in Kuhn, Lakoff, and other philosophers of science and language. The organization that produces NIC has to be broadly enough construed, on occasion, to include the community of sociologists of science and linguists, even though this inclusion may never be represented overtly in the records of the classification scheme. In passing, these alliances can form a kind of organizational memory that becomes instead forgetting. It means storing information in locations once within the network of an organization but now outside of it; a variety of outsourcing gone sour. The alliances may be fragile, or historical circumstances may change. Thus, for example, the problem of using a centralized external memory source like the library at Alexandria. . . .

The second complexity is that de novo classifications reflect a bootstrapping between what practicing nurses already know and what the science of nursing will tell them. Thus, to get the category of culture brokerage in NIC (see figure 7.5), Tripp-Reimer had to get it into the research literature as something that was already being done by nurses (and indexed in databases!). The NIC team in general claims both that nursing is already a science and that it is a science that has not yet been formulated. They need both points for their project. That is, they need to maintain the former to justify the profession against current attacks and the latter to justify their classification system, which when in place will protect it from future attacks.

One is reminded of Piaget's (1969) assertion that our earliest intuitions are of the relativistic nature of time, and that we need to unlearn our school lessons both to access the latest science and to get back in touch with our childhood insights. The point here is to suggest that unlearning, like forgetting, may be a more pervasive feature of organizational and cognitive life than accounts of learning and of memory

Culture Brokerage 7330

DEFINITION: Bridging, negotiating, or linking the orthodox health care system with a patient and family of a different culture

ACTIVITIES:

Determine the nature of the conceptual differences that the patient and nurse have of the illness

Discuss discrepancies openly and clarify conflicts

Negotiate, when conflicts cannot be resolved, an acceptable compromise of treatment based on biomedical knowledge, knowledge of the patient's point of view, and ethical standards

Allow the patient more than the usual time to process the information and work through a decision

Appear relaxed and unhurried in interactions with the patient

Allow more time for translation, discussion, and explanation

Use nontechnical language

Determine the "belief variability ratio"—the degree of distance the patient sees between self and cultural group

Use a language translator, if necessary (e.g., signing, or Spanish)

Include the family, when appropriate, in the plan for adherence with the prescribed regimen

Translate the patient's symptom terminology into health care language that other professionals can more easily understand

Provide information to the patient about the orthodox health care system

Provide information to the health care providers about the patient's culture

BACKGROUND READINGS:

Caudle, P. (1993). Providing culturally sensitive health care to Hispanic clients. Nurse Practitioner, 18(12), 40-51.

Jackson, L.E. (1993). Understanding, eliciting, and negotiating clients' multicultural health beliefs. Nurse Practitioner, 18(4), 36-42.

Rairdan, B., & Higgs, Z.R. (1992). When your patient is a Hmong refugee. American Journal of Nursing, 92(3), 52-55.

Sloat, A.R., & Matsuura, W. (1990). Intercultural communication. In M.J. Craft & J.A. Denehy (Eds.), Nursing Interventions for Infants and Children (pp. 166-180). Philadelphia: W.B. Saunders.

Tripp-Reimer, T., & Brink, P.J. (1985). Culture brokerage. In G.M. Bulechek & J.C. McCloskey (Eds.), Nursing Interventions: Treatments for Nursing Diagnoses (pp. 352-264). Philadelphia: W.B. Saunders.

Figure 8.1
Culture brokerage, NIC. An intervention requiring the nurse to mediate between medical belief systems.
Source: *NIC*, second edition.

Erasure and the Present

Donald Crowhurst went quietly mad on a round-the-world yachting race and lay becalmed on the ocean developing a theory of the cosmic mind while at the same time completing and radioing in an immaculate official log that had him winning the race at a record pace. Crowhurst's double log surfaces within his madness as contemplation on the nature of time: "The Kingdom of God has an area measured in square hours. It is a kingdom with all the time in the world—we have used all the time available to us and must now seek an imaginary sort of time." (Tomalin and Hall 1970, 259).

might lead us to believe. The act of clearance is to take away useless theory; then ethnographic work will uncover the true science (always already there) that NIC can express. The act of clearance, therefore, is not one of simple denial of the past, though complex historical narratives need to be constructed to distinguish the two.

We do not accept the position that such clearance leads to the creation of some sort of truer science—the issue of the validity of nursing knowledge is entirely orthogonal to our purpose. We are producing an anatomy of what it has meant in the case of nursing work to create such a science. This is not an accidental feature of their work but can be seen as a core strategy over the centuries in the creation of sciences through the establishment of stable classification schemes. The strategy itself provides a way of managing a past that threatens to grow out of control. One can declare by fiat that the past is irrelevant to nursing science, while, in Tripp-Reimer's case, validating the past as embodied in current best practice. The development of a classification scheme will provide for a good ordering of memory in the future so that nothing henceforth deemed vital will be lost.

This claim that nothing vital will be lost is strategically important but largely unverifiable for two reasons. First, the classification scheme itself forms a relatively closed system with respect to the knowledge that it enfolds. Thus, in Latour's terms, it resists trials of strength. It becomes difficult to stand outside of it and demonstrate that something is being selectively deleted or overlooked from the archive it supports. Second, even if the classification scheme is in principle robust, it is by definition hard to remember what has been removed from the archive when the archive itself is basically the only memory repository at hand.

With the strategy of clearance, we saw the complete wiping clean of a historical slate. This made it possible for a single origin for nursing science to be created. From that point of origin nursing actions could be coded and remembered in an organizationally and scientifically useful fashion. A second mode of directed forgetting in organizations is erasure: the constant filtering out of information deemed not worthy of preserving for the organization's future purposes.

Historically, the selective erasure of nursing records within hospital information systems has been drastic. Nursing records are the first destroyed when a patient is released. The hospital administration does not require them (nursing is lumped in with the price of the room), doctors consider them irrelevant to medical research, and nursing theorists are not well enough entrenched to demand their collection. Huffman (1990: 319), in a standard textbook on medical records management writes:

> As nurses' notes are primarily a means of communication between the physicians and nurses, they have served their most important function during the episode of care. Therefore, to reduce the bulk and make medical records less cumbersome to handle, some hospitals remove the nurses' notes from records of adult patients when medical record personnel assemble and check the medical record after discharge of the patient. The nurses' notes are then filed in chronological order in some place less accessible than the current files until the statute of limitations has expired and they are destroyed. (Huffman 1990, 319)

Traditionally nurses have been facilitated out of the equation: though they may not have an official trace of their own past, their duty is to remember for others. In one of those vague but useful generalizations that characterize information statistics, it was asserted, in a book on next-generation nursing information systems, that 24 percent of total hospital operating costs were devoted to information handling. Nursing "accounted for most of the information handling costs (28 percent to 34 percent of nurses' time);" and what is worse, "in recent years, external regulatory factors, plus increasing organizational and health care complexity, have augmented the central position of information in the health care environment" (Zielstorff et al. 1993, 5). The nursing profession acts as a distributed memory system for doctors and hospital administrators. Ironically, in so doing, it is denied its own official memory.

Even when the erasure is not mandated, it has been voluntary. One text on a nursing classification system cites as a motif of the profession

an observation that "the subject of recordkeeping has probably never been discussed at a convention without some agitated nurse arising to ask if she is expected to neglect her patients to write down information about them . . ." (Martin and Scheet 1992, 21, echoing a 1917 source). And Joanne McCloskey, one of the two principal architects of NIC notes that "the most convincing argument against nursing service or Kardex care plans is the absence of them. Although written care plans are a requirement by the Joint Commission for Hospital Accreditation and a condition for participation in Medicare, few plans are, in fact, written" (McCloskey 1981, 120). In her study of the ICD, Ann Fagot-Largeault (1989) notes the same reluctance on the part of doctors to spend time accurately filling in a death certificate (itself a central tool for epidemiologists) when they might be helping live patients. Thus there is, in Engeström's (1990a) terms, a block between internal memory and external memory. Because representational work takes time, those filling out forms systematically erase the complex representations that they hold in their heads in favor of summary ones. In the case of the ICD, there are many complaints about the quality of data, due to the overuse of general disease terms or "other" categories. In the case of a computerized NIC, nurses are sometimes suspected by the NIC implementation team of using the choices that appear before them on a screen (which they can elect with a light pen) rather than searching through the system for the apt descriptor (IIP 6/8/95).

One of the main problems of nurses is that they are trying to situate their activity visibly within an informational world that has factored them out of the equation. It has furthermore maintained that they should be so excluded, since what nurses do can be defined precisely as that which is not measurable, finite, packaged, or accountable. In nursing theorist Jenkins' terms, "nurses have functioned in the post-World War II era as the humanistic counterbalance to an increasingly technology-driven medical profession" (Jenkins 1988, 92). Nursing informaticians face a formidable task. They have tried to define nursing as something that fits naturally into a world partly defined by the erasure of nursing and other modes of invisible and articulation work. This is parallel with technicians who seek new ways of writing scientific papers in a way that their work is acknowledged, and yet neither the nature of scientific truth nor its division of labor remains intact.

Sometimes the nurses are driven for these reasons by their own logic to impeach medical truth. At other times they challenge orthodoxy in organization science, or they seek to restructure nursing so that these

challenges will not be necessary. In the end, there will be an information infrastructure for medical work that contains an account of nursing activity. The move to informational panopticons is overwhelming in this profession as in many others. With projects like NIC—which offer new classification systems to embed in databases, tools, and reports—we get to see what is at stake in making invisible work visible.

This section has explored two strategies, clearance and erasure. Some of the points made here in the context of organizational forgetting relate to arguments within the sociology of science about scientific representations of nature. These include the idea of deleting the work (Star 1991a, Shapin 1989) and the deletion of modalities in the development of scientific texts (Star 1983, Latour 1987). That is, as a scientific statement gets ever closer to being accepted as fact, historical contingencies get progressively stripped from its enunciation.

Why, then, talk at all about memory and forgetting when representation and its literature can do much of the same work? The concept of representation tends naturally to abstract away the ongoing work of individual or organizational agents (compare here Woolgar 1995, 163). It is difficult to express the fact that the representation can have different meanings at different times and places in the organization in a language that has been used rather to demonstrate the conjuring of a single articulation of "fact." The act of remembering a fact organizationally involves not only mobilizing a set of black-boxed allies (in Latour's terms) but also translating from the context of storage to the present situation (one might store a fact for reason x but recall it for reason y). This is a central problem for most classification systems operating as information storage tools. Within an organizational context, it is easier to explore the distribution of memory and forgetting than the distribution of representation.

Finally, there it is always a temptation when talking of representation to fall into a cognitivist trap of assuming the primacy of thinking. By concentrating on "following the actors," sociologists of science have as a rule produced a language that privileges the scientific "fact" and its circulation. They have in this put the infrastructure supporting that fact relatively into the background (what goes on inside the black box, or indeed what black boxes look like, is seen as irrelevant). From the perspective of organizational memory, a modality can be deleted in a number of different ways. It might be distributed (held in another part of the organization than in that which produces the text); it might be

How to Forget

In a work reminiscent of Frances Yates' (1966), Fentress and Wickham argue that artificial memory systems went on the wane after Descartes. "Instead of a search for the perfectly proportioned image containing the 'soul' of the knowledge to be remembered, the emphasis was on the discovery of the right logical category. The memory of this system of logical categories and scientific causes would exempt the individual from the necessity of remembering everything in detail. . . . The problem of memorizing the world, characteristic of the sixteenth century, evolved into the problem of classifying it scientifically."

(James Fentress and Chris Wickham 1992, 13)

built into the infrastructure (the work environment is changed such that the modality is never encountered); or simply dismissed. Looking at ways of distributing memory and operating forgetting we can, therefore, look in more fine-grained detail at what happens as the representation moves into and out of circulation.

Clearance is a strategy employed internally within the profession of nursing as a tool for providing an origin for the science of nursing. Erasure is employed externally on the profession of nursing as a tool for rendering nursing a transparent distributed memory system. The logic of the relationship between clearance and erasure has been that the nurses are operating the clearance of their own past in order to combat the erasure of their present in the records of medical organizations. Medical information systems, they argue, should represent the profession of nursing as if it just began yesterday. Otherwise, they will copy the transparency of nursing activity from one representational space (the hospital floor and paper archives) to another (the electronic record). This poses, then, the question of what happens when a new ecology of attention (what can be forgotten and what should be remembered) is inaugurated with the development of a new information infrastructure.

Memory—individual and organizational—is in general filtered through classification systems. Such systems permit encoding of multiple bits of information about the environment into a single coherent framework (see Schachter 1996, 98–133). Edouard Clarapède (who performed the initial notorious experiment of having a stranger rush into the classroom, do something outrageous, and then have students

describe what happened) noted as early as 1907 that "the past—even of a simple event—was less a record than a sort of taxonomy. Not perceptions, but categorization of familiar types was the major function of memory" (cited in Matsuda 1996, 109).

Any complex information infrastructure—paper or electronic, formal or informal—claims by its nature to contain all and only the information that is needed for the smooth running of that organization. Organizations frequently want to know everything relevant about some past action. For example, if there is a blackout along the West Coast due to a tree falling in Idaho, an awful amount of information needs to be recalled and synthesized for the connection to be made. Frequently, a prime function of recordkeeping in the organization is to keep track of what is going on so that, should anyone ever want to know (auditors, a commission of inquiry, and so forth), a complete reconstruction of the state of the organization at a particular moment can be made. For instance, Hutchins (1995, 20) talks about the role of the logs kept by navy ships of all their movements. "Aboard naval vessels . . . records are always kept—primarily for reasons of safety, but also for purposes of accountability. Should there be a problem, the crew will be able to show exactly where the ship was and what it was doing at the time of the mishap." For something to be remembered officially by an organization, however, it must be recorded on a form. Forms necessarily impose categories (Berg and Bowker 1997).

No reconstruction will cover literally everything that was going on at a particular moment. Rather, it will capture primarily objects that fit into the organization's accepted classification scheme of relevant events. The kind of memory that is encoded in an organization's files for the purposes of a possible future reconstruction could be called "potential memory." We are using the word potential to draw attention to the distributed, mediated nature of the record. No one person remembers everything about a medical intervention, and generally it can be processed through an organization without ever having been recalled. There is a possible need to recall any one intervention in huge detail, however, and the only way that the possible need can be met is through the construction of a classification system that allows for the efficient pigeonholing of facts.

Within the hospital, nursing work has been deemed irrelevant to any possible future reconstruction; it has been canonically invisible (Star 1991a, Star and Strauss 1999). The logic of NIC's advocates is that what has been excluded from the representational space of medical practice should be included.

Operating within the space of erasure that is at once home for them and a threat to their continued existence, the nurses in Iowa have thought long and hard about the politics and philosophy of classifying their activities so that they fit into the hospital's potential memory. They do not want to flip over from being completely invisible to being far too visible. They have decided to name their tasks, but not to name too much at too fine a grain of detail. To this end they have adopted their own practice of continuing partial erasure (where they limit the nature and scope of erasure) for three reasons:

- From within the exercise of the profession of nursing, to recognize local differences and protect local autonomy (so central to the nursing self-image) while providing the necessary degree of specification for entry into the world of potential memory. They have decided to specify only down to the level of interventions, but to leave the subcategories of activities as relatively fluid—several possibly contradictory activities are subsumed under a single intervention (see figure 7.1 for example).
- From within the hospitals of which nursing constitutes one administrative unit, to protect the nurses from too much scrutiny by accountants. It is harder to set off aspects of nursing duties and give them to lower paid adjuncts if that work is relatively opaque. The test sites that are implementing NIC have provided some degree of resistance here. They argue that activities should be specified so that, within a soft-decision support model, a given diagnosis can trigger a nursing intervention of a single, well-defined set of activities. As Marc Berg (1997b) has noted in his study of medical expert systems, such decision support can only work universally if local practices are rendered fully standard. A key professional strategy for nursing—particularly in the face of the ubiquitous process to reengineer—is realized by deliberate nonrepresentation in the information infrastructure. What is remembered in the formal information systems resulting is attuned to professional strategy and to the information requisites of the nurses' take on what nursing science is.
- From an information systems perspective, to ensure that information does in fact get recorded on the spot. There is a brick wall that such systems encounter when dealing with nurses on the hospital floor. If they overspecify an intervention (break it down into too many constituent parts), then it will be seen as an NSS classification—one that is too obvious. The project team sees the classification scheme as having to be very prolix at present; but when the practice of nursing itself is fully standardized, some of the words will be able to wither

away. They point to intervention classifications used by doctors that are much less verbose—and can afford to be, they argue—because every doctor knows the standard form of treatment for, say, appendicitis. (Though they also argue that there are local variations in medical practice that have been picked up by good reporting procedures and that NIC will be able to provide such a service for nursing, leading to an improvement in the quality of practice). It is assumed that any reasonable education in nursing or medicine should lead to a common language wherein things do not need spelling out to any ultimate degree. The information space will be sufficiently well prestructured that some details can be assumed. Attention to the finer-grained details is delegated to the educational system where it is overdetermined.

These NIC erasure strategies—dealing with overspecification and the political drive to relative autonomy by dropping things out of the representational space—are essential for the development of a successful potential memory. Partial erasure of local context is needed to create the very infrastructure in which nursing can both become a science like any other and yet nursing as a profession can continue to develop as a rich, local practice. The ongoing erasure is guaranteed by the classification system. Only information about nursing practice recognized by NIC or by other classification schemes in use can be coded on the forms fed into a hospital's computers or stored in a file cabinet.

Granularity and Politics

Nursing informaticians agree as a body that for proper health care to be given and for nursing to be recognized as a profession, hospitals should code for nursing within the framework of their memory systems. Nursing work should be classified and forms should be generated that utilize these classifications. There has been one notable disagreement, however, with respect to the best strategy for coding nursing work into memory systems.

To understand the difference that has emerged, recall one of those forms you have filled in that does not allow you to say what you think. You may, in a standard case, have been offered a choice of several racial origins, but may not believe in any such categorization. There is no room on the form to write an essay on race identity politics. So either you make an uncomfortable choice to get counted, and hope that enough of your complexity will be preserved by your set of answers to the form, or you do not answer the question and perhaps decide to

devote some time to lobbying the producers of the offending form to reconsider their categorization of people. The NIC group has wrestled with the same strategic choice. It must fit its classification system into the Procrustean bed of all the other classification systems with which it must articulate in any given medical setting. Only thus may it come to form a part of a given organization's potential memory. The other choice is to reject the ways in which memory is structured in the organizations with which they are dealing.

Let us look first at the argument for including NIC within the potential memory framework of the hospital. The nursing team argues that NIC has to respond to multiple important agendas simultaneously. Consider the following litany of needs for a standard vocabulary of nursing practice:

> It is essential to develop a standardized nomenclature of nursing diagnoses to name without ambiguity those conditions in clients that nurses identify and treat without prescription from other disciplines; such identification is not possible without agreement as to the meaning of terms. Professional standards review boards require discipline-specific accountability; some urgency in developing a discipline-specific nomenclature is provided by the impending National Health Insurance legislation, since demands for accountability are likely both to increase and become more stringent following passage of the legislation. Adoption of a standardized nomenclature of nursing diagnoses may also alleviate problems in communication between nurses and members of other disciplines, and improvement in interdisciplinary communication can only lead to improvement in patient care. Standardization of the nomenclature of nursing diagnoses will promote health care delivery by identifying, for legal and reimbursement purposes, the evaluation of the quality of care provided by nurses; facilitate the development of a taxonomy of nursing diagnoses; provide the element for storage and retrieval of nursing data; and facilitate the teaching of nursing by providing content areas that are discrete, inclusive, logical, and consistent. (Castles 1981, 38)

We have cited this passage at length since it incorporates most of the motivations for the development of NIC. The development of a new information infrastructure for nursing, heralded in this passage, will make nursing more "memorable." It will also lead to a clearance of past nursing knowledge—henceforth prescientific—from the textbooks, it will lead to changes in the practice of nursing (a redefinition of disciplinary boundaries), and to a shaping of nursing so that future practice converges on potential memory.

Many nurses and nursing informaticians are concerned that the profession itself may have to change too much to meet the

requirements of the information infrastructure. In her study of nursing information systems in France, Ina Wagner speaks of the gamble of computerizing nursing records, "Nurses might gain greater recognition for their work and more control over the definition of patients' problems while finding out that their practice is increasingly shaped by the necessity to comply with regulators' and employers' definitions of 'billable categories'" (Wagner 1993, 7). Indeed, a specific feature of this "thought world" into which nurses are gradually socialized through the use of computer systems is the integration of management criteria into the practice of nursing. Wagner continues: "Working with a patient classification system with time units associated with each care activity enforces a specific time discipline on nurses. They learn to assess patients' needs in terms of working time."[45] This analytic perspective is shared by the Iowa nurses. They argue that documentation is centrally important; it not only provides a record of nursing activity but also structures the activity at the same time:

> While nurses complain about paperwork, they structure their care so that the required forms get filled out. If the forms reflect a philosophy of the nurse as a dependent assistant to the doctor who delivers technical care in a functional manner, this is the way the nurse will act. If the forms reflect a philosophy of the nurse as a professional member of the health team with a unique independent function, the nurse will act accordingly. In the future, with the implementation of price-per-case reimbursement vis-à-vis diagnosis related groups, documentation will become more important than ever. (Bulechek and McCloskey 1985, 406)

As the NIC classification has developed, observes Joanne McCloskey, the traditional category of "nursing process" has been replaced by "clinical decision making plus knowledge classification." And in one representation of NIC that she produced, both the patient and the nurse had dropped entirely out of the picture (both were, she said, located within the "clinical decision making box" on her diagram) (IIP 6/8/95). A recent book about the next generation nursing information system argued that the new system:

> cannot be assembled like a patchwork quilt, by piecing together components of existing technologies and software programs. Instead, the system must be rebuilt on a design different from that of most approaches used today: it must be a data-driven rather than a process-driven system. A dominant feature of the new system is its focus on the acquisition, management, processing, and presentation of "atomic-level" data that can be used across multiple settings for multiple purposes. The paradigm shift to a data-driven system represents a new generation of information technology; it provides strategic resources for clinical nursing practice rather than just support for various nursing tasks. (Zielstorff et al. 1993, 1).

This speaks to the progressive denial of process and continuity through the segmentation of nursing practice into activity units. Many argue that to "speak with" databases at a national and international level just such segmentation is needed. The fear is that unless nurses can describe their process this way (at the risk of losing the essence of that process in the description), then it will not be described at all. They can only have their own actions remembered at the price of having others forget, and possibly forgetting themselves precisely what it is that they do.

Some nursing informaticians have chosen rather to challenge the existing memory framework in the medical organizations they deal with. They have adopted a Batesonian strategy, responding to the threat of the new information infrastructure by moving the whole argument up one level of generality and trying to supplant data-driven categories with categories that recognize process on their own terms. Thus the Iowa team pointed to the fact that women physicians often spend longer with patients than male doctors; however, these physicians need to see patients less often as a result. The female physicians argue that just such a process-sensitive definition of productivity needs to be argued for and implemented in medical information systems so that nursing work be fairly represented (IIP 6/8/95). They draw from their tacit (because unrepresented) reservoir of knowledge about process to challenge the data-driven models from within.

Within this strategy the choice of allies is by no means obvious. Since with the development of NIC we are dealing with the creation of an information infrastructure, the whole question of how and what to challenge becomes very difficult. Scientists can only deal with data as presented to them by their information base just as historians of previous centuries must rely heavily on written traces. When creating a new information infrastructure for an old activity, questions have a habit of running away from one. A technical issue about how to code process can become a challenge to organizational theory and its database. A defense of process can become an attack on the scientific world-view. Susan Grobe, a nursing informatician, has made one of the chief attacks on the NIC scheme. She believes that rather than standardized nursing language, computer scientists should develop natural language processing tools so that nurse narratives can be

interpreted. Grobe argues for the abandonment of any goal of producing "a single coherent account of the pattern of action and beliefs in science" (Grobe 1992, 92). She goes on to say that "philosophers of science have long acknowledged the value of a multiplicity of scientific views" (92). She excoriates Bulechek and McCloskey, architects of NIC, for having produced work "derived from the natural science view with its hierarchical structures and mutually exclusive and distinct categories" (93). She on the other hand is drawing from cognitive science, library science, and social science (94). Or again, a recent paper on conceptual considerations, decision criteria, and guidelines for the Nursing Minimum Data Set cited Fritjof Capra against reductionism, Steven Jay Gould on the social embeddedness of scientific truth, and praised Foucault for having developed a philosophical system to "grapple with this reality" (Kritek 1988, 24). Nurse scientists, it is argued, "have become quite reductionistic and mechanistic in their approach to knowledge generation at a time when numerous others, particularly physicists, are reversing that pattern" (ibid., 27). And nursing has to find allies among these physicists. "Nurses who deliver care engage in a process. It is actually the cyclic, continuous repetition of a complex process. It is difficult, therefore, to sketch the boundaries of a discrete nursing event, a unit of service, and, therefore, a unit of analysis. Time is clearly a central force in nursing care and nursing outcomes. Nurses have only begun to struggle with this factor. It has a centrality that eludes explication when placed in the context of quantum physics" (ibid., 28). The point here is not whether this argument is right or wrong. It is an interesting position. It can only be maintained, as can many of the other possible links that bristle through the nursing informatics literature, because the information infrastructure itself is in flux. When the infrastructure is not in place to provide a seemingly "natural" hierarchy of levels, then discourses can and do make strange connections among themselves.

To not be continually erased from the record, nursing informaticians are risking either modifying their own practice (making it more data driven) or waging a Quixotic war on database designers. The corresponding gain is great, however. If the infrastructure is designed in such a way that nursing information has to be present as an independent, well-defined category, then nursing itself as a profession will have a much better chance of surviving through rounds of business process reengineering and nursing science as a discipline will have a firm foundation. The infrastructure assumes the position of Bishop

Berkeley's God: as long as it pays attention to nurses, they will continue to exist. Having ensured that all nursing acts are potentially remembered by any medical organization, the NIC team will have gone a long way to ensuring the future of nursing.

Classification Systems: Potential Memory and Forgetting

Three social institutions, more than any others, claim perfect memory: the institutions of science, the law, and religion. The legal and clerical professions claim perfect memory through an intricate set of reference works that can be consulted for precedence on any current case. The applicability of past to present is a matter of constant concern often argued in the law courts or in theological disputes. Scientific professionals, though, have often claimed that by its very nature science displays perfect memory. Furthermore they structure their recall primarily through a myriad of classification systems that give them a vast reserve of potential memory. Scientific articles are in principle—though never in practice—encoded in such a way that, hopefully, an experiment performed one day in Pesotum, Illinois, can be entirely replicated 100 years later in Saffron Walden, England.

The chapter now draws some more general conclusions about the ways in which classification systems structure memory within organizations, taking as a chief example the nature and operation of classification systems in science. There are two major reasons for choosing the institution of science for a wider discussion—the NIC development team claims to be rendering nursing scientific, and so these wider examples develop naturally out of that section above; and classification work has been more formalized in science than in other institutions.

It can readily be accepted that great discoveries were made but not recognized as such at the time (the cases of Kepler and Mendel are canonical). But it is not often held that discoveries were made, recognized, and then forgotten. Traditionally in science the discourse of perfect memory has not been that of the complete file folder, though notable publications have claimed to be archives for their respective disciplines. The more general claim to perfect memory is that this good recordkeeping is in the very nature of science. Take, for example, Henri Poincaré's *Science and Hypothesis* (1905). All scientific work, for Poincaré and many other positivists, went toward the construction of an eternal palace. Poincaré uses the metaphor of an army of scientists, foot soldiers, each adding a brick or so to the edifice of science. "The

scientist must set in order. Science is built up with facts, as a house is with stones" (101). The thing about bricks is that they do not get forgotten: they are there in the nature of the edifice. Nobody need actively recall them: buildings do not remember. But each brick that is in a building is continuously present and is therefore ageless. In another metaphor, Poincaré sees the work of doing physics as similar to building a collection of books with the role of the theorist being to facilitate information retrieval, to catalogue:

> Let us compare science to a library that ought to grow continually. The librarian has at his disposal for his purchases only insufficient funds. He ought to make an effort not to waste them.
> It is experimental physics that is entrusted with the purchases. It alone, then, can enrich the library.
> As for mathematical physics, its task will be to make out the catalogue. If the catalogue is well made, the library will not be any richer, but the reader will be helped to use its riches. (104)

The very nature of theory, then, is that it furnishes a classification system that can then be used to remember all (and only that) which is relevant to its associated practice.

All classification systems, however, face a bootstrapping problem. In a world of imperfect knowledge, any classificatory principle might be good, valid, useful: you will not know what makes a difference until you have built up a body of knowledge that relies, for its units of data, on the classification scheme that you have not yet developed. This is Spinoza's problem. Consider its form in the world of medical record-keeping—a world in which every trace might count for a patient's health or a clinical discovery. To maintain a good system of medical records, a state needs to classify a huge amount of information not only about its own citizens but about citizens of countries that it is in contact with (classification systems are necessarily imperialistic; witness the protests of African doctors to pressures from western AIDS researchers). As seen in chapter 2, the need for information and thence the burden of classificatory activity is effectively infinite.

In a world in which, as Ann Fagot-Largeault (1989, 6) has pointed out it is impossible to die of old age (the category of being "worn out" having been removed from the ICD) it appears that we are afloat in a sea of multiple, fractured causalities each demanding their own classification systems and their own apparatus of record collection. To deal with the plenum of information that all good organizations logically need, one can operate a distribution of memory in space (such and

such a subgroup needs to hold such and such knowledge) and a distribution of memory in time (such and such a memory will only be recalled if a given occasion arises).

Classification systems provide both a warrant and a tool for forgetting at the same time as they operate this distribution. To take an overview of this process, consider the case of the classification of the sciences. Auguste Comte wrote about this in the first volume of his course of positive philosophy wherein he lays out a new classification of all the sciences in hierarchical order, each science having a statics and a dynamics. He argued that it was only at the current state of advancement of science that a true classification system could emerge since only now were the forces of religion and metaphysics sufficiently at bay that a true picture of the nature of knowledge could emerge.

At the same time, the sum total of scientific knowledge was sufficiently great that it was inconceivable to learn a science by mentally tracing its history. There were too many wrong turns, blind allies, or vagaries. (Just as one does not want to remember where one's keys are by tracing the series of actions that one has made in the past several hours). With the new classification system, knowledge could be arrayed logically and naturally. One would lose chronological order but gain coherence. Indeed, only in this way could science be logically taught; thus: ". . . the most important property of our encyclopedic formulation . . . is that it directly gives rise the true general plan of an entirely rational scientific education" (Comte 1975 [1830–45], 50).[46]

What is left in Comte's work is the positivist calendar, where certain great scientists have their days, just as the saints had theirs in the age of religion. Serres annotates this passage with the observation that the formation (training) of scientists covers up and hides the formation (production) of scientific knowledge (51).

Indeed, Comte sets in train a double motion. On the one hand, you will only learn science if you forget its history; on the other hand, you will only understand the history of science if you look at the entire history of humanity:

> This vast chain is so real that often, to understand the effective generation of a scientific theory, the mind is led to consider the perfectioning of some art with which it has no rational link, or even some particular progress in social organization without which this discovery would not have taken place. . . . It follows therefore that one cannot know the true history of any science, that is to say the real formation of the discoveries it is composed of, without studying, in a general and direct manner, the history of humanity. (52)

On one side we have the complete history of humanity, where nothing can be forgotten because everything might be relevant. On the other, we have an efficient classification system that allows us to remember only what we need to remember about science. The classification system operates as a clearance: all that was religious and metaphysical is wiped away with a single gesture. It operates selective erasure in that even in the current scientific age the processes of the production of knowledge will have to be erased from the account of the knowledge itself. The classification system tells you what to forget and how to forget it. It operates a double distribution in space of scientific memory. First, the social story of science will be excluded from the organization of the sciences, and held outside of it (if at all) by historians. This is a form of erasure.

Second, it offers a natural hierarchy of the sciences, saying that a given discipline (say geology, statics) will need to remember all and only a given set of facts about the world. It also operates a distribution in time, saying that all scientific problems can be progressively unfolded so that at one point along the path in treating a problem you will need to draw on biology, then chemistry, then physics, then mathematics. Each type of memory that has been distributed in space will also be sequenced in time. The plenum is contained by the overarching organization constituted by the scientific community precisely through a controlled program of first clearance then continuing erasure. The work of conjuring the world into computable form (compare Hutchins 1995) has already begun by the setting up of a certain kind of formal memory system, for example, one in which facts can be stored in linear time and space.

In the history of science, we frequently encounter an apposition among clearance (the deliberate destruction of the past) and establishment of a classification system. When Lavoisier set out to found the new discipline of chemistry, he wrote a textbook that standardized the names of the elements (so that Ag became silver: not Diane's metal, a name that "remembered" the alchemical prehistory of the discipline). He also rewrote the history of chemistry so that his rivals, arguing the theory of affinities, no longer occupied a place in the textbooks: they were written out of the historical record. (Bensaude-Vincent 1989).

The strategy of clearance is a complete wiping clean of the slate so that one can start anew as if nothing had ever happened. As in the example of the burning of books, it is doubtful if clearance can ever work in the short term since people do remember things and institutional arrangements do bear traces of their past, for example, in the case of an outmoded classification system being reflected in the arrangements of artifacts in a museum. In the long term, however, by the time that the curricula have been redesigned, the manuals rewritten, and new nursing information systems produced, it can become a highly effective tool. Clearance is a pragmatic strategy. It may well be the case that a given organizational routine or piece of knowledge has roots in the distant past. At the same time, it may also be the case that in dealing with said routine or knowledge it is easier to act as if it had just arrived on the scene. For this reason the issue of truth or falsity of memory can be a red herring in treatments of organizational memory as well as analytically undecidable: a false memory, well constructed through a program of forgetting, can be of great use.

Erasure is a key dimension of classification work in all organizations. There is a famous passage in the Sherlock Holmes stories where Watson informs Holmes that the earth circles the sun; Holmes politely thanks Watson and then remarks that he will try to forget this fact as soon as possible, since it is a kind of fact that cannot possibly be relevant to the task that is at hand for him: the solution of a crime. In scientific organizations, things get deliberately forgotten in a variety of ways. Scientists classify away traces that they know to be relevant but which should not be officially recorded. For example, when looking at the early archives of the Schlumberger Company, Bowker was struck by a change in the written traces being left of company activity (1994). In the early days the boxes contained a series of highly detailed reports of daily activity sent by engineers in the field across the world to the company's center of calculation in Paris, to borrow Callon's felicitous phrase (Callon 1986). The theory, explicitly stated, was that the company needed the best possible records of what went on in the field to build up a sufficiently large database so as to construct scientific knowledge. It needed this as well to coordinate strategies for the insertion of the company into the oil field environment.

Then one day things changed. Detailed accounts in French of work practice became sketchy tables in English of numbers of oil wells logged. What had happened? The company had gotten involved in a legal suit with *Halliburton* and had come to realize that its own internal traces of activity were open to potential scrutiny by U.S. courts determining patent claims. There were two simultaneous realizations: first the records should be in English, since the French language could be read by a southern court as a foreign code. Second, the records should

only contain kinds of facts that leant weight to the company's official presentation of itself: that is to say the cycle of accumulation of messy half-truths should be carried out elsewhere than in the organization's own potential memory system (Bowker 1994, chapter 3).

This strategy of distributed erasure is more punctillist than that of clearance: it involves the systematic and deliberate forgetting of some actions the better to remember others. In Adrienne Rich's words, this is an act of silence. "The technology of silence/The rituals, etiquette/the blurring of terms/silence not absence . . . Silence can be a plan/rigorously executed" (Rich 1978, 17).

Classification systems subtending information infrastructures operate as tools of forgetting (without representation in the medical informatics infrastructure, the profession of nursing is progressively erased from the annals both of history and of science). They also operate as tools for delegating attention (Latour 1996b has an extended discussion of this sense of delegation). Nurses do not want to have to carry around in their heads what drugs the patients on their wards need to be taking and when. They either use written traces or electronic means to hold the memory and perhaps automatically remind them (either directly by commanding attention through a beeping sound or routinely by constituting distributed traces that the nurse will encounter on their normal rounds, for example, the canonical chart at the foot of the patient's bed). The storage of information in a section of an organization's permanent record guarantees that attention (Weick and Roberts 1993) is paid to that information in either the production of organizational knowledge (formal accounts of how the organization works) or the organization's production of knowledge (how the hospital contributes to the production of nursing knowledge).

To produce nursing (and other) knowledge, then, various kinds of forgetting need to be operated on the permanent record held by organizations. This suggestion is fully complementary to the results from science studies and organization theory that many significant memories are held outside of formal information infrastructures. Ravetz (1971), Latour (1987), and many others have noted that one cannot do scientific work without being able to draw on information about specific local, organizational details of the operation of a given laboratory. And yet that information is nowhere systematically stored. In a series of studies of Xerox technicians, Julian Orr has shown that formal representations of fault diagnosis is often, on the spot, supplemented and indeed replaced by the swapping of war stories ("I had a

machine that did something like that . . ." and so forth). We do not go into the preservation of nursing stories that Orr's work (Orr 1990, 1996) and others' assures us will be generated alongside of and as a complement to formal representations of nursing work. Further, new information infrastructures such as a hospital information system adopting NIC will in fact retain traces of organizational work and will despite themselves allow for the sharing of organizational memory. One might develop here the concept of organizational repression (by analogy to repressed memories). The argument comes down to asking not only what gets coded in but what gets read out of a given scheme; for example, who learns what from the fact that the coding book always falls open on a given page? (Compare Brown and Duguid 1994 on the importance of such peripheral clues.)

Just as oral history is a significant form of community memory, however, it is a different kind of memory (dates are far less important, stories migrate between characters, and so forth, see Vansina 1961) from that retained in the written record. This chapter has placed emphasis purely on the nature and articulation of what goes down in the continuing formal record that the organization preserves of its own past activity. This latter area is interesting in its own right because it is by using these memories that transportable formal accounts used in law, science, and management will be constructed.

Conclusion

Information, in Bateson's famous definition, is about differences that make a difference. Designers of classification schemes constantly have to decide what really does make a difference; along the way they develop an economy of knowledge that articulates clearance and erasure and ensures that all and only relevant features of the object (a disease, a body, a nursing intervention) being classified are remembered. In this case, the classification system can be incorporated into an information infrastructure that is delegated the role of paying due attention. A corollary of the "if it moves, count it" theory is the proposition "if you can't see it moving, forget it." The nurses we looked at tried to guarantee that they would not be forgotten (wiped from the record) by insisting that the information infrastructure pay due attention to their activities.

This chapter has argued that here may indeed be good organizational reasons for forgetting. It has also argued that the ways in which

things get forgotten are not merely images in a glass darkly of the way things get remembered; rather they are positive phenomena worthy of study in their own right. We have discussed two kinds of forgetting: clearance and erasure. From this emerged a consideration of forgetting and potential memory (mediated by classification systems).

The chapter has stressed that representation in the formal record is not the only way to be remembered: indeed, there is a complex ecology of memory practices within any one organization. The shift into long-term memory, however, that the infrastructure provides is significant, if fraught. The production of transportable knowledge used in other registers (scientific texts, the law) at present assumes that this knowledge can be stored and expressed in a quite restricted range of genres. As we saw with Poincaré, it can be argued that the work of much scientific theory is the storage of information as long-term memory. To prevent continuing erasure within hospital information systems, nurses have had to operate a clearance of their own past (recorded history begins today). The prize before their eyes is a science and a profession; the danger oblivion. (Either being definitively excluded from ongoing information practices and thus relegated to an adjunct role or being included but then distributed through reengineering.)

There is much to be done to understand the processes of commemoration, memory, history and recall in organizations. Organizational forgetting and organizational memory are useful concepts here because they allow us to move flexibly between the formal and the informal, the material and the conceptual. Designers of information superhighways need to take the occasional stroll down memory lane.

IV

The Theory and Practice of Classifications

This final part of the book attempts to weave the threads from each of the chapters into a broader theoretical fabric. Throughout the book we have demonstrated that categories are tied to the things that people do; to the worlds to which they belong. In large-scale systems those worlds often come into conflict. The conflicts are resolved in a variety of ways. Sometimes boundary objects are created that allow for cooperation across borders. At other times, such as in the case of apartheid, voices are stifled and violence obtains.

Chapter 9 discusses an abstract model of the several processes involved in both the development of boundary objects or any other alternatives. The key concept in this chapter is multiplicity both of people's memberships and of the ways in which objects are naturalized simultaneously in more than one world. People become members of many communities of practice. They do so at different rates and with different degrees of completeness. Some communities are all encompassing while others occupy very little of one's life space. Some things are shared quite locally; others become standardized across thousands of social worlds. While it is impossible, and will always be impossible, fully to map the myriad of relationships even a simple situation contains, it is possible to get at least a gestalt sense of the issues involved.

The chapter discusses the multiple trajectories of membership and naturalization. It discusses the consequences of some memberships being silenced, ignored, or devalued. It examines the notion of "cyborg" as a term for discussing the relationships between memberships and the naturalization of objects. The categorical exile of people and objects creates a monstrous landscape, such as those seen in chapters 5 and 6.

Chapter 9 concludes with recognition of the language that people often use in describing the complexities of people, things, and their