

Chapter 4

Writing Technologies at White Sands

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Increased technology in a workplace creates the potential to dramatically change the basic structure of written communication in that workplace. However, that potential may not always be realized. This ethnographic study of a government organization identifies patterns of local use, resistance to standardization, and the persistence of paper forms that complicate writing with electronic tools in a traditional bureaucracy.

This chapter summarizes the results of an ethnographic study of written communication in a moderately sized government organization during a period of approximately twenty-seven months, from May 1991 through August 1993. My research addressed how the influx of technology is affecting written communication there.

Many studies of writing in the workplace have concentrated on relatively homogeneous groups of writers. Paradis, Dobrin, and Miller (1985), for example, studied the writing done by 33 engineers and scientists at an R&D organization. Winsor (1990) conducted case studies of two engineers. Faigley and Miller (1982) surveyed 200 workers, all college graduates, from a broad range of occupations. Flatley (1982) surveyed 89 managers in the San Diego area. Couture et al. (1985) surveyed employees in 50 occupations, but limited their study to “competent writers” (p. 405). As an employee of a large government installation and a graduate student of technical and professional communication at New Mexico State University, it seemed to me that much of this research did not adequately address the kinds of writing I saw going on around me.

It is natural for a writing researcher to focus on significant documents. After all, if one is to study writing, what better place to start than to study manuals, reports, or newsletters? While I do not question the value of this research, it is important to know whether these documents are really representative of workplace writing, or whether they just illustrate writing that is highly visible. By addressing primarily the most significant documents, or the writing done by only a few people (technical writers, engineers, managers), I felt most workplace composition studies had failed to adequately address the day-to-day writing done by most of the employees in my organization. It seemed analogous to a researcher studying a family’s diet by observing only mealtimes and ignoring the potato chips, peanuts, candy bars, and apples snacked on throughout the day.

The organization I worked in and studied was the White Sands Missile Range’s Directorate of Information Management. White Sands Missile Range is a Department of the Army installation that provides perhaps the premier overland missile testing capabilities in the entire world, although the range’s testing is no longer limited to missiles. The range is a massive chunk of real estate (about the size of Delaware and Rhode Island put together) in the desert of southern New Mexico. Although commanded by an army general, the White Sands workforce, including contractors, is overwhelmingly civilian. The range is also home to contingents from the U.S. Air Force and the U.S. Navy.

The Directorate of Information Management, where I work, is a support organization to White Sands, providing information services for everything from photographic support of missile firings, to mail and distribution for the entire range, to planning for the range's computer networks. The organization also operates a video-teleconference facility and a cable television station offering limited programming. Parts of the organization have made army documentaries and training films for years. We provide dataprocessing support to White Sands, with its IBM mainframe and networked UNIX minicomputers. We also provide software and hardware troubleshooting and training for the several thousand personal computers on the range.

In our organization, no one has the title of technical writer. What we do have is an organization of more than 300 electronic technicians, budget analysts, photographers, secretaries, management analysts, engineers, engineering technicians, computer programmers, and a smattering of military personnel. All are involved daily with a wide variety of information services.

The Nature of the Research

What I attempted to do was quite simple. I wanted to observe and document the written communication that went on around me and to identify patterns and trends in the ways in which increased technology in the workplace was changing, or not changing, written communication. The study was undertaken on a part-time basis in my own organization and was done with the support of the organization. I estimate that I averaged two to three hours per week of work time devoted exclusively to the research.

I chose a qualitative approach, with data derived from multiple sources, as the research course that would best permit me to identify patterns in written communication. Since I was studying written communication, it seemed logical to start with the documents themselves, and I set about gathering as many as I could. I collected thousands of documents and subjected several hundred to intensive analysis. My definition of written communication was quite broad and included handwritten documents, forms, memos, and e-mail.

As a longtime employee of the organization, I was by definition a participant. My own position is that of a computer programmer/system analyst. For most of the study period, I was a team leader of a small team in the areas of personal computer software development and mainframe database administration. I had worked in the same building since 1975, except for a three-year assignment in Germany. During several months of the study, I was able to observe the workplace from the perspective of a supervisor.

As a part-time graduate student studying writing in the workplace, I also attempted to look at written communication at White Sands as a disinterested observer. I took copious notes through-out the study and spent considerable time sorting my observations.

I conducted more than twenty formal, sit-down interviews and hundreds of shorter, more informal interviews with personnel throughout the organization. In the spring of 1993, I also distributed a five-page questionnaire to all employees of the organization. (The response rate was greater than 40 percent.)

Major Patterns in the Writing at White Sands

Several patterns or generalizations seemed to be true for understanding communication within the directorate and would potentially have far-reaching ramifications for understanding writing in the workplace. The patterns I note here should, of course, be considered in the light of the limitation of my research. Considering the number of offices and employees in the organization, and the number of documents created, my research touched on only the smallest fraction of the organization's written communication. Nonetheless, the patterns I discovered should be of interest to those who teach and study writing in the workplace. This work accounts for the experiences of working professionals who do not define their professions as "technical communicators" but who nevertheless do a great deal of writing at work. This study should illustrate the need for further research into their experiences. The most significant of my findings form the basis of this discussion:

- Most writing created within the organization is event-driven. In other words, some event, either in the past or in the future, causes the document to be created. Such events can also be part of larger institutionalized processes.
- Most written communication in the organization is part of a process that aims to get something done. Moreover, most written communication is a by-product of a process, rather than an end product.
- A considerable amount of written communication in the organization involves preprinted forms.
- Some documents suffer from a worth/benefit imbalance.
- New technology tends to augment, not replace, old technology.
- While written communication is important within the organization, and a great deal is produced, most written communication requires only the simplest of technology to create.
- Benefits to document creation caused by increased technology must be balanced against the cost in equipment and human resources required by the technology itself.
- Technological improvements, like any tool, are of greater value in some offices than in others.
- Improvements resulting from the introduction of technology in the workplace tend to be incremental and slow. When something goes wrong with the technology, however, the impact is likely to be severe and rapid.

Most Writing in the Directorate Is Event-Driven

One thing that was immediately apparent from an examination of documents at White Sands was that most written communication there is event-driven. Some event happens, or is about to happen, that serves as a catalyst for the writing. Typical events that initiated writing in the study were

- notification that an inspection team was scheduled to arrive;
- an employee requested training;
- an accident happened on the job;

- new key control officers were appointed for a building;
- new software was installed on a multi-user computer system;
- an employee retired; and
- a computer virus was found in another installation, and employees were reminded of the availability of virus-checking software.

Many events are unpredictable and add to the tension and excitement of the workplace. People described these by using such phrases as “stamping out brush fires.” They may be initiated by a personal visit from a manager or customer, a scribbled “Your Action” on a memo, a phone call or a message on a voice-mail system, or an e-mail message. Not all events require written communication, of course, but many do. A corollary is that very little writing is created spontaneously, with the possible exception of doodles.

Understanding that documents are spawned by events is important. Receiving a document can in itself be an event that causes the creation of other documents, so that a single event can cause a chain reaction of activity. Few employees in the organization can accurately predict on Monday morning what their coming week will be like. The next phone call or office distribution may contain a catalyst for many hours of effort.

Not even the simplest documents exist in isolation. Even the most basic written communication is, as Faigley (1985) has pointed out, “inextricably tied up in chains of communication” (p. 241). So, much of the corporate lore seems to be tied up in what a coworker of some years ago called “the great oral tradition.” “Here is what you do when someone is injured at work....” “These are the steps you must go through in order to turn in equipment as excess....” “You want a CD-ROM reader? Fine, here is what you must do....”

When events are cyclical and/or repetitive, they are still events. The Biweekly Status Report, for example, is a report to the directorate commander which is a roll-up of information submitted from every office in the organization. Because it is a biweekly report, it can be plotted for months in advance. As another example, a supervisor with twelve employees knows that during the course of the year he or she must write twelve annual appraisals. In many cases, these events have been around for decades and have become institutionalized, perhaps documented somewhere-in SOPs (Standard Operating Procedures) or regulations. Within the directorate, for example, processes may be governed by:

- organizational units within the directorate;
- the directorate itself;
- White Sands Missile Range offices;
- TECOM (the Test and Evaluation Command, the parent organization of White Sands);
- AMC (the Army Materiel Command, the parent command of TECOM and grandparent command of White Sands);
- DA (the Department of the Army);

- DoD (the Department of Defense);
- OPM (the Office of Personnel Management); and
- other government agencies (the Department of Labor, for example, has forms and procedures to be used when there is a serious on-the-job injury).

Most Writing in the Directorate Is a By-Product of a Process

We can define a process as a grouping in sequence of all the tasks directed at accomplishing one particular outcome. Examples are the steps in producing a product, hiring or training a new employee, or filling an order. In this light, we begin to see that every activity is part of a process, and there are thousands upon thousands of processes in every organization (Scholtes et al., 1988).

Applying this process-oriented thinking to written communication, nearly every piece of writing is a part of some larger process, whether the communication is recorded on paper or in an electronic message on a computer. It might even be a plastic room number attached to a door. The process may be as simple as taking a phone message for a co-worker or as important as justifying the work existence of an employee, office, or organization. Every process has, or logically should have, its own scorecard detailing what is important to that process. There should be some means of determining, at the completion of the process, the degree of success of each particular step in a process. Sometimes the speed of the process is important, but, at other times, complete and total accuracy of data may be essential to the success of a process.

Some documents created within the directorate are end products of a process. The creation of a manual or an SOP or a class diploma has as the final result a paper document. The worth of the effort for the process should be judged by the quality of the document. An award certificate with coffee stains does not reflect a successful effort. One “certificate of appreciation” presented to one of my co-workers, a nicely printed document, had the state printed as “New Mixico.”

The output of other processes, however, may not be a document at all. The output of a request for an account on one of the directorate’s computers, for example, is the assignment of the account. The output of a training request is the training itself. The process may generate a trail of paper along the way, but these documents are not products but by-products. Their worth should be judged by how well they further the processes they serve.

An analogy with sports might make the point clearer. In downhill skiing, contestants are scored on their speed through the course. As long as the contestant stays within the course boundaries and perhaps obeys a few other rules, it is the final time that counts. Form counts for nothing in scoring such a race. Presumably, a skier could ski part of the course backwards. In platform diving, on the other hand, the worth of a dive is not based on how quickly the diver enters the water, but rather on the form exhibited between the platform and the water.

There seems to be a real danger in confusing products with byproducts-with judging a downhill skier on form. Effort aimed at improving what are essentially by-products may be wasted, if not detrimental to the process. If a document must be returned to its originator for trivial cosmetic reasons, or if it waits in an “in” box for approval by an official who is on vacation, the by-product may be served, but the process

is not. All this is not to say that byproducts are unimportant, only that their worth must be balanced against the total process.

A Considerable Amount of Communication Involves Preprinted Forms

Preprinted forms, both official and unofficial, are central to most of the processes I studied. They come in all sizes and colors. Some include carbon paper, some are carbonless, while still others are single-part forms of only a few square inches. With few exceptions, forms are mostly by-products of processes. I would like to discuss forms at some length here because they are so integral to the processes and writing I studied. Together with regulations and custom, they constitute “the system” that must be lived with at White Sands. Whether or not this system is efficient, it is the way things are, and it is not easily changed. One document collected in my study, a yellowing, typed summary of codes used in the army’s supply system that was unearthed during an office move, was written in 1961. The information was still, by and large, applicable more than thirty years later.

While there are a few forms that are end products (such as forms that are designed to be placed on walls, or security stickers stuck on telephones, or the open/closed sign that is attached to a safe), most forms are designed to improve a process. The White Sands forms warehouse, which is administered by the Directorate of Information Management, stores more than a thousand individual form types (these are only the official ones). Sometimes it seems that there is, indeed, a form for every purpose. There is even a form for establishing an official form.

Forms often carry efficiency to an extreme degree. One of the best examples of this is DD Form 1556: Request, Authorization, Agreement, Certification of Training and Reimbursement. As the title indicates, this form is used throughout the process of getting a single individual through a single training class. It is the form that is used to request training. It is used to approve or disapprove the training. It is used to certify that funds are available for the course. There are spaces where the school indicates whether or not the applicant was accepted for the training. A section is provided to record that the fees were paid. In case of nongovernment training of more than eighty classroom hours, there is a place for the student to certify that he or she will remain in the government for a certain period after the completion of the training. Finally, the form is used to record the student’s evaluation of the course as well as comments for the student’s supervisor on the usefulness of the training.

To achieve all this, DD Form 1556 is a 10-part carbon form. Together with a front page of instructions, the entire package contains 11 sheets of paper plus 8 sheets of carbon paper. Eight of the form pages also use the reverse side of the page.

This form is a mechanical marvel. Through the use of short and long carbons, blacked-out on some pages, and clear insets on some of the carbon paper, each page within the form allows it to be used for many different purposes. Yet, the student’s name is reproduced on each page and needs to be typed only once. The key word here is typed, for the DD Form 1556 is a model of efficiency only within the old mechanical office paradigm. Within an office with clerical personnel, typewriters, a mail-distribution system, and file folders, the form is, in its own way, extremely efficient. As long as there is someone available to type the form, reverse carbons, and decollate and distribute the parts of the form to the proper offices, the system served by this form has the potential for operating quite smoothly.

In a sense, then, forms are not just a product of the existing paradigm, they are the paradigm itself. As long as these paper forms exist, the old paradigm will exist. Revising forms merely polishes the process. Even when such forms are automated, they still operate within the paradigm. Unless a system were devised that could totally eliminate the forms, the basic process would remain intact. In any case, there seems to be little an individual, an organization, or an entire installation can do about a standard form. As long as the DD Form 1556 continues to be the only approved means of requesting training, for example, technology can do only so much. As soon as the form is created, it ossifies the process, capturing a business process as it existed at a given point in time. Once printed in massive quantities and distributed to many offices, the form tends to be the master, and not the slave, of the process.

The implication for written communication here is that there may sometimes be more effort put in to improving by-products than to improving the process. An employee who corrects spelling errors in a form notifying employees that it is time to pay their coffee dues may be improving the by-product of the process, but may not be improving the process. An employee who provides a flawless, written report on, say, the need for additional telephones in an office may see the report as an end product, and, indeed, to that employee, the report is an end product. Yet, in the context of the larger process, the report is a by-product. An inappropriate treatment of all writing as an end product may be misguided and ultimately disruptive to the work processes within the organization.

Document Balance-Worth versus Effort

Those processes described above sometimes involve conditions that are not always easy for a writer to work under. Sometimes documents do not receive the effort they should and are served up half-raw, so to speak. Other documents, on reflection, seem clearly overcooked.

An important feature of our workplace is that work must often be done at a feverish pace. It was not unusual for workers there to be asked to meet absurdly short deadlines. Our group was once told shortly after 9 a.m. that information was needed for a briefing early that afternoon; we had to provide a list of all computer systems we supported, along with a short description of each, by 11 a.m. The list provided was woefully inadequate. Given an entire day, we would have produced a much more complete and valuable list. With a week, it would have been even more complete. But this deadline was nonnegotiable, and “I can’t provide that information on such short notice” was not an acceptable response. Those who requested the information knew it was incomplete and certainly did not complain about the format or content of the information we provided. However, had writing specialists examined the slips of paper left behind, they might have assumed that the organization was staffed by workers in desperate need of training in grammar, spelling, and handwriting. The information collected, collated, edited, and transferred to slick transparencies and handouts reflected the two-hour lead time we were given before the briefing.

This raises an important question for further research. How common is this lack of opportunity for editing in technical writing environments? University training, which assumes leisurely revision and careful editing, may mislead students who eventually face such conditions.

If some documents are denied the attention they need, others receive too much. Time and again I saw employees, especially managers, look at a painfully wrought document, scan the first few pages, and hand the document back to its author with a nod. Few documents were savored and digested to the

extent the creators felt they deserved. Part of this has to do with time. Just as there is often not enough time to prepare a document, there is just as often not enough time to study it once it is completed. Therefore, many workers have learned that it is preferable to err on the side of brevity rather than on completeness.

Some documents are created in response to a set of requirements, and those requirements can change, often as a result of further clarification of the problem. Since some requests for documentation eventually seem to go away, writers sometimes delay projects until the last moment, in a variation of the "just-in-time" inventory system developed in Japan. One interviewee carried this to an extreme: To avoid giving a manager opportunity to make his usual request for wholesale changes in her work, she kept delaying submission until just before the absolute deadline. In the end, her manager had no choice but to approve the document as submitted.

People who think of all documents as products, and not as byproducts, of a process are often difficult to please. Concerned with a document's completeness of information and neatness, they are often at odds with those who are more concerned with speeding up the process. One of the glories of e-mail in our organization is that there are no regulations governing the form of an e-mail message, so that it is possible to concentrate on the message. However, my study showed that many e-mail messages still follow a strict memorandum format. Perhaps the creators feel more comfortable with formal memoranda or expect the documents to be printed out. In such cases the e-mail network functions merely as a faster courier service, thus preserving one writing context inside a much different one.

New Technology Tends to Augment, Not Replace, Old Technology

The same cart that wheels a new personal computer into an office does not wheel out the typewriter. There is not a decreased need for knowledge, skills, and equipment because of the increased technology in the workplace. Instead, additional skills are required. Personal computers do not replace typewriters; they augment them.

Typewriters will probably remain in the White Sands offices until the last preprinted form is replaced. Most memoranda seem to be created by using word-processing programs, but forms, especially carbon forms, must be filled out with a typewriter or by hand. Even after the most common forms are stored on CD-ROM, offices will still need typewriters to fill out the more obscure forms.

On the other hand, there are quantitative changes in equipment use. Typewriters may still be required, but they are not used as much. Because employees are doing much more of their own document creation, secretaries do much less typing, but they still must type. Increasingly, however, employees at all levels are called upon to work in more and more complex environments. To send and receive electronic mail, for example, employees of White Sands normally must use the UNIX network. Secretaries must be familiar with at least one of several word-processing programs on the network as well as with a variety of word-processing programs on office PCs. They must be able to use fax machines. Many must dial in to remote databases and use spreadsheets.

As a result of this variety, offices are called upon to juggle an increasing number of "things." New things (hardware, software, processes) appear periodically, but fewer go away. As a result, nearly everyone

in the organization, regardless of position, seems to be learning something, and the backlog of needed knowledge is forever increasing.

Most Written Communication Created in the Organization Demands Only Simple Technology

By my broad definition of written communication, the Directorate of Information Management does an enormous amount of writing. Yet, most of the documents produced are similar to those created five, ten, or twenty years ago. The processes used to create the documents may have changed, but the products have not. A memorandum may be created on a computer with a word-processing program rather than on a typewriter, but the end result is still a memorandum. Forms may be filled out using a pen, a typewriter, or a dot matrix or impact printer, but the product is still a preprinted form. Even if the form is created using a software package, such as PerFORM, which creates the form itself, the product is still much the same.

Note that I said that a communication may require only simple technology. Nevertheless, its writer may have used technology that is quite complex and expensive. Yet, the documents themselves reflect little of the technology used to create them. Was a memorandum typed with a typewriter, printed on an impact printer, or printed by a laser printer? If it was created on a personal computer, what word-processing software was used? Was the personal computer a DOS system, or a Windows™ system, or was it perhaps done on a Macintosh? Compared with the technology of a few years ago, much of the hardware and software coming into offices today is like a Ferrari compared to a riding lawn mower, but it is a Ferrari stuck in traffic.

Considerable Effort Is Associated with Technology

Many directorate working hours are expended in what I call “technological pencil sharpening”-time that is indirectly associated with written communication, but that is not associated with the creation of a specific document. Installing hardware and software, learning a word-processing program, configuring a printer, and troubleshooting of one kind or another all fall in this category. Formal training in, say, WordPerfect should be considered here, as would helping a co-worker transfer files.

Because the directorate is a support organization, many of the employees I studied are involved with customer support, handling problems with telephones, terminals, networks, personal computer hardware and software, an IBM mainframe, and even the range’s many water wells. Many of the problems do not involve written communication, but many do. The directorate’s personnel are the first line of support for customer problems with word-processing software.

Some time ago, in the face of a growing diversity of word-processing software, the directorate was the dominant force in advocating a standard word-processing package for White Sands. Our group argued that we could not adequately support every program, either for technical support or training, and that a standard word-processing format would eliminate many file conversion problems. Thus, in the late 1980s, a common word-processing package was designated for the entire installation.

Designating a standard word-processing package was one thing, but putting it into use was quite another. Some users did not have the package, and, even when we acquired a large number of copies, there were not nearly enough to go around. Within my own section, our copies of the package for

personal computers arrived several years after it was named as the standard. Many personal computer users continued to use whatever word-processing software they had always used. Network users faced a different problem. The network was made up of disparate, networked minicomputers, from different manufacturers, with a different word-processing solution on each type of computer. A further problem was that, as different nodes were upgraded, the new machines often contained different word-processing software. Even when a UNIX version of the standard word-processing package was put on the network, the package still did not gain much acceptance (at least during the period of my study), even among users familiar with the personal computer version.

Such diversity of word-processing solutions is expensive in several ways. Learning a new word-processing program is timeconsuming, as is converting a document from one format to another. Even those who stay with one word-processing program are not immune to change, as new environments (the Windows™ and UNIX versions, for example) and new releases tend to keep even experienced users from wandering too far from their manuals.

My questionnaire suggested there may be a silent backlash against changing word-processing software. Despite having had a standard word-processing package for several years, and despite its being available in both MS-DOS and UNIX environments, less than a third (30.3 percent) of respondents named the standard word-processing package as the program they used most at work. When asked which program they would prefer to use, the number improved somewhat, to 37.7 percent. But, in what I felt was a telling response, when asked how satisfied they were with their current word-processing package, 58.8 percent said they were “totally satisfied.”

The Worth of Technology as a Writing Tool

One pattern which came from my own observation, and which was confirmed by the interviews, both formal and informal, is perhaps the most significant in the study. It is quite simple and makes a certain amount of sense, yet it has far-reaching implications. The generalization is this:

If technology functions as a tool for an office, that is, if it helps the employees do their jobs better or faster or helps them to improve the final product, then it stands a good chance of succeeding if introduced into the workplace.

If, on the other hand, new technology does not function as a common tool, that is, it does not help them to do their jobs better, then it may have a negative effect on office efficiency.

Restated to focus on written communication, the observation is that, if an office has historically created a specific type of document, improving the technology to increase efficiency with that type of document may pay dividends. But if an office has never created a specific type of document, giving that office the capability to create that document does not mean anyone will do so. Give a carpenter a power saw to augment a handsaw, and he or she will make great use of it. Give a carpenter a soldering iron, and it will probably not be used very much. Give a computer with a spreadsheet package to an office that keeps manual spreadsheets, and the gains in productivity may be spectacular. The same package given to a writing group may lay dormant.

Support for this finding comes from several sources. First, there are the documents themselves. With my classification of documents, there are whole categories of writing that, by their very nature, do not seem to be affected by increased technology. Handwritten documents, for example, seem to thrive in spite of technology. Simple memoranda require only the simplest word processing and may still be created on a typewriter. Forms are also designed for use, for the most part, with a typewriter or a pen.

In the interviews, I attempted to determine the extent to which new documents were being created. Despite having the technology to function as miniature publishing houses (full-featured word-processing packages, laser printers, and desktop publishing packages), most offices do not seem to be creating new documents, although they may be using new technology to create documents they have always created. Documents of some complexity and length, such as user guides and manuals, are created by offices that, in the words of one interviewee, “have done it for twenty years.”

Probably, there were documents not collected for my research that would prove exceptions to this rule. My research did, in fact, reveal a few places where people were creating some new documents. However, the tendency seemed to be to stay with traditional forms in any specific office.

Some documents at White Sands (computer-system documentation, for example, or memoranda, or entries on preprinted forms) are governed by strict formatting guidelines. Other documents are not, and these are the ones where writers stand to benefit most from the enhanced technology. This second group includes manuals, studies, proposals, organization charts, fliers for office picnics, and coffee rosters.

Improvements Come Slowly, but Problems Come Rapidly

In general, improvements in written communication in the directorate have tended to come slowly, like dawn. Using word processing, or MS-DOS, or Windows™ takes a certain amount of knowledge. Whether its source is from reading manuals, formal classes, coaching by a co-worker, or trial and error, a certain amount of time is involved in learning new techniques.

During the study period, White Sands started converting to ETS, the Electronic Timekeeping System, a mainframe system that permits an employee’s timecards to be entered online. It also permits supervisors to certify these timecards online. While the ETS is generally felt to be an improvement over the paper timecards filled out by hand and signed by a supervisor, the implementation took many months. Timekeepers, a handful at a time, had to be trained on the system, and some offices did not have the proper equipment to allow them to access the system. Such time-intensive improvements are costly and must promise widespread benefits before they can be justified in financial terms.

On the other hand, when things go wrong with advanced technology, they are likely to do so immediately and, apparently, without warning. The copier breaks on the forty-seventh of fifty copies. MS-DOS issues the familiar “Abort, Retry, Fail?” message, and a day’s work is lost. A hard drive goes down on a personal computer, putting a year’s work at risk. A backhoe slices an electrical cable, cutting power to several buildings. A key employee leaves for another job, taking with her the entire office repository of WordStar lore. Strange page breaks start appearing in documents. Such failures are also costly and may require extensive knowledge to troubleshoot.

There are exceptions, of course, like changing printer ribbons, where improvements are instantaneous while quality degrades over time. In general, however, the greater the technology in an office, the more costly and painful is the process of learning to use the technology, the more likely there are to be problems, and the more specialized the troubleshooting expertise needed. Many directorate employees are familiar with MS-DOS, but fewer are familiar with Microsoft Windows™, and fewer still are familiar with the escape sequences needed to manipulate fonts on a laser printer. Nearly everyone can use an electric typewriter, many can use a word-processing program on a personal computer, but not many can use a scanner.

What Can Writing Students and Their Teachers Learn from the White Sands Example?

The following observations from my study seem particularly important to those who consider the sort of preparation universities might offer people who will eventually work in places like White Sands. They do not all represent easy solutions, but rather reflect issues such preparation should address.

Institutional Constraints Differ from Those of the Classroom

There are many obvious differences between a classroom setting and a business setting, but perhaps the most significant is the attitude toward innovation and change.

In the organizational setting I studied, there is an accepted, or normal, way of doing something, and deviating from this norm is often problematic and outside the scope of authority of any single individual. There is a way to requisition supplies, a way to apply for another job, and a way to request a new telephone line. These “ways,” or processes, typically involve many different offices, each with its own area of responsibility and expertise. It is one thing to strive for change, but it is another to actually coordinate such a change for the many offices (including the several layers of corporate headquarters above the organization, such as the Department of the Army or the Department of Defense).

A classroom, on the other hand, is an entity that operates with a great deal of autonomy. Innovation and experimentation are quite properly encouraged, as long as the cause of technical communication is served. Changes do not have to be, to draw a parallel with the workplace, approved by the Board of Regents or the university’s president. For those who will enter the workplace as technical communicators, there is probably no better way to encounter this difference than to experience the workplace itself. Co-op programs and internships provide training that is impossible to duplicate in a classroom.

Nevertheless, technical communications faculty could develop assignments which attempt to duplicate some of the conditions students may face on the job. Such an approach might, in a small way, emphasize that most documents exist within a historical context.

These conditions might include

- too little time to adequately prepare;
- equipment that is outdated, unfamiliar, or does not work;

- key personnel/information that is unavailable;
- changing requirements as documents are in process;
- working in small teams.

Technical Communicators and Computer Training

All methods used in this study indicate that there are serious problems with training in the use of word-processing software, email, and personal computers within White Sands. There are just too many products, too many operating systems on too many types of computers, too many people using the products, and too few formal training classes to address even the most basic training needs. What training there is, be it formal classroom training, using tutorials associated with a particular application, reading a manual, or coaching from a co-worker, concentrates on task-oriented procedures: "This is how you set the margins...." Students who will work in environments like this one may need to come equipped with a wide exposure to a variety of systems and an enthusiasm for learning new techniques as they are introduced.

What no training adequately addresses is troubleshooting: "See, it says right here in the book that when I click here . . . but this is what I get . . . looks OK on the screen, but when I try to print it" Based on my observations, employees are frequently called upon to resolve problems that are only remotely associated with their training and inclination. There is an office joke that the person who has a manual is a recognized expert on the product.

A person with word-processing skills may be called upon to assist when there is any sort of problem in the process of creating, printing, or distributing documents. It may be a problem with the word-processing program itself, but it may just as likely be incorrect settings of DIP switches on the printer or problems with a modem. Technical communication students may not feel that a knowledge of the RS-232 standards for asynchronous cable communication is a valuable weapon in document creation, but in our organization it frequently is.

Most people do not use technology in the way they are "supposed" to. Sometimes this is out of ignorance (years ago, I helped a person who entered figures into a spreadsheet and then added them up on an adding machine), but more than likely it is because the technology fails to help them do the work they do, in the way they would like to do it. Software packages are loaded, fiddled with for a while, and ignored, eventually to become "shelfware." Workers ignore computer-based calendars and make notes of future meetings on desk calendars or pocket planners. Important information is still conveyed orally rather than by email. User guides and manuals are ignored. Printers make weak but fairly effective space heaters on chilly mornings.

New technical communicators should be helped to see that the workplace is not a trade show. An office should not be judged by the technology it has, but on how well the office does what it exists to do. Since the time when computers were showcased in glasswalled rooms, the tendency has been to perceive computing equipment as entries in a glitz race. Classes in technical communication should be designed to prepare students to function in a setting which encompasses not only technology's enticing future, but also its humdrum but functional and familiar past. There may be a small market for technological soothsayers and prophets in some organizations, but what is more likely expected of new employees is

that they be able to make immediate contributions to solving today's problems, using the tools that are available now.

Dealing with Change at White Sands

One of the issues I wanted to explore in my study was Zuboff's (1988) description of the "magnetism of the past" (p. xv). I wanted to determine how real this phenomenon was in my own organization. What I found was that the magnetism not only exists but exerts its influence over every aspect of the offices and workers I studied. It is "the way things are done" as well as "the way things have always been done." The ways of the past are entrenched and may be driven out only with difficulty.

This magnetism does not manifest itself so much in an infatuation with the past, or in the lack of knowledge of the workforce, or in a belief by the workforce that the current ways are the best, or in a fear of change by the workforce. Instead, the magnetism exists in the forms, regulations, and traditions of a hierarchy stretching from the offices of the Directorate of Information Management to the Department of Defense and beyond. It exists in standard mainframe computer systems that, in some cases, have been around for decades. It exists in hardware and software that, while still useful, are several versions behind the current version.

Change is expensive. Whether expressed in real dollars, lost productivity, direct or indirect training costs, or by any other means, getting from here to there will be costly. Regardless of how slick and efficient the perceived target might seem to be, resources will be consumed. Pointing out budgetary limitations effectively smothers many new projects. The easiest and least expensive part may be purchasing the actual hardware and software. Changing processes is what is difficult and expensive, and unless the underlying process is changed, improvements may be illusory. Therefore, technical communication education should strive to prepare students for a world in which they will be only one spoke on a wheel, on a wagon which has many wheels. They will play an important part in the organization, but it may initially be only a small part. To a much greater extent than they have experienced in school, new technical communicators may be subject to constraints over which they have no control. Many documents they will be creating will not look much different, or in fact be much different, than those created by their co-workers in the organization for dozens of years.

There is another force at work, a force that is often quite strong. This is the force that looks to the future, that embraces technology and sees its possibilities. It is an anxious and impatient force that is fueled by market forces touting the latest technological advances. People who are touched by this force are aware that the bulk of the range's forms could be stored on a few CD-ROM disks and printed on demand. They are aware that the potential exists for automating entire processes. They are aware of how effortlessly and quickly text, charts, drawings, and photographs from many offices could be brought together seamlessly into a single document.

However, even those who fall under the spell of technological possibility are soon faced with fiscal reality. Need is not an acceptable currency for acquisition, and technological potential is even less so. The monetary pie of any organization is not infinite; indeed, during my study period, financial resources at White Sands shrank noticeably. In many areas, it is a rather simple matter to design a better or more efficient system, but it is not so easy to implement that system, given that today's pockets are not as deep as yesterday's and may be even shallower tomorrow. I now have a better appreciation of how both

forces operate in the workplace I studied. Everyone I interviewed, from rank-and-filer to manager, made a convincing case for the validity of his or her particular point of view. There are, as far as I can tell, no simple solutions to even the simplest problem.

University instruction tends to celebrate potential and to be oriented toward the future. The world I studied, as it is being drawn (or pushed) toward the same future, must also turn to face, Janus-like, the past. The processes and paradigms of yesterday are firmly entrenched and must be accommodated.

At the conclusion of this study, I found that my attitude had changed toward technology in the workplace. I am certainly not anti-technology, but I have tempered any zeal I might have had about the short-term impact of technology in the workplace. During the study, I arrived at certain insights regarding technology and writing that should be understood by those who will enter the workplace as well as by those who will prepare them. On the basis of my observations of this specific workplace, some areas (presentation graphics, for example) have made excellent use of technological advances, while other areas are likely to reap only superficial benefits for years, if not decades, to come.

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