Computer Envy: Essays on Computer Systems Management

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1 Consultants

Office automation (OA) can be approached from two sides. For administrative services, OA is the introduction of tools developed originally in data processing (DP) to the office. From DP's angle, OA is the extension of "normal" methods to every-wider fields of application. Because few of us have expertise in both spheres, a good deal of money is spent on external consultants who help bridge the gap between DP and OA.

Here are some guidelines to help both DP and OA staff extract every penny of value from their investment in consultants.

How much consulting gets done in industry as a whole? Globally, several tens of thousands of individuals and thousands of firms bill several billion dollars a year for services in general management, financial management, marketing, production, data processing, personnel, and small-business administration. You can get information on sources of consulting by

- contacting your hardware and software vendor representatives and describing the sort of problem you are concerned about;
- speaking to members of your professional associations, including local and international computer users' groups for references to well-thought-of firms;
- contacting trade associations.

Scope

When the client and consultant are discussing OA problems and how the consultant could help, both parties must be conscious that a consultant always has two allegiances: to the manager hiring her and to the firm employing the manager. You must define the scope of the consulting assignment so that the consultant can in fact legitimately tackle the task. For example, it would be pointless for a local OA manager to request assistance in deciding whether to implement satellite-link teleconferencing nation-wide within a corporation. Such a project would be beyond the manager's scope.

Sometimes consultants are asked by managers to produce support for a pre-defined set of conclusions as part of an internal political battle; consultants should be chary of accepting such assignments without making it clear that their report may very well disagree with preconceptions.

As you evaluate potential consultants, look for those who can state their understanding of your problems clearly. I am fond of the phrase, "Let me see if I have understood" because it's a chance to test my perceptions against those of the client. When you have chosen your consultant, prepare an action plan that defines what you both plan to do, by when and how you will know when to stop.

All consulting is aimed at change: either fixing what doesn't work or improving what already does or inventing a new solution for a problem foreseen. By writing down what will constitute sufficient change, you ensure that your external consultant does not become an unwanted permanent member of your corporate family. A consultant is not a permanent employee of your department. A reasonable expectation is that with time, the frequency of consultant visits will decline for any specific project. As part of the assignment, consultants normally expect to work closely with members of the client organization to impart their knowledge and methods.

Consulting fundamentally involves teaching. I once met a consultant who did minicomputer performance analysis. I asked him what tools he taught his clients to use in analyzing system performance; he answered, "Tools? I don't teach any tools. Listen, if a client is going to spend thousands of dollars on a performance

monitor, I'd rather he spend it on me." Clients must ask their consultant exactly how their firm will become less dependent on external help by paying for consulting time.

A professional consultant will clearly identify the limits of her knowledge. Faced with requests for help in areas beyond his competence, the consultant will point out that alternative sources of information would be more cost-effective. One test you can apply to judge the professionalism of a prospective consultant is to ask her to identify the limits of her professional competence.

Ethics

To conclude, I quote the ILO on a code of ethics for consultants (2, p.50):

- The codes of professional conduct are basic instruments used by the consultants' associations to establish the profession and protect its integrity.... Thus members of the associations engage themselves
- To place the client's interest ahead of their own;
- To keep information about the client confidential and take no advantage of its knowledge;
- To accept no commissions in connection with the supply of services to the client;
- To hold no directorship or controlling interest in any business competitor of the client without disclosing it;
- Not to invite an employee of a client to consider or apply for suggested alternative employment;
- Not to calculate remuneration on any other basis than a fixed fee agreed in advance, which may be on a time rate;
- To inform clients of any relationship and interest that might influence the consultant's judgement;
- To accept no assignment which exceeds the scope of their competence;
- Not to work when their judgement might be impaired by illness, misfortune or any other cause;
- To refrain from seeking business by public advertising or by payment of commission for the introduction to clients.

For good measure, you can find the Code of Ethics of the (ISC)2, the certifying authority for Certified Information Systems Security Professionals, at **https://www.isc2.org/cgi/content.cgi?category=12**

2 The Expert in the Next Office

"Marcie, can you spare a minute?" Marcie groans inwardly. This is the sixth time this morning someone has come in from a neighboring office to ask her for "a minute". Each occasion lasted about a quarter of an hour. The questions all concerned LOTUS 1-2-3, on which Marcie is the acknowledged expert.

However, Marcie is actually the Assistant to the Director of Finance, not a Technical Support specialist from the Information Center in Data Processing. Every time she's interrupted by a call for help from people in Accounting, Shipping, Engineering, and even occasionally from Data Processing, she falls further behind in her assigned work. She likes helping people, but lately she's had to stay late after the nominal end of her work day simply to make up for the time she has used acting as informal technical support to her neighbors.

Marcie may have a bad time of it unless something changes in her organization. She may be fired by her boss because her productivity drops too low according to her job description. She may burn out and quit because of overwork and criticism. Or she may cause resentment among her colleagues and neighbors by declining to help them or by complaining to her own boss and causing a ruckus. Alternatively, she may have a good time and manage to meet all the demands on her quite successfully until the DP department begins to feel threatened and someone either complains to the higher-ups or begins spreading nasty comments about poor, helpful Marcie.

Being the expert in the next office is tough on the expert.

Looking at this situation from a management point of view, there are problems for the recipients of all this free aid. The longer they can persist in getting apparently free help from their unofficial benefactor, the longer they can avoid letting upper management know they need help with their office automation tools. Then when the bubble bursts and the expert becomes unavailable, managers are confronted with a sudden demand for unplanned resources. In some organizations, unexpected staffing requirements are difficult to satisfy. Managers have a hard time explaining how it is that they were unable to predict the need and budget for it.

TINSTAAFL

Engineers often say, "There is no such thing as a free lunch" (abbreviated TINSTAAFL) to imply that no benefit is without cost.

From a technical support perspective, even the most gifted unofficial expert is necessarily an amateur. True, there are many users whose technical knowledge of their tools exceeds that of their own technical support staff. But professional technical support consists of far more than just technical knowledge. Almost no amateur expert will

- Have colleagues to discuss the problem with on a technical level;
- Have backup personnel so she can provide faster service to requesters;
- Search the appropriate technical manuals with the user experiencing a problem;
- Have access to all the periodical information provided by manufacturers;
- Document the problems carefully so as to avoid having to solve them all over again later;
- Have access to phone-in consulting services;
- Determine the cause of the problem and ensure that the problem does not recur; and
- Broadcast information about the problem, its workaround, and its fix to unaffected users who may benefit from the information.

Summary

In conclusion, it is more sensible for employees to help themselves and each other by letting management know they need technical support. When someone asks you for technical help, by all means help them--but let your manager know immediately that there's a support problem. When you have a technical problem yourself, by all means ask your expert neighbor for help--but tell your own manager that it was an exceptional case and that you'd much rather have a permanent technical support team to work with.

3 Redundancy

Redundancy is feared and loathed in most offices and data processing environments. Redundancy is defined as "superabundance; superfluity; having a quality in excess."

In some offices, "redundancy" is a synonym for loss of a job, as in "My position was made redundant." Sometimes upper management perceives redundancy as padding or featherbedding--having too many people doing the same thing. In database design as in filing, information is stored in the fewest possible places.

However, more careful analysis reveals that redundancy is essential for a healthy organization. Redundancy lets a manager stay home when she's sick and lets a word processing operator continue his work when the disc drive gets sick. Redundancy provides the elasticity that lets office and computer operations proceed normally despite the ups and downs of human and machine existence.

I propose a Redundancy Rule for successful office automation:

ELIMINATE UNIQUE RESOURCES.

Consider two aspects of modern work: equipment and people. No one would accept working in an office with exactly one pen. Even if only one person needed the pencil at a time, one would be unwilling to tolerate the risk of breaking the unique writing instrument. One would expect to stock a backup pen or at least a good temporary replacement like a pencil.

Managers must plan for such replacements and backups as part of the operating costs of their office. The hardware acquisition budget should include reasonable provision for "redundant" equipment. For example, I recommended to one of my clients that they choose an local area network with at least two identical file servers (the processor coordinating access to central disks and printers) rather than a competing configuration that had a single server. Should one server break down, the other one could meet network needs temporarily, albeit at lower service levels. Downtime would be lower; system flexibility would be higher.

The Redundancy Rule implies that one should do backups. Without backups, information on a single disc is a unique resource. The Rule implies that one should invest in uninterruptible power supplies for word processors (WPs) and microcomputers but not necessarily for printers. Information in the WP and micro memory may be unique (if one can print from memory without first saving to disc) but anything we send to a printer can be regenerated. The Rule implies that given a choice between buying two different automated systems or buying two identical systems, one should get the twin systems to be able to cannibalize one of them in an emergency. The Rule implies that if the volume of equipment purchases justifies it, one should invest in a floater unit which can serve for training purposes until it's needed to help someone out of trouble when an operational unit breaks down.

Organizations

What about people? Some people believe that the Redundancy Rule is dangerous to their careers. I once met a programmer who admitted that he didn't want to document his source code "too well" because then his employer could dispense with his services. The irony was that this fool lost his job anyway. A computer systems foul-up flooded the market with defective products and the company went bankrupt. Keeping unique information to oneself is bad, bad, bad. From the employer's point of view, having an indispensable employee is unwise, indeed dangerous. What happens when Slavia the Spreadsheet Superwoman is ill or on holiday or resigns? Who will produce the company newsletter when Miklos the Desktop Publishing Marvel stomps out of the office in a fury?

From the employee's point of view, being indispensable is trouble indeed. Wang Mei the Network Nabob works overtime--maybe even unpaid overtime--when the network goes down. Siva the Laserprinter Lion

cannot move out of his present job because no one has been trained to replace him if he's promoted. The Unique Resource has no one in the office with whom to discuss technical problems; where is the pleasure of exchanging ideas, the challenge of organizing and articulating ideas in teaching?

A Unique Resource is in a rut.

In conclusion, everyone benefits by avoiding unique resources. Cause a little redundancy--it will calm things down in rough times and liven things up in calm times.

4 Floaters

Many offices would benefit from having a spare microcomputer ("micro") available for use but unassigned to any one person. Such a micro is called a floater. Floaters are useful to replace broken equipment if a service contract does not specify a replacement unit. When office automation (OA) is effectively implemented, OA tools are no longer optional; they are required for staff to function. For example, if everyone uses electronic mail (e-mail), there is little substitute for having access to the e-mail system. Furthermore, in an efficient office, no other user has much slack in her use of her assigned equipment. Non-functional micros mean lower productivity and even potential friction over sharing remaining equipment.

Floater units can prevent these consequences. Floaters can serve when unexpected work arises if the work can be partitioned. For example, if a sales office suddenly has to respond to a Request for Proposal (RFP) in a hurry, the sales force could assign a section of the RFP to a salesperson who doesn't normally have an assigned micro. The floater could speed production in this emergency.

Floaters are useful when a micro is needed for a less-frequent tasks that require a special peripheral. For example, if month end graphics take a whole day to produce, a floater could be attached to a plotter and left to plot without inconveniencing the operator of the micro usually attached to that peripheral.

Similarly, some larger offices use one of their micros as a teaching tool. A video interface can be installed on most micros, permitting trainers to hook them up to a video projection unit or to the newer overhead transparency projection units. Video projection units resemble large-screen projection TV sets; they have curved screens about five feet square and projection units requiring calibration for proper focus. They cost many thousands of dollars. Overhead transparency projection units are about the size of a standard 8.5 x 11" notebook, weigh about a pound, and fit on any overhead projector. Both devices allow an audience to see whatever is on the micro linked to the projection unit.

The problem is that unless the modified micro is a floater, someone has just lost her workstation. If that person is part of the course, there may be less difficulty than if she is expected to continue working. But even if she is taking the course, usually someone else has to cover for at least part of her work; alternatively, the "student" ends up having to work overtime after the course to make up for "lost" time. In both cases, it can be difficult to move the micro hooked up to a projection unit from the teaching environment back to the workplace. A floater unit prevents this problem.

There are many opportunities for increased office productivity by allowing or even encouraging work at home. Creative work, especially, is sometimes difficult in an office. Workdays often seem like a series of interruptions when one is trying to devise a plan or write a complex document. In contrast, many people are at their creative best either early in the morning or late at night. Unless your office is a step away, it's hard to get those ideas into practice at those hours. Once one is used to working with one's favorite OA tools (word processing, spreadsheets, graphics), it's hard to be as productive with a plain piece of paper. As for typewriters, how many of you habitual word processing users have had the experience trying to write on your old college electric typewriter? It's a horror.

A floater unit can be taken home for special purposes without disrupting normal work. In contrast, it's usually unthinkable to take one's assigned workstation out of the office. Having a floater to work on at home even has benefits on family life. Think of the charming scene as Mom looks up with a smile to help Johnny with his homework, then bends back to her corporate financial model.

This chapter was written in a roadside rest area in Nicodemus, Kansas, on an HP Portable Plus--one of the two floater units I use in my office.

5 Portables in the Office

With the advent of the powerful new portable computers, office automation managers should consider adding at least one portable to their toolkit. A previous chapter described the advantages of "floater" units: those microcomputers ("micros") not assigned to any specific person. A portable computer is an ideal floater unit.

First, some terminology. There are several size and power classes of portable micros:

- Floor-mounts, whose processor units stand beside a desk and weigh 20 or 30 pounds;
- Desktops, about 20 pounds; cables link the components;
- Transportables, which look like sewing machine cases, have few external cables to worry about, and weigh 15 to 20 pounds;
- Portables, weighing some 15 pounds; some are the size and shape of a breadbox;
- Lap-top portables, weighing from seven to 15 pounds;
- Note-book portables, usually weighing four to seven pounds; typically 8.5" x 11" x 1.5";
- Palm-top micros, weighing about a pound or less and roughly 4" x 6" x 0.5".

Moving floor-mount and desktop micros is not recommended. The components are big, awkwardly shaped, wired together with many cables, and not designed to be moved. Even with special carrying cases, it takes a determined and strong person to carry the screen and a disc drive very far.

Transportables are much easier to move around. These devices fold up neatly; they have no dangling cables to catch on corners. They have small screens, but some may be plugged into larger monitors. If they must be transported, they are rugged enough to withstand the normal shocks of car rides, for example.

Portables--the breadbox size--are also a good choice for the office, with the added advantage that they are easy to take home. Most portables run on wall current, although some have a few hours of battery life for occasional spontaneous use. Such portables may fit under an airline seat, but they are awkward to use on a plane because of their size.

Laptops and notebooks

Laptops and notebooks may be the ideal choice as floaters. They range in size from the binder sized to the briefcase-sized. These self-contained units take up little room on a desk, and the smaller ones can be used in an airplane seat. A portable with hard disc can run about four hours on a battery charge

A minor warning for those interested in using laptop micros during air travel: they are difficult to use in the economy section of the plane. The screens are typically to tall to fit comfortably in the cheap seats. Notebook computers are easier to use.

Tiny computers

Several companies make palmtop MS-DOS compatible computers. These units typically use read-only memory (ROM) cards for different applications. They are useful for occasional note-taking and to organize lists of contacts. Some run spreadsheets, making them useful for such applications as expense account summaries or specialized financial models. However, their keyboards are so tiny that they are all but unusable by anyone who is used to touch-typing. Hunt-and-peck typists may not be inconvenienced much.

Seeing is believing

Evaluate the display of any portable you consider buying. Liquid crystal displays (LCDs) can be hard on the eyes for those unused to them; supertwist LCDs are better. Palmtop computers have 8 or 16-line, 40-character-wide screens; the rest all have at least 80 column by 24 line displays. Some systems have high-resolution screens (e.g., VGA compatible monochrome and even color screens).

Some portables use plasma displays--glowing letters on a dark background (or the inverse). Most people find plasma screens easy to read, but they use more power. The original Toshiba 3100, for example, had no battery pack available (partly because of the screen and partly because of the hard disc). Most portables can be hooked up to an external monitor, increasing their usability as desktop units when the user is at the workstation for long periods.

Data storage capacity

Data storage is an important issue when evaluating portable micros. Some systems use solid-state memory (RAM and ROM), which are not much affected by vibration and shock (although the user-installed chips can work loose if improperly seated in their boards). Main memory capacities on portable computers generally match the range available on more static models.

Most portables use 3.5" floppies (1.44 MB) and a hard disc (20 MB and up).

Linkage

Finally, consider communications capabilities. Many systems have internal modems available as well as having serial ports capable of up to 19,200 baud operation. Internal 1200/2400 and even 9,600 baud modems are available for most portables. Small 2,400 baud modems the size of a pack of cigarettes are also available. Portable computers usually come supplied with Centronix parallel output ports for standard printers.

Tiny computers usually provide serial ports for linkage to larger systems; some permit peripheral sharing (e.g., printing directly on a larger system's printer).

Summary

In summary, when considering whether to buy a portable as a floater, the following checklist can be useful in your analysis:

- Size: transportable? briefcase? laptop? notebook?
- Power source: AC or AD/DC?
- Screen: LCD or plasma? fixed or detachable?
- Mass storage: RAM/ROM or discs? floppy or hard?
- Compatibility with IBM-PC?
- Communications ports: serial? speed? modem? parallel?

6 Appropriate Technology

In the mid-1970s, I lived in a tiny town at an altitude of one mile near the continental divide of Africa and a few degrees south of the equator. Butare is the University town for Rwanda, a country south of Uganda, west of Tanzania, east of Zaïre and north of Burundi. Electrical power was shut off for several hours a day because of petrol shortages and because of mechanical failure in the ancient generators installed during the colonial administration, decades before. We used to light lanterns without interrupting our dinner conversation when the lights flickered warningly--that's how normal it was to lose power.

Butare is about 90 miles from the capital, Kigali. In North America or Europe, we'd expect that to be a one- to two-hour drive. In Rwanda in the mid-1970s, the voyage to Kigali was a four- to five-hour ordeal. In the dry seasons, the clay road was a 90 mile washboard. In the rainy seasons, it became a gigantic mud-wrestling pit. In all seasons, the road was full of brightly-dressed pedestrians carrying earthen pots on their heads, babies on their backs, and herding cows, goats, and chickens along the edges.

To telephone anyone, we had to go to the PTT--Postes, Telephone et Telegraphe. The PTT had telephones which often worked; very few of the buildings in the town had their own phones. Sometimes, we could actually hear voices above the crackling static that pervaded the phone lines. Often, we'd give up and try again another time.

People in the developing world could use office automation (OA) techniques just as fully as people in technologically advanced countries. The problem is that the infrastructure for effective implementation of microcomputers, word processors, and electronic mail is missing. The infrastructure we take for granted--electricity, roads, phone lines--is still being installed in much of the world. So how does one run a microcomputer, deliver replacement parts, or tie into a network in the absence of the infrastructure?

Approaches to development

One of the approaches to development assumes that the Third World must recapitulate the history of technologically advanced nations. Developing nations should lay down asphalt roads, install telephone poles, and build generating plants. Only then should they try to implement more sophisticated tools such as OA. Another approach suggests that not all the technology developed in the First World is suitable for the Third World. Some techniques are more appropriate than others. But what should one do to implement OA technology when not all the pieces are in place for supporting it?

I think one answer lies in a paradox: far from sending primitive systems to the Third World, we should be looking at some of the most advanced technology--but with an eye to its appropriateness.

Context defines value

Consider word processing (WP). Should the University of Rwanda spend money on typewriters, word processors or on microcomputers and printers? Typewriters last along time, are resistant to breakage, and don't require power. However, typewriters are used not only for correspondence and reports, but are crucial for home-grown printing. In the Third World, typewriters are used to prepare the masters used for spirit duplicators--the mechanical predecessors to photocopying machines. When I was a professor at the University, a good deal of time was wasted by the nuisance of correcting typographical errors on those masters. One would have to apply a pink plastic liquid, let it dry, and type over again. The results were often a smudged copy. So in those circumstances, there would be a premium for being able to print the masters correctly the first time. Word processing equipment becomes even more useful than in an office in Montreal.

Electricity

How can we overcome power difficulties? By using portable equipment. Recently, typewriter manufacturers such as Smith Corona have been advertising portable WP units for about U$500. These battery-operated units would buffer their users against power fluctuations and interruptions. Their integrated printers seem simple enough not to require frequent servicing. They have 100 Kb floppy diskettes (why only 100 Kb? I recently encountered a 10 Mb 5.25" floppy drive) which might be used not only for backup and storage but also as a means of transferring files from one machine to another.

Another pervasive need is computing power. Just like people anywhere else, Third World managers desperately need to be able to keep track of numerical information, such as student performance, agricultural yields, medical records, and finances. In fact, because so much of Third World life hangs on the edge of disaster, one could make the argument that effective decision support is even more important than in the First World. I suggest that serious consideration be given to portable microcomputers as the computer of choice for developing nations.

A wide variety of portables is now available. However, I maintain that the ROM/RAM-based portables such as the obsolete HP Portable Plus (the "110+") are the best for work in a developing country. These systems depend on large amounts of read-only memory (ROM) and random-access memory (RAM) rather than on hard disks and floppy drives. External disks are available for the 110+, either battery operated and linked via the Interface Loop (HP- IL) or as standard Interface Bus units (HP- IB) linked through an HPIL/HP-B converter. HP will support up to 2 Mb RAM; With new non-HP memory boards, the 110+ can be upgraded to 4 Mb. ROMs available from Personalized Software (publishers of the Portable Paper can provide megabytes of utility software. The 110+ thus becomes a powerful tool for a variety of applications but keeps its unique virtue of being a sealed unit with no moving parts (except the keyboard and the screen hinges). Faced with operating conditions including a fine red dust which seeps into everything, I would bet on the 110+ rather than on units with diskette drives. Faced with the jouncing ride to Kigali, I would bet on RAM memory rather than on a hard disk. Too bad the HP110+ was not fully compatible with MS-DOS.

Through the HP-IL, several 110+ computers can be linked; file exchange and peripheral sharing are painless and effective. Indeed, the linkage can even include HP41C calculators, which can be used as remote data entry devices for alphanumeric information. One potential application in OA is to massage locally-collected information and produce summary statistics. The summaries could then be loaded onto HP41C magnetic cards and delivered to a central station for integration into reports.

The battery-operated HP Thinkjet with HP- IL interface is perhaps ideal for field conditions. The entire print head is replaced with every ink cartridge, and in my experience, the printer doesn't seem to break down.

The 110+ will run for about 16 to 20 hours of continuous work, although in practice, by using the timeout feature, one can extend this period to several days of ordinary work. The Thinkjet is good for only a few hours of use on one charge. It may be necessary to use non-battery operated disk drives and printers. In such

cases, or to run conventional systems, Third World managers and technocrats should investigate uninterruptible power supplies (UPS). For a few hundred dollars, one can install 0.6 KVA systems capable of running a complete microcomputer system for a 20 minutes to an hour and a half. For a few thousand dollars, a 5 KVA system will run several micros for several hours.

Modems and mail

What about telecommunications? If the telephones are so awful, how can one send information between centers? One approach is the new variable-speed modems with extensive error-correction. These modems adapt their speed to line quality; the more noise, the slower they run. Such modems could take advantage of occasional quiet periods to speed up transfer rates. Local area networks based on coaxial cables may be easier to install and maintain than telephone switching equipment, since the coding and decoding can be done by microcomputer equipment. For communications across the country, I wonder if Third World nations wouldn't do better to study satellite linkages instead of trying to lay telephone cables. Such linkages require relatively simple receiver dishes and are less likely to be damaged than miles of cable.

Electronic mail carried over such networks might have major advantages over regular paper mail. Certainly the speed of transmission would be far greater than overland delivery. Furthermore, it might be much harder to censor such mail than written materials; with the unfortunate prevalence of totalitarian regimes throughout the Third World, such features as encryption and automatic backup might be even more useful than in more open societies.

Retrospect

In 1977, a group of professors at the University of Rwanda organized a symposium entitled, "Microcomputers for the Third World." We were referring to programmable calculators. Even so, our colleagues were amazed at how powerful these simple tools could be in solving their practical problems. How much more excited they would be to see the progress in appropriate technology today. I hope that international aid agencies pay attention to helping Third World nations obtain and use equipment that fits their needs rather than imposing solutions appropriate for a far different environment.

First world

Does any of this bear on running an office in North America or Europe? Indirectly, it does: we must remind ourselves that tools can be judged only in a context. Asking, "Which is the better computer?" is meaningless unless one answers the question, "For what purposes?"

7 Electronic Mail for Plain Folks

By now, most people have probably used, seen, or at least heard about electronic mail (e-mail). These products, running on local area networks (LANs), minicomputers and mainframes, serve companies with as few as a few dozen employees on up to those with thousands. E-mail systems have an impressive repertoire of functions. For instance, one can usually

- Receive and send messages from and to e-mail users logged on to one computer or many in the network;
- Prepare messages offline and send the ASCII (plain text) files or binary files such as LOTUS worksheets, MS-WORD documents, and programs;
- File information according to any label one wishes in "folders" which can themselves contain other labels;
- Define and use mailing lists to save time when sending the same messages to multiple users;
- Specify options for delivery such as URGENT, delayed, and receipt-required.
- There are sometimes other useful features which are not strictly part of the e-mail functions, such as an electronic appointment calendar that certain associates may be permitted to consult when planning meetings.
- E-mail systems have the following general advantages:
- Fast delivery (seconds to minutes, regardless of distance);
- Faster message reply turnaround time;
- Guaranteed delivery on first try or store-and-forward until successfully delivered;
- Audit trail of message transactions;
- Optional hard-copy message delivery;
- More cost-effective and efficient compared to couriers and intra- company mail.

I always explain why e-mail is useful by saying that it permits "fast asynchronous communication" among people. E-mail is like the familiar telephone answering machine; some communication can get through even if both people aren't on the line at the same time. Letters, telegrams, and "mailgrams" (telegrams delivered by the postal system) allow asynchronous communication, but they're not very fast--they work on the scale of days, not minutes. In contrast, I can get a twenty page document from my desktop computer in Montreal to that of a client in Alberta in less than ten minutes using a public e-mail system. The cost? About CDN$5 (U$4) including the system's fees for our connect time.

Alternatives

How can one send electronic messages to people who have no computer links, no modems, or even (gasp) no microcomputers?

TELEX I (formerly TELEX) and TELEX II (formerly TWX) provide e-mail service to about two million subscribers around the world. In recent years, these systems have been interconnected so that subscribers to one can reach anyone on both networks. These services are good for short messages, but the relatively slow transmissions mean that more than a page or two can be expensive. The same twenty page report that cost CDN$5 to e-mail would cost about CDN$50 to send by TELEX.

FAX

An alternative to TELEX is the facsimile machine. A typical "Group 3" device is about the size and cost of a photocopier; it communicates with another facsimile unit over regular phone lines on a station-to-station basis. Benefits of facsimile include

- easy installation: plug into power and a telephone jack;
- flexible input: typed or handwritten, photographs or sketches;
- robust communication: tolerates more line noise without retransmission than other e-mail systems;
- simple use: put the paper in the hopper and press the button;
- automatic operation: will redial until successful without operator intervention.

FAX boards which fit inside microcomputers allow documents to be sent via fax as if they were being printed to a printer. With the right software, it is possible to send a fax including all enhancements (e.g., bold, underlining, special fonts and so on) and graphics (diagrams, digitized photographs) without having to create a paper version locally.

Even facsimile is available without having to buy one's own equipment. ITT, MCI International, Graphnet, and RCA Q-FAX are examples of commercial facsimile services that can provide facsimile transmission of documents handed in at a service center. Customers may also transmit documents to such a service from their own facsimile terminals or via computer link and telex.

Finally, one can send a fax from any microcomputer by using a VAN.

VANs

Value-added Networks (VANs) provide messaging services as well as many other information services. For example, one can dial up a local telephone number using a modem and a telecommunications program and have access to vast libraries of current information, go shopping electronically, and order airplane tickets for the cheapest flight between two cities. There are also hundreds of electronic meeting places ("forums" or "SIGs"--special interest groups) for such things as animal rights, medicine, law, working from home, and sports interests.

VANs provide public e-mail for all the subscribers who wish to use their services. Some VANs (e.g., CompuServe) charge for messages purely by how long it takes to create and receive the data (charging by "connect-time"). Others (e.g., Bell Canada's iNet2000) charge by the amount of data sent and received (charging by traffic).

Editing functions are available for those working on dumb terminals. However, for anyone using a microcomputer or word processor to communicate by e-mail, it's much more economical and efficient to edit the text locally ("offline") before transmitting it to the e-mail service. With connect time at CDN $0.25/minute for INET, even a fast typist can generate expensive charges for a simple message, especially if there are online corrections to make.

The more popular VANs have software available that helps automate the communications process, making it easier to work offline--and without racking up communications charges while composing and reading mail.

VANs also provide FAX capability; one can send ("upload") a message and have it converted into FAX codes for immediate or delayed delivery to a recipient.

Archaic recipients

For recipients who have no electronic address or FAX, public e-mail services are also linked to several national postal systems. For instance, one can send anyone at all a message printed on a laser printer and

packaged in a fancy colorful envelope that is sure to catch their eye. In Canada, this service is called ENVOYPOST.

The neatly printed, attractive message is delivered the same day or the next working day. Special delivery and registered mail are available at extra cost. An ENVOYPOST message costs about CDN$3. For Canadian addresses, we're allowed up to four pages of text; for US addresses, we can send one page per message.

Exactly the same dialogue can be used to COMPOSE ENVOYCOURIER, which prints the message at a participating office of PUROLATOR, the international courier company. These documents are then hand-delivered to the recipient. The cost is about CDN $10 per message with same- or next-day delivery.

These services are probably available in one form or another anywhere in the developed world. I suggest you contact the organizations mentioned in this article if you are in Canada or the US; elsewhere, try your P.T.T. (Post, Telephone, Telegraph) services. Good luck.

And send me a message if you join the plain-folks e-mail services.

8 Computerized Telephone Usage Monitoring

Large companies have used call detail accounting reports (CDAR) for years to study and control telephone usage-especially long-distance calls. Another term used is station message detail recording (SDMR). Such systems have become available to smaller companies with the advent of call- accounting service bureaus and mini- and micro-based computer software. Industry estimates commonly cite savings of about 30% on total long-distance telephone costs once CDAR systems are implemented. This column summarizes some of the features of CDAR; the notes include names and addresses of a few vendors that readers may wish to contact for further information.

The long domination of telephone services by the Bell Telephone Company in the United States (and Bell Canada up north) caused many corporations to forgo internal control of telephone services and costs. We tend to assume that Ma Bell's reports are all we can get. All of us are familiar with the kind of report we receive from our local phone companies: they typically show the date, time, number called, length of call, and cost. Such information is useful but incomplete. There is usually no information about local calls. Even for long distance calls, two useful pieces of information are missing:

- Which employee called a line or extension; and
- Which project or client the call may be related to.

Knowing who placed which call may be useful in tracking down unusual use of the phones. For instance, a pattern showing a two-hour phone call to the opposite coast of the continent every Friday after normal business hours might suggest a discreet, polite enquiry about possible personal calls on company equipment.

On another level, proper summary information about the areas called by employees may identify geographical regions where the density or importance of clients and suppliers might justify investing in--or at least investigating--special telephone services to reduce long-distance phone costs.

In-house

Many firms have special purpose telephone lines such as wide-area telephone service (WATS) or non-switched leased lines connecting major telephone switches within the corporation (tie lines). Such organizations usually have computerized branch exchanges (CBXs) which automatically assign long-distance calls to the least expensive communications channel. However, in smaller offices, although the lines are available, individual employees decide when to use them. Computerized phone usage monitoring can help improve call distribution to minimize costs. Specific employees who consistently ignore WATS and tie lines can thus be identified and their behavior corrected.

Even when employee use of specialized communications lines is optimal, there may be usage bottlenecks. These will show up in the phone records as periods of unusually high use of alternate, more expensive services. They may also be visible as periods with long waiting lists (queues) for those special services. Appropriate actions in such cases may include ordering additional outbound lines on the existing services or purchasing new WATS or tie lines.

The Automobile Association of America (AAA) uses information from a CDAR unit to track inbound as well as outbound calls. The details have permitted efficient scheduling and hiring to handle the massive volume of calls (up to 3000 per day). Some organizations bill clients for services; e.g., consulting firms. For them, it can be profitable to attribute a project or client code to calls--even local calls. Automatic reports for each project eliminate the need for staff to pore over their telephone bills to figure out whom they called and why. The

time saved may pay for the CDAR system within weeks. Precise statistics on time and duration of client calls may even encourage more precise employee time management and reporting. It's hard to claim that one was working on project A when the phone records indicate a half-hour call related to project B in the middle of the reported period.

In recent years regulatory decisions have reduced the Bell System's monopoly, allowing other companies to link their equipment directly into the networks. These regulatory changes permit users to intercept communications signals between the phone sets and the phone company's central switching equipment. It is thus possible to record information independently about calls placed or received in computer files for later analysis. Once we have the ability to record the phone company's information, it's easy to add user-specific information such as billing or client codes. The additional information can then be massaged by computer programs to produce reports in any way required by the user.

Example

Several thousand Canadian firms, including mine, subscribe to Call-Net Communication's CDAR service. Here's how it works:

- A microprocessor-equipped black box intercepts all outgoing call from one of our touch-tone phones.
- The black box generates a dial tone; however, it does not access the Bell system immediately.
- When we dial a number, the microprocessor analyzes whether it's a local number or long distance; if long-distance, it determines if it's a toll-free number (such as 800- calls or 555-1212 information) or a billable one.
- Then it either dials the BELL system directly (for local or toll-free numbers) or dials the Call-Net switching system.
- Call-Net's computerized exchange uses Call-Net leased lines (trunks to send our phone message to the nearest out-dial switch in the CallNet grid.
- Then the Call-Net receiving station dials out, often as a local call to our target phone number.

So far, it's hard to see what the fuss is about: fine, fine, we dial a number and some other system dials it for us; so what? The trick is that Call-Net can program its microprocessor to accept additional touch-tone digits following the phone number. The microprocessor recognizes which three- digit codes are valid area codes and can tell when we dial international twelve-digit codes. When we dial long distance calls, the Call-Net box beeps at us and we must enter our own code sequence. For instance, we use three-digit codes to tell if a call is billable or not, and if so, to which client for which project. Code 1-0-0, for example, might be the ACME WIDGET CORP. PROJECT EVALUATION, and so on. Another company might choose to have 1-0-0 mean Accounting/Joe/Research. The meaning of the code is entirely the customer's business, not CallNet's. The black box sends this code along with the phone number to the Call-Net central computerized exchange, allowing the CDAR service to print periodic, detailed reports on exactly which phone call was for which project.

Reports

At the end of each billing period, we receive three reports:

- Calls in chronological order for each accounting code, including total cost and time;
- Calls in order of decreasing cost;
- A summary of total number of calls, average duration, and cost for all the codes.

Since the reports are generated by simple computer programs, a client can request special conditions and reports from the vendor; e.g., one might report only those calls costing more than a certain limit, or have a report showing all the calls for a specific employee.

Call-Net is a Canadian company. For US firms, Account-A-Call Corporation (AAC) provides all the features described above and more. This firm also sells proprietary software (PC POLLER) which runs on PCs to poll remote memory devices (such as AAC's TADPOLL hardware) attached to private branch exchanges (PBXs). The data collected from these memory devices can then be analyzed by AAT's CALL MANAGER software running on the Vectra to generate the reports described above. These solutions thus provide the functions of Call-Net and AAT in-house.

Summary

In summary, call-accounting technology and services provide a painless way to increase office efficiency by rationalizing phone usage in today's automated office.

9 Computer Contamination

Time bombs,", "Trojan horses," and "viruses" are man-made bugs that afflict computers and give nightmares to the people who run them. They can choke networks with dead-end tasks, spew out false information, erase files, and even destroy equipment. Since office automation is a branch of computing, we should all be aware of what's happening and how to protect ourselves.

A computer virus is a piece of software that causes its own duplication without permission of its host. Such pieces usually insert themselves into other programs, such as the operating system, and then propagate into other systems by 'infecting' floppy disks. Some viruses announce themselves whimsically by flashing an unexpected message on screen: e.g., "Something Wonderful is About to Happen!". Anything unexpected like that while you're running a word processing program is enough to cause an anxiety attack. Viruses can be hidden in useful programs, which are then called 'Trojan Horses.' In a bitter jest, one vandal infected a 'vaccine' program originally designed to combat viruses and spread the modified program via a bulletin board system.

Programs which cause unexpected events at a particular time or after being run a certain number of times are called 'Time Bombs.' One such program destroyed many files in universities around the world. A computer terrorist organization that sounds like something out of a James Bond movie (The Chaos Computer Club) claimed that they infected NASA's computer system during the five-months they had access to government files in 1987. These weirdos said they planted a virus hidden in a Trojan Horse and that they would soon set it off.

Now, what are we to do about all this fuss in our plain, ordinary work in office automation? Does it matter?

I think so. I think that we should protect our organizations and ourselves with increased caution when using contributed programs and even when accepting disks from outside or unknown sources.

Guidelines

Some guidelines for programs from bulletin boards:

1. By preference, use contributed software that includes the author's name and address; write to her and verify that she really did write and contribute the version listed on the bulletin board.
2. Don't install programs of questionable origin on your hard disk; indeed, shut down your hard disk (if your system allows that) when you test the new programs.
3. If possible, find someone with an older copy of the same version of the utility or program you want to use; examine the number of bytes in both programs. If the version numbers are the same but the byte counts differ, be wary. Talk to your data processing staff to explore the question before using the program freely.

And for diskettes from unknown or dubious sources:

4. Use utility programs such as the Norton Utilities to list all files, including the 'Hidden' ones. Question anything you don't recognize.
5. Copy the files you want from the source diskette to another one. Make a careful note of how many bytes in all are required for the fileset you want to copy and also of how many bytes are free on a new target diskette; then compare byte counts on the copy and on the source. There should be no extra space used on the target.

Summary

In summary, don't assume that a free program is clean. It may be a very dirty trick indeed. Be reasonable in testing your 'gift horse' in a secure environment and don't let it loose into your production environment until you are confident it's clean.

10 The Wireless Office

Office automation is moving toward greater integration of formerly standalone workstations with central systems such as the HP 3000 or micro-based file servers.

Today, OA administrators must learn to grapple with problems that once were the domain of data processing system managers. For instance:

"Josie, could you move my HP 150 from my old desk on the fourth floor to the opposite side of the building on the eighth floor? Oh, and could you have it done by this afternoon? I have an important report to finish for the president."

Sound familiar? It should. At a conference in 1988, a participant reported a study showing that in a particular company, 70 percent of employees had been physically relocated in their building in a six-month period.

What happens in your office if you move computer equipment from one place to another?

It depends on your connectivity. If you have no connections among your workstations, there is no problem at all, assuming you can get electrical power at the new location.

Coaxial cable (used for local area networks, or LANs) imposes strict limitations on how far away from the LAN cable you can site your terminals or computers.

Even ordinary (RS-232C, asynchronous) wiring has its problems. Some organizations are lucky enough to have had the foresight and the opportunity to include their data communications lines in the same cables and conduits as their phone lines. At very little extra cost, they used telephone cables with six, eight, or twelve wires instead of four. Since an ordinary phone needs only two wires (a "twisted pair") and a direct-connect serial port for a mainframe or minicomputer will accept three pin connections, it's possible to use the thicker cables to feed both phones and terminals. Certain local area networks (LANs) run over twisted pair as well.

Typically, such an installation has two "phone jacks" at each desk: one is actually for the phone and the other feeds to a panel from which the systems manager can link to their HP3000 ports. This arrangement means that it takes a few minutes to service equipment in any area of the building without having to install extra wires.

The difficulties occur in buildings where wiring goes through walls or through ceiling conduits. Even if there is room in the conduits, it takes a long time (hours, sometimes) to pull a new cable--often hundreds of feet or more--from the central computer to a new terminal emplacement. If the conduits are full, it can be impossible. If there are no conduits, one may have to drill through concrete or metal walls. Sometimes months pass before the building permits can be secured to do such a thing; there goes any hope of quick response to changing requirements.

Wireless connections

Some years ago, when I visited the HP research and development labs, I saw prototypes of an infrared-based wireless communications system. Recently, such linkages have been used to send data to portable printers from hand-held computers/calculators. But, this technique has not been commercially available for communications among computers or terminals.

At the same conference mentioned previously, a vendor described a novel wireless solution to difficult communications problems: radio transmission. According to Robert D. Clark of RYLUN COMMUNICATIONS, cabling costs have been increasing despite the decreasing cost of DP and OA equipment, with the result that the price per workstation has remained constant over the last few years. The cost of cabling relocations is estimated at a billion dollars a year in the United States and about $100 million a

year in Canada. Even worse than the cable expense is the cost in time and money for network planning, approvals, installation, relocation, maintenance, and upgrades. An attractive solution is wireless networking.

ARLAN (formerly called Radionet) is a local area network based on principles developed in the 1950s and extensively used by the military. With extremely low-power transmitters, the system allows microcomputers, terminals, word processing stations, and mini or mainframe computers to communicate within buildings and between buildings. The units have been tested successfully for up to six miles line-of-sight (with no intervening obstructions). As a side benefit, the units make it difficult or impossible to intercept the data stream; that is, it is not easy to tap into the "line" to read information illegally. The manufacturer claims the system is impervious to interference from office equipment; you can turn the photocopier on and off without harming your link to the main computer.

Typical applications for a radio-based network:

- buildings where cable ducts are already filled to capacity;
- older structures where cabling is too expensive (e.g., massive walls, no ducts);
- nursing stations or bedside patient monitoring;
- computers or terminals in any room at will (e.g., boardroom presentations or one-time installations);
- portable classrooms: e.g., at trade shows, universities;
- disaster recovery centers to eliminate the need for expensive double wiring.

The equipment costs about $3,600 (U.S.) or $4,400 (Canada) per linkage (that is, for a unit at the workstation and at the host site), so don't rush out and buy a bunch without studying your situation carefully with your system manager. Multi-port units are available; they lower costs to about $300 (U.S.) per link at the host end ($350 Canada) for a 32-port unit.

Look for further developments of this interesting new technology. Tell your system manager about it.

References

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2. In Canada: RYLUN COMMUNICATIONS Inc., Data transmission and switching products, 205 Riviera Drive, Unit 14, Markham, Ontario L3R 1L6 (416) 479-3222
3. For information on U.S. distributors, TELESYSTEMS SLW Inc., 25 Dyas Road, Suite 104, Don Mills, Ontario M3B 1V7 (416) 441-9785

11 Obsolescence

Have you ever heard someone lamenting the obsolescence of his computer? "Oh woe," says a president, "I bought a wonderful computer three years ago and now people laugh at me for using such a clunker." In the HP world, one sometimes hears people railing against HP for having "orphaned" the HP 150; it's a dead machine, someone wails; it will never be upgraded.

There are two meanings for the word "obsolete":

1. No longer in use or in fashion;
2. No longer used or useful, because of outmoded design or construction, or because of hard wear.

Some computer users believe that because a computer or terminal is obsolete in the first sense--no longer in fashion--it must be obsolete in the second sense--no longer useful. The feeling is unfortunate, because old equipment may be used productively long after the computer industry has moved on to newer, faster, lighter, smaller, less expensive, or more attractive designs.

What determines whether one should sell, trade in, or junk "obsolete" equipment?

If the equipment still works for your purposes, keep it.

The HP 150, for example, was described as "still one of the most cost-effective word-processing terminals available". The speaker uses HPWORD/3000, which runs partly on the HP3000 and partly on the HP 150. Newer computers run more software than the HP 150; however, for use with HPWORD, the older computers are fine. There would be no advantage to upgrading.

You should upgrade if you can save money by so doing.

A few years ago, the monthly support costs for a new disc drive were roughly the same as those of an old disc drive (the HP7925) with 30 percent of the capacity. Given the trade-in allowance for three old drives, it turned out that the new drive would be paid for in about four years simply on the basis of the savings in maintenance costs. The improved speed and reliability were bonuses.

If equipment is no longer suitable for some applications, see if it can satisfy another application.

Many HP3000 shops still have the nearly indestructible HP264x terminals here and there in their offices. The terminals are much larger than the current crop, their keyboards are designed differently, and they cannot easily display the now-familiar two-line function key labels. For many applications, these terminals just don't work well any more. However, there may be someone in your office doing head-down data entry (rapid, continuous input of numerical or alphanumerical information without looking at the screen). These people may be perfectly happy with the HP264x terminals. After all, data-entry clerks don't change from one keyboard to another, so the slightly different keyboard layout wouldn't matter. They don't look at the screen much, so unlabelled function keys would not bother them so much either. There might be a problem with HP264x terminals whose maximum speed is 2400 baud, but sometimes even that wouldn't matter--e.g., if system response time were very good and data entry did not require changing entry forms.

If equipment is no longer suitable for some users, see if it can satisfy other users.

A local college recently replaced dozens of old HP 125 micro-computers with PC-clones. However, the HP 125s proved perfectly serviceable as terminals and even as simple micros for people who had never had one before. One HP 125 ended up in the bookstore as part of a point-of-sale system.

Give old equipment away to charitable institutions.

Depending on tax laws in your area, you may be able to obtain a business tax credit for donations of obsolete equipment to charitable organizations. Such donations might include giving functioning equipment to social service groups (Centraid, Red Cross, Oxfam, Greenpeace, etc.), and functioning or broken equipment to universities, community colleges, and schools.

Even broken terminals can be useful in physics and electronic labs, since units can be cannibalized to fix other equipment or used in teaching demonstrations.

Put old equipment at home.

Another worthy use for old terminals and micros is to put them into employees' homes with a modem. With modem prices so low these days (2400 baud units cost around $100), a modest expenditure can help people avoid midnight emergency trips to the computer center. For example, many programmers would benefit from a home terminal to fix problems during nighttime or holiday production runs. Some minicomputers can even be restarted after a system failure from a remote terminal (assuming due preparations are made before leaving the site and precautions taken against breaching security).

Modems and telecommunications packages such as Reflection and Advance-Link (and many others) permit radically different computers to share text files. Even though an HP125, a Vectra, and the HP3000 may use different word processing packages, they can convert their document files into plain text (ASCII); plain text lacks enhancements such as boldface or italics. This plain text can then be read into any other word processing package, to be manipulated further as required. Thus a secretary with a very large document to enter into a word processing package might make arrangements to work at home one day on an old computer. After entering the text, the secretary could transmit the file to the main computer by modem, print it for review, and edit it on the host. The next day, the secretary could finish the document at the office by adding enhancements and pagination.

Such a technique is part of telecommuting. Telecommuting may make life and work much easier for many people who commute long distances.

12 Telecommuting

Suppose you were offered the opportunity to work on your job at home instead of your office. What should you think about while considering such a suggestion?

Telecommuting "means performing job-related work at a site away from the office, then electronically transferring the results to the office or to another location.1" This working style is also known as remote work, home office work, telework, location-independent tasks, and industrial homework.

Cross & Raizman1 published an interesting book on telecommuting. This chapter is based partly on their ideas, on additional questions raised by a published research study (2), and on a critical review of workat-home (including but not limited to telecommuting) by a British study group (3). A computerized online bibliographical database supplied additional references.

Features

Many people around the world already work at home for their employers (house spouses are explicitly excluded from most of the following discussion). By 1986, 13 million people in the United States worked at home at least some of the time. In 1984, 36% of the 7,757,000 US workers with home computers used them for job-related purposes4.

What kinds of companies and jobs lend themselves to telecommuting1? Successful implementers include insurance companies, banks, computer firms, software labs, stockbrokers, researchers, managers, reservations clerks, telemarketing employees, trainers writing courses, financial analysts.

Jobs appropriate for telecommuting tend to require

- Little space and special equipment;
- Little face-to-face contact;
- Long periods of time for autonomous work;
- Project-oriented work;
- Adequate communications channels and information transfer.

The employees who succeed in telecommuting tend to be those who are already

- Highly motivated and skilled;
- Committed to their employer;
- Volunteers for the project;
- More productive than average at the office;
- Less gregarious than average;
- More independent;
- Better than average at time-management and organization.

The managers of successful telecommuting programs tend to be

- Familiar with the techniques;

- Experienced in remote work;
- Secure in their supervisory abilities;
- Confident of their staff.

Benefits

Proponents list the benefits of telecommuting as follows:

- emphasis on objectives instead of employee appearance;
- longer hours of service to clients;
- lower employee stress;
- elimination of costly office services such as cafeterias and day-care facilities;
- opportunities for specialists, the handicapped, the homebound, or people living in remote areas to work on interesting tasks;
- increased mutual respect, trust, and loyalty as employees demonstrate their productivity and managers demonstrate their confidence in their staff;
- reduced time spent in social interactions;
- callers need not know employee's location if call-forwarding, conference calls are used;
- increased physical liberty: appearance, dress, and working style are unobserved by supervisor, colleagues, and clients;
- greater efficiency can liberate more time for private life;
- escape from the currently popular open-office environment, which some employees dislike.

Because the national and international telecommunications networks can make access almost as easy from distances of thousands of kilometers as from next door, telecommuting has implications employment in data-processing-intensive activities . For example, work can shift to areas with lower salaries. A Boulder, Colorado firm currently takes money out of subscription envelopes and sends the forms by air to Ireland, where data entry clerks use the Colorado mainframe to enter data.

David Fleming, director of the California state government's telecommuting pilot project, pointed out that telecommuting offers one member of two-income family to keep an existing job even after relocation5. The same point was raised in a discussion of a midwestern company which saved $130,000 in staff turnover costs when it used telecommuting to retain 12 valued employees after relocating their offices.

Examples

Examples of telecommuting include:

- Aetna Life and Casualty Company: relocated some computer programmers to an office in a suburb; used teleconferencing to work with clients; now expanding to a multi-site, national system.
- Blue Cross/Blue Shield (South Carolina): hospitals and 200 doctors' offices file insurance information on patients directly into a central computer; "cottage coders" and "keyers" do 40-60% more work than in the office because of fewer interruptions; employees are paid for each report processed (errors result in deductions).

- Fort Collins, Colorado: 3% of city workers telecommute; have the same equipment at home as at the office.
- CDC: homework program gives 26 handicapped people around the US opportunity for gainful employment; they work with mainframes in Minnesota.
- The California state government plans to permit a growing number of employees to work at home part of the time. This telecommuting project is a response to a law which took effect on July 1, 1988. The new law requires employers to offer employees ways of working at home5. The employees in the project include lawyers, engineers and program analysts--"those who write or number crunch as part of their jobs."
- Another large employer, Pacific Bell, with 17,000 management level employees, began its own pilot project in 1985 with 100 employees. Between 500 and 1000 managers are now officially enrolled.

Hewlett-Packard and other companies use a related technique, teleconferencing. HP's product announcements are often preceded by teleconferences for sales and technical staff at which employees from around the world can put questions to top managers. Boeing has committees which meet by networking three or more conference room; and American Airlines has a daily teleconference to brief management from coast to coast on the state of the corporation. All of us have seen this technology in action on our TV screens when news people interview celebrities through two- way voice/image links. Look for more on teleconferencing in another column next year.

Doubts

Not everyone accepts telecommuting as a blessing, or even as a practical approach to work. Margrethe Olson, Associate Professor at the Graduate School of Business Administration at New York University, is quoted as saying that telecommuting is an "insignificant phenomenon." She apparently wrote a report for the National Science Foundation stating that "in none of the cases [studied] did management see telecommuting as a significant benefit to the employee or organization. In all cases, supervisors would have preferred the employee on-site if they had the choice."

Other observers also see telecommuting in a less rosy light. Yes, employees may hope for increased flexibility(2):

"One of the attractions of homeworking is thought to be the autonomy the homeworker has in deciding when and for how long she will work and at what pace. The time and effort control exercised over the assembly line worker and all those who clock in and out of work is contrasted with a person working in her own home, with no supervisor or timekeeper. In the abstract such a contrast appears to give the homeworker a freedom and flexibility denied the factory or office worker. It is a critical component of positive evaluations of remunerated work at home, and a major reason why homeworking is assumed to be a boon for women who need to adjust their paid work around family responsibilities (p.120)."

However, the authors continue, "...this picture is quite misleading." Many people were unable to refuse work or set their rate of production, for fear of losing their "contract". Many worked late hours (e.g., until 2 am) to meet demands of their employers. Husbands and other family members imposed their demands on home workers with little concern for their job. Flexible demands by the employer may result in disruption of home workers' lives.

A corporate lawyer commented that telecommuting might place unbearable pressures on junior partners in law firms or on rising executives in large corporations(6). As it is, these people often work late at the office on crash projects or briefs; what will happen, he asks, when they can work at home until all hours on those projects? Is there not a risk of having 'invisible' work imposed on these people by the possibility of labor at home?

"Reducing unnecessary social interactions" is mentioned positively by some authorities1. However, people differ in their goals at work. Although many people are indeed highly goal-oriented, others might find the concept of "reducing unnecessary social interactions" disturbing.

Research

Many managers have trouble with the idea of independent work without constant supervision. David Fleming found some managers so frightened of their perceived decrease in power that they did not want employees trained in telecommuting techniques6. Such fears might lead to increased rather than decreased stress for employees.

A social scientist studied sixteen people in five midwestern companies in the United States: WP operators, editors, text developers, programming developers, programmer/analysts, and program designers3.

He collected information before and during the telecommuting experiments (3 and 6 months after start) by using questionnaires and interviews. His findings:

- Communications decreased in all directions (lateral, upward, and downward) for those who worked at home full time; they increased for those who worked at home part time;
- Job satisfaction decreased with time;
- Identification with the work group decreased.
- Cross & Raizman1 summarize the barriers to successful telecommuting as follows:
- Half the companies with telecommuting experiments abandoned them within two years, partly because of a lack of standards and clear objectives;
- Management attitudes may interfere, especially where employee performance is equated with punctuality, sociability, and appearance rather than the quality of work;

Problems

- Telecommunications failures,
- Working from hotels can be difficult because of phone equipment (no jacks, poor lines),
- There are difficulties getting telecommuters and regular office personnel together for meetings.

Government regulations may cause difficulties:

- Some broad ordinances preclude work in some localities;
- Some ordinances restrict placement of dish antennae sometimes needed for high speed data transfer.

Legal issues can complicate implementation

- Workers' compensation insurance regulations may be difficult to apply, leading to judicial proceedings;
- Ambiguous status of employees: are they contractors or employees?

On this last point, some observers see telecommuting as a ploy to strip workers of the rights and privileges they have acquired as permanent employees. Union concerns include:

- Some firms charge workers for equipment "rental";

- Decreased wages may be offered because of the "convenience" of telecommuting;
- Increased workloads may be imposed partly because of the isolation of workers, who can compare notes and organize grievances less easily than office workers;
- Possible exploitation because of the lack of visibility of home workers;
- Will it be possible to require equal pay for work of equal value despite the locale and style of the work?
- What are the criteria for promotion, especially for women, who are perceived as the most likely to succumb to the idealized picture of work-at-home;
- Will telecommuters suffer a disadvantage in training for better jobs because of their lower visibility?
- Ergonomics: what measures will be implemented to ensure proper working conditions, including lighting, ventilation, and appropriate furnishings?
- "Electronic scabs" could reduce union power by allowing work to go on at different locations despite a picket line.

To this list, I would add the issue of the home workspace. Should the employer benefit from reduced office costs without passing some of the savings on to the home worker? David Fleming estimated that the State of California would save about $25 million a year because of reduced office space leases by having "10% of the state's work force...spend two to four days a week working out of their homes(5)." In this sense, telecommuting may provide greater benefits to employers than to employees.

It will be interesting to follow the research on this technique to see if any evidence accumulates about its long term effects.

Conclusions

Telecommuting, like most changes in technology and work methods, offers both promise and danger. I urge those considering trials for telecommuting to

- Define the problems telecommuting is supposed to solve;
- Set clear goals with measurable objectives that will allow decisions about continuing the project;
- Involve potential telecommuters, their managers, and their coworkers in planning the project;
- Protect telecommuter's career prospects by making explicit what constitutes successful participation in the trials;
- Set frequent checkpoints to prevent isolation of the telecommuters;
- Insist on regular contact with the rest of the office staff;
- Discuss compensation for the conversion of home space into office space;
- Involve trained counselors to ensure that the experiment will not disrupt family integrity.

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13 Billing for Computer-Aided Services

As computers become common in offices around the world, professionals (consultants, lawyers, doctors, accountants, etc.) who bill for their services face an increasingly difficult question: what will happen to their incomes if they do their work faster?

Billing for services

Professionals differ in how they bill clients. Sometimes they bill for specific services rendered, e.g. extracting an impacted wisdom tooth or doing a performance analysis for an HP3000 Series 70. Such billing may be the result of government of professional association fee schedules. Fixed-price billing can also reflect market practices and customer expectations or be set during contract negotiations.

Sometimes professionals bill for their time. For example, lawyers usually bill clients for the number of hours they spend in court on their behalf; accounting firms bill at different rates for the hours spent by partners, associates, assistants, and clerks; performance consultants may work by the hour. Billing for time requires more trust from the client than billing for services using fixed costs, but it insures that unexpected circumstances requiring more work are paid for by the client. Conversely, a problem easier to solve than expected ends up costing the client less.

Billing for time requires straightforward cost accounting, but the details are not always easily understood by everyone. Some clients forget a consultant has overhead. They compute the consultant's hourly rate, multiply it by the number of hours in a normal work week, and have heart failure when they see the large "salaries" they have calculated. Running the consultant's business includes salaries, capital equipment, supplies, etc. The minimum cost of a consultant's time, for instance, is the total cost (including salaries of support staff) of the business divided by the number of hours available for billable work.

Computers

Computers are used in many fields for many purposes--including work usually billed by the hour. For example, a client once asked me to find newspaper and journal references dealing with unionization and computer operations. I did the work in a few hours using enormous public databases with hundreds of thousands of articles and full-text retrieval. There were 37 articles in my report; it would have been extremely difficult and time- consuming to do the work manually.

How should such service be billed to the client? I billed by the hour, but I included all network access and lookup charges on the itemized account statement. Would it have been better from the client's point of view to have a fixed charge per item? But what if there had been more hits (articles qualifying for inclusion in the report) than expected? Maybe a fixed charge for the entire project would be preferable. But what if the topic had been so specialized that there were only one or two hits? Would the client have been so pleased with a fixed cost?

Or consider a lawyer doing research on precedents for a court case. This background work is essential for the client's success. The work is usually assigned to juniors who manually read through indexes and records of court cases, law journal articles, and textbooks. Research can easily extend into days or even weeks of intense labor. Clients pay for all this work by the hour.

Now suppose the law firm installs a central bibliographic database using an HP3000 and costing, say, half a million dollars of initial outlay and a quarter of a million dollars a year to run (including maintenance, salaries,

insurance, facilities, and financing). Now the law clerks are online. They can look through thousands of articles using context-sensitive searching and locate hundreds of likely references within hours. Their reports are not only faster than their manual efforts, they're better. The reports have fewer errors of transcription because the text can be copied directly from the database into documents; they are more thorough because more articles can be scanned and because the algorithms for full-text searches can spot information that might be missed by a human researcher.

Suppose all this great work is completed in one-tenth the time it used to take. What should the firm charge? One-tenth the cost? But who will pay for the infrastructure that makes the speed possible? Even if the amount of work increases so that the staff are billing for the same number of hours, they will still end up at a loss unless their billing rate goes up. If the firm spends more money to make its workers work faster and then bills less because they work fewer hours, financial difficulties are on the way.

On the other hand, if the firm increases hourly rates to compensate for the additional overhead, is there not a risk of pricing themselves out of the market?

The key issues involve the cost of the computer services, the applicability of the new resources to the billable work, and the way the costs should be recovered. Let's examine a simplified case in more detail and see what insights will emerge. Assume we amortize $500,000 of equipment over three years; assume an additional $250,000/yr is required for computer center expenses. Assume finally that 20 percent of the billable work uses the computer system.

Table 1 shows the cost accounting for our simplified example.

TABLE 1: Cost accounting example

	Before OA	Bundled	Unbundled
Total Cost Incl Salary	$1,000,000	$1,416,667	$416,667
Hours Billable Per Partner/Yr	1600	1600	320
Min Billing/Hr	$208	$295	$434
Hours Req'd For Search	100	10	10
Cost/Hr	$208	$295	$642
Total Cost	$20,800	$2,950	$6,420
Cost Ratio For Clients	100.0%	14.2%	30.8%

In the column labeled Before OA, we see partners with 200 days of 8 hours/day of billable time (a gross simplification, but never mind). They can establish a minimum billing rate based on their costs. A manual search taking 100 hours costs the client a minimum of $20,800.

In the column labeled Bundled, the partners have assumed that the computer costs should be borne by all their clients, whether or not the particular assignment benefits from the additional resources. In this scenario, the computer system is a general overhead. All clients pay more, but the computer search now takes one-tenth the time and costs the client 14.2 percent of the old price.

In the column labeled Unbundled, the partners realize that the costs of the computers could be recovered from the beneficiaries of those additional resources rather than from all their clients. They base their surcharge on the additional costs divided by the number of hours used. They apply the surcharge to their

computer searches (giving a total of $208 + $434 = $642/hr). In this way, the search clients benefit from a major reduction in their costs (only 30.8 percent of the original price) while all other clients see no change in their hourly rate.

These principles are applied in many data centers where costs are defined according to usage. Cost-accounting is simplified by the availability of detailed resource utilization data. Such data are easy to get from sophisticated time-sharing systems such as the HP3000, but where will lawyers, say, get the information they need when they use a local area network tying together multiple microcomputers? How will a system administrator determine which services would benefit from the computer resources so corporate planners can set the appropriate surcharges?

Value-based billing

There is a controversial approach to setting costs that bypasses these issues. Some economists favor setting fees as a function of the value to the client rather than the cost to the producer. The argument is that the client's improved efficiency or lower costs are benefits which have an objective value; as long as the cost of the improvements is less than the value of the improvements, the return on the investment is positive.

An example might be changing a couple of parameters of a large computer's operating system and increasing throughput by 10%. Total effort by the consultant: 30 seconds. Value to the consumer? It's hard to say exactly, but it might be computed as a function of total system throughput. If the total value of the salaries of 20 data entry clerks costing $15,000/year were the basis for the calculation, then the 10 percent improvement might be worth $30,000 per year. In any case, the value to the client would certainly be much more than 30 seconds at, say, $200/hour ($1.67).

Most clients would object strenuously to a contract that specified payment of thousands of dollars for something that took a few minutes of expert knowledge. Given the complex nature of the operating system and operational environment, one never knows whether solving a problem will be easy or difficult. My own practice is to bill strictly for time (although I use different rates for teaching and consulting) and take the consequences if the job is quickly done. My experience is that customers will call a professional back if they have received good value for their money, so I think it works out well for everyone even with billing-for-time.

Summary

In summary, implementing office automation where billing for time is necessary requires detailed attention to cost recovery. The challenge is much more than simply a technical issue. Failure to allocate costs appropriately can directly reduce corporate revenues or decrease the firm's competitive position.

14 VDT Ergonomics

Should employees and management be concerned about health effects of working with computer displays? What are the ergonomic factors influencing successful use of these tools? "Ergonomics refers to the interplay between humans, machinery and the work environment and how each element influences the others during work activity (1)."

In this chapter, I shall review information on how using video display terminals (VDTs) affects worker health and how to avoid problems. VDTs will include terminals and computer monitors using cathode-ray tube (CRT) technology or liquid-crystal (LCD) and plasma displays (PD).

NIOSH Report

In 1980 and 1981, the National Institute for Occupational Safety and Health (NIOSH) reported on-going studies of CRT users (2-8). The major points of the study were

- No evidence of radiation hazard;
- Significantly higher incidence of eye strain, tearing and itching eyes, and sore shoulders (90% of word processing operators reported eye problems);
- More anxiety, depression, and anger among vdt users than comparable office workers not using terminals and monitors.
- "the two principal causes of these eye problems are poor contrast between the crt screen's background and its images and glare (or reflected ambient light)(9)."

NIOSH recommended

- Regular rest periods;
- Eye exams before and periodically after working with VDTs;
- Detached, adjustable keyboards and screens;
- Glare reduction by proper room lighting and workstation positions;
- Adjustable chairs;
- Tests of CRT radiation emissions after servicing.

To reduce glare, NIOSH suggested

- Closing drapes during hours of direct sunlight;
- Good terminal location with respect to overhead lights;
- Hoods on terminals to shield the screen;
- Glare shields;
- Diffusers on all fluorescent light fixtures.

Glare shields include(9)

- Roughened surfaces;

- Nylon mesh;
- Thin-film optical coatings;
- Polarizing filters;
- Panel film;
- Light-control film.

Antiglare filters also reduce static electricity on the CRT surface, improving contrast (10). The static charge is also claimed to influence health by depleting negative ions in the air around the terminal (11,12); one study suggested that ion depletion causes "video operators' distress syndrome." The study recommended re-ionizing the air or using filters to reduce static.

A second finding of the same study suggested that some visual strain can be relieved by using dark characters on a light background rather than the reverse (12).

Radiation

The NIOSH study showed that all measurable radiation classes were below various official safety levels.

These studies involved hundreds of terminals at a dozen sites. Radiation levels in all categories were comparable with those of common household appliances; X-rays were below background levels in the normal environment. The question of long-term effects was not addressed by these studies.

Despite the reassuring measurements, some employees have attributed various health problems to VDT use; for example, hospital workers in Canada reported ruptured eye vessels, miscarriages, swollen hands, and birth defects (13). The difficulty with these claims is that no epidemiological evidence exists to support the hypothesis that the effects are caused by the VDTs.

Psychosocial factors

There is growing evidence, however, that VDT use may influence health through psychosocial effects rather than radiation. A National Academy of Sciences (NAS) study15 suggested that the fit between a person's needs (or preferences and values) and the likelihood of satisfying those needs at work greatly influences worker's health. There has to be a match between the demands placed on a worker and that person's abilities. Even if perceptions of overload, for example, are objectively incorrect, it's still important to pay attention to the perception.

The NAS report suggested that to increase satisfaction with VDT work, employers should optimize

- Employee control over work; e.g., provide automatic measurements of input speed to the employee directly, not to supervisors;
- Participation in system implementation; e.g., ensure that all system development teams include user representatives from the very start;
- Predictability; e.g., tell employees in advance when system shutdowns are planned;
- Complexity; e.g., provide a mix of responsibilities and opportunities for initiative;
- Social support; e.g., arrange breaks of 15 minutes every two hours for groups of VDT users rather than forcing them to stop individually.

VDT users will tend to become dissatisfied if they

- Are unsure of their precise job definitions;

- Worry about unemployment due to increasing automation;
- Are faced with inflexible deadlines even when system performance or availability are reduced.

Another review of the field16 supported the suggestions above and added the following issues as influences on VDT users' physical and mental health:

- Completeness: users fare better if they can see the finished product of their labors rather than being forced to work on fragments; e.g., have a single WP operator work on a report from first draft through final version rather than shifting it among members of a pool;
- Training: training periods should be measured in weeks, not hours. Even after an initial training period, workers should not be expected to be fully productive with new technology until they have integrated the new skills into their word patterns.

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15 Computer Envy

A good friend of my wife's visited from France recently, and her experiences as a secretary in a university department offer lessons for managers.

Bertine (not her real name) works in a high-powered research department. Before 1981, she was using a typewriter. At that time, the scientist in the next office bought his secretary an electric typewriter. A few days later, her boss replaced her old clunker by an electric typewriter. Bertine was not consulted.

In 1983, the scientist in the next office (henceforth known as the SITNO) bought his secretary a word processor. A few days later, Bertine's boss bought her an Olivetti word processor. She was not consulted.

Between 1983 and 1986, her boss bought a couple of HP plotters and an HP computer which remained in its box in a corner.

In 1986, the SITNO bought his secretary a Macintosh. A few days later, Bertine's boss bought her a Macintosh too. This time, she protested. In the years since the arrival of the Olivetti, she had learned to use it well; it suited her needs perfectly. No, no, said her boss, the Macintosh was obviously better. There were, however, no details of why it was better.

Bertine was in trouble. Her boss had purchased the Macintosh from a cut-rate dealer several hundred kilometers away; the dealer provided software "free." More precisely, the dealer provided stolen software. One copy of the reference manual for each of twenty programs was provided; Bertine was told to photocopy them. There was no training period. There was no technical support whatsoever. When Bertine had trouble, it was assumed to be her fault; she had to struggle along as best she could.

Realizing that she was wasting a lot of time trying to learn how to use her new equipment by herself, Bertine asked for training. Her boss refused, saying, "even cleaning women can use Macintoshes."

A year after the Macintosh arrived, Bertine's boss installed a network of five Macintoshes with a server and a laser printer. The server is located in the boss's office; however, he does not know how to turn it on. Because of the lack of support, none of the secretaries knows how to access the full character set including scientific and Greek symbols that the laser printer is capable of handling. They do not know how to configure their word processing package to reflect the differences between the dot-matrix draft printers and the laser; therefore, their drafts have to be manually re-paginated to account for the printers.

Bertine noticed that her back hurt after a day at work. She realized that her working conditions were the problem: her chair was not fully adjustable, the table was too small, the keyboard was too high, and there was no copy stand. She prepared a list of requests--and was immediately turned down because the boss said there was no budget for that.

Bertine quit and now works for another department. Her boss quickly begged her to come back. Why? Well, there were no written summaries to help a new secretary learn office procedures; there were no training manuals for the equipment; there was no technical support. So office productivity dropped dramatically.

Bertine refused to go back.

What were the overall costs for the scientist of his unfortunately-not-wholly-eccentric computer acquisition methodology? He paid a lot of money for equipment that was never fully used and he demoralized--and ultimately lost--his staff. I can't quantify those costs (because I don't have his budget figures) but it must be a significant part of his total expenses.

Lessons

Bertine's boss ignored some elementary principles that are worth repeating:

- Consult your staff before buying productivity aids;
- Buy equipment that meets substantive needs;
- Your neighbor's equipment is not necessarily better for you just because it's newer;
- Provide adequate training;
- Ensure adequate technical support;
- Pay attention to ergonomics;
- Treat your staff as colleagues, not as servants.

16 Stealing Software

Recently I noticed a store advertising a software library. Curious, I went in and found an entire wall unit filled with programs of all kinds--databases, spreadsheets, games, communications packages, financial systems, engineering software, fourth-generation languages, compilers and so on. All the big names were there in their original boxes: LOTUS, Ashton-Tate, Walker Richer and Quinn, Aldus.... Each software package was plastered with a sticker so it could be borrowed by a user. The cost of borrowing the package was about 10% of the original cost of the software. The advertising flier disclaimer said

The sole purpose of the club is to assist members in evaluating software before purchasing the original software at discounted prices. All evaluation rental fees are applied to purchases of original software.

Members must be aware that the copyright laws of Canada expressly forbids [sic] duplication in whole or in part of the original software rented for evaluation.

What we had here was a full-fledged software piracy gang.

I contacted the Software Publishers' Association (SPA) in Washington, DC for information on what could be done about the pirates. They sent me two folders full of interesting information I'd like to share with you. Fittingly for a column about copyright violations, I do have permission from Peter Beruk, their very helpful litigation manager, to quote extensively from their documentation.

Having earned my living as a programmer (long ago), I have never been very keen on software piracy. True, at one time in my youth I myself (blush) modified the code of a proprietary package so I could keep using it when my new employer wouldn't buy it. I regret having done that--I tell you about it to avoid being labeled as holier-than-thou) and have never done it since. Why have I come round to the view that unauthorized software copying is bad?

The Case Against Software Theft

[Excuse me while I climb into the imaginary pulpit here....] Ahem. In the pamphlet entitled, "Software Use and the Law," the SPA writes,

...the problem of software theft has developed and threatens to impede the development of new software products. Romantically called "piracy," the unauthorized duplication of software is a Federal offense that affects everyone: large and small publishers and legitimate users. Even the users of unlawful copies suffer from their own illegal actions. They receive no documentation, no customer support, and no information about product upgrades.

The pamphlet goes on to make the following points:

- Title 17 of the U.S. Code forbids unauthorized copies of copyrighted material.
- Individuals have the right to make a backup copy of their software. All other copies are illegal.
- Educational institutions do not have any special right to copy software; however, many software publishers do offer special discounts or special (limited) educational versions of their products.
- User groups have no special right to share copyrighted software. Both the user group and the owner of the meeting place where illegal copying takes place may be prosecuted (hotel owners beware).
- Corporate users must not place single-user versions of software on their local area networks.
- A toll-free number (1-800-388-PIR8) is available to report software theft.

Before you go out and report your employers and colleagues to the SPA, though, it would be a very good thing to tell your manager (or your manager's manager if necessary) about the dangers of stealing software. You can point out that the illegality could easily be reported at any time by a disgruntled employee. Stealing software, like any other criminal action, lays a company open to blackmail. If someone hassles you for pointing this out, you should be aware that there are laws in effect in the U.S. to protect "whistle-blowers" (those who report unsafe or illegal activities in the workplace) against harassment.

The Employee Agreement

The SPA Self-Audit Kit included the following sample corporate employee agreement where "(Company/Agency)" represents the name of your company, agency, or department):

Company/Agency Policy Regarding the Copying of Personal-Computer Software

1. (Company/Agency) licenses the use of software from a variety of outside companies. (Company/Agency) dos not own this software or its related documentation and , unless authorize by the software developer, does not have the right to reproduce it.
2. With regard to use on local area networks or on multiple machines, (Company/Agency) employees shall use the software only in accordance with the license agreement.
3. (Company/Agency) employees learning of any misuse of software or related documentation within the company shall notify the department manager or (Company/Agency's) legal counsel.
4. According to the U.S. Copyright Law, persons involved in the illegal reproduction of software can be subject to civil damages of as much as $50,000 and criminal penalties, including fines and imprisonment. (Company/Agency) does not condone the illegal duplication of software. (Company/Agency) employees who make, acquire or use unauthorized copies of computer software shall be disciplined as appropriate under the circumstances. Such discipline may include termination.

I am fully aware of the software use policies of (Company/Agency) and agree to uphold those policies.

_____

Employee Date and Signature

Policy Safeguards

An information security agreement be signed by every employee (at every level, including top management) every year. Requiring such signed agreements ensures that

- No one in your organization can claim that he/she didn't know about the policy forbidding software theft;
- No employee can be bullied by a manager into breaking the law;
- Your organization can prove that it actively opposes software theft if an action is launched by an aggrieved software vendor.

This last point warrants additional comment. According to the information I have received from lawyers, case law in both the U.S. and Canada includes precedents where firms have been found guilty of tolerating or encouraging unlawful activities because corporate policies were sporadic, half-hearted, or otherwise unconvincing. An organization must not only spout the letter of the law; it must actively

- Disseminate information about corporate policy;
- Support the acquisition of legal copies of required software; and
- Apply appropriate penalties to employees who break the law.

A stated policy to prevent software theft is useless if employees are allowed to use stolen software openly. An appropriate penalty might be to deduct the cost of a legal copy of a pirated package from both the employee's salary and from his or her manager's.

SPA Self-Audit Kit

The SPA Software Self-Audit package came with several simple tools for reducing software theft. Perhaps the oddest was a pair of metallic stickers with the anti-piracy hotline phone number in red. I strongly advise against putting such a sticker on your own computer or phone; it would be an invitation to harassment or even vandalism by those employees who like to steal software. However, if your employer were to put such a sticker on every computer in the company, it would be a useful reminder of corporate policy.

The SPA includes two audit sheets to copy. The Audit Tally Sheet is to be used by individual computer users. It provides space to show the name of each commercial computer program, whether it has commercial documentation (not photocopies), and whether there is documentary proof of purchase for this particular copy of the program.

The Audit Summation Sheet is for management to see the global results, including cost of compliance with copyright laws. It provides space to record the total range of software in the office or company, the number of copies in use, and the number of copies provably purchased.

Upper management might be shocked to discover the extent of software theft in their own organization; even results of incomplete audits are illuminating.

SPAudit Software

Finally, the SPA Self-Audit Kit comes with a 3.5" and 5.25" PC diskettes containing auditing software. SPAudit was written by Softguard Systems and reproduced by The Software Factory as part of the SPA anti-theft project. It has a list of reserved filenames for over 650 known proprietary software products. It works simply by scanning all directories on each system for files with the reserved names. Users can print a report for each system; if the same diskette is used for several systems in turn, one can print a global summary at the end of the audit.

The documentation points out that because the product works with filenames only, it may fail by

- Missing products whose files have been renamed;
- Mis-identifying non-proprietary files as products because of coincidental choice of filename.

SPAudit users are asked to contribute information to the SPA about both classes of error.

As pointed out by the SPAudit pamphlet, this product cannot possibly prove that any given package has been stolen. It merely identifies which packages reside on a given system. It is then up to the people responsible for the audit to follow up with detailed verification of the legitimacy of the copies.

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17 Personnel Hiring and Training: A Security Specialist's View

Crime is a human issue, not a technological one. True, technology can reduce the incidence of white-collar crimes, but the fundamental problem is that people can be tempted to take advantage of flaws in our procedures and information systems. The most spectacular biometric access control in the world won't stop someone from getting into your office if the janitor lets them in "just to pick up a report."

Hiring

Hiring new employees poses a particular problem; growing evidence suggests that many inflate their resumes with unfounded claims. Be especially careful of vague words such as "monitored", and "initiated"--find out what the candidate did in specific detail. Be sure that references are followed up at least to verify that the candidate really worked where the resume claims he or she did.

Checking references from previous employers is fraught with uncertainty, however. Former employers may hesitate to give bad references even for incompetent or unethical employees for fear of lawsuits if their comments become known or even if the employee fails to get a new job.

Another problem in interpreting recommendations is that some employers prefer to conceal crimes against them in order to protect their public image. In some cases, people who successfully carried out crimes have been rewarded by a "golden handshake" (a special payment in return for leaving) and positive references. They can then move on to victimize a new employer.

A general approach to identifying such distortions is to question the candidate closely about details of what is supposed to have been accomplished. The answers can then be compared with the story told by references.

Ask experienced employees to interview the candidate who claims special knowledge. I recall one new employee who claimed to have worked with a particular sort of computer for many years--but didn't know how to log on. It turned out he had simply lied on his resume. Had he chatted briefly with any of the programmers on staff, he might not have been hired in the first place.

Mysterious Wealth

A consistent theme in security literature is that sudden indicators of wealth are a clue that someone may be committing a white-collar crime. If the office worker who usually rides a twelve-year old rust-bucket suddenly appears with a nifty new sports car, it would be common sense to find out where it came from. Any radical change in personality should elicit concern, too. If the normally relaxed accountant now has beads of sweat on her forehead whenever you discuss the audit trails, perhaps it's time to look into her work more closely. Office managers don't have to be paranoid, they just have to act paranoid.

Training

Another office security issue fundamentally tied to personnel policies is training. I recall being told of a case in which an employee tried to use a fire extinguisher. He seized the canister and threw it into the fire--the base of the fire, mind you: that's what it said on the canister, "Aim at base of fire."

Procedures may look good on paper, but it is only when employees are trained that office effectiveness and security can be improved. Better yet, employees should be encouraged to question what they're told and suggest improvements themselves--before a crisis or emergency develops, not during.

18 Firings and Resignations

Office workers frequently have access to important information about their employer--whether computerized or not. In another chapter, I have written about hiring and keeping office personnel. The other end of the employer-employee relationship also deserves attention from a security-conscious office manager. Taking our security mandate in the widest sense, we have to protect our employer and ourselves against potential damage from unethical, disgruntled or incompetent employees and against the legal consequences of improper firing procedures. On the other end of the spectrum, common sense and common decency argue for humane and sensitive treatment of people being fired and those who are resigning.

Resignations

The potentially most dangerous form of employment termination is the resignation. The problem is summed up in the caption of a cartoon I once saw. A savage attack is in progress against a medieval town; a clan war chieftain confronts a singed and dirty warrior. "No, no, Og! Pillage, THEN burn!" Like the warriors, employees rarely resign without planning. An employee may have an indefinite period during which he or she knows that resignation is imminent, whereas the employer remains unaware of the situation. If the employee has bad feelings towards or evil designs on the current employer, there is a period of vulnerability unknown to management. Dishonest or unbalanced employees could steal information or equipment, cause immediate or delayed damage using programmatic techniques (the so-called "logic-bomb"), or introduce faulty data into the system ("data diddling").

Firings

Firings give the advantage to employers. The time of notification can be controlled to minimize its effects on the organization and its business. For example, employers might find it best to fire an incompetent or no-longer acceptable employee before beginning an important new project or after a particular project has finished.

To reduce the psychological impact on other employees, it might also be best to fire someone at the end of the day before a long weekend, thus giving everyone a cooling-off period outside working hours. One hardly wants the buzz of conversation and speculation that often follow a firing to intrude on the work day.

The fateful day

Let's suppose the time has arrived for the employee and the employer to part company. In both resignations and firings, security consultants unanimously advise instant action. Not for the leisurely grace period during which employees wind down their projects or hand them off to other staff members. No, security officers are a hard lot, and they advise the following scenario:

- In a formal exit interview, and in the presence of at least two managers, an officer of the employer informs the employee politely that his/her employment is at an end;
- During the exit interview, the officer explains the reasons for termination of employment;
- The officer gives the employee a check for the period of notification required by law or by contract (e.g., the same period as that between pay checks) plus any severance pay due;
- Under supervision (preferably in the presence of at least one security guard), the employee is escorted to their work area and invited to remove all personal belongings and place them in a container provided by the employer;

- The employee returns all company badges, IDs, business cards available, credit cards, and keys;
- The employee is ushered outside the building.

At the same time as all this is happening, all security arrangements must be changed to exclude the ex-employee from access to the building and to all information systems. Such restrictions can include:

- Striking the person's name from all security-post lists of authorized access;
- Explicitly informing guards that the ex-employee may not be allowed into the building, whether unaccompanied or accompanied by an employee, without special authorization by named authorities;
- Changing the combinations, reprogramming access card systems, and replacing physical keys if necessary for all secure areas to which the individual used to have authorized access;
- Removing or changing all personal access codes known to have been used by the ex-employee on all secured computer systems (microcomputers, networks, mainframes);
- Informing all outside agencies (e.g., tape storage facilities, publications with company advertising) that the ex-employee is no longer authorized to access any of the employer's information or to initiate security or disaster recovery procedures;
- Requesting cooperation from outside agencies if ex-employees attempt to exercise unauthorized functions on behalf of their former employer.

The task is made more difficult by seniority or if the ex-employee played an important role in disaster recovery or security. The employer should be assiduous in searching out all possible avenues of entry resulting from the person's position of responsibility and familiarity with security procedures.

In one story circulating in the security literature, an employee was fired without the safeguards suggested above. He returned to the workplace the next Saturday with his station wagon and greeted the security guard with the usual friendliness and confidence. The guard, who had known him for years, was unaware that the man had been fired. The ex-employee, who still had access codes and copies of keys to secure areas, entered the unattended computer room, destroyed all the files on the system, and then opened the tape vault. He then engaged the guard's help in loading all the company's backup tapes into his station wagon. The thief even kept complaining about how he had to work on weekends. This criminal then tried to extort money from the company by threatening to destroy the backup tapes, but he was found by police and arrested in time to prevent a disaster for his ex-employee.

Training replacements

One of the key organizational issues in planning or responding to termination of employment is training replacements for the departing employee. Such needs are voiced to justify policies allowing a more graceful, civilized and friendly approach to firings and resignations. It seems reasonable to encourage the departing employee to train the colleagues or new employees who will assume his or her responsibilities. However, cross-training should be part of the normal operations of all organizations. One form of the rule is, "Eliminate unique resources," as discussed in another chapter. Applied to an organization, it becomes, "No knowledge shall be known to only one member of the team."

This principle does not mean that one should (or can) form clones who have identical skills; on the contrary, knowledge should be distributed throughout one's organization. No one member need know everything another knows, but each responsibility or skill should be known to at least one other member. With this approach to sharing knowledge, an organization is stable; without it, the departure (or illness or vacation or other absence) of any one member with unique knowledge can cause disruption or even catastrophe.

I recall a client in a data center operations management class who volunteered the following story. There was a programming wizard responsible for maintaining a key production program; unfortunately, he had poor communication skills and preferred to solve problems himself rather than training and involving colleagues. "It'll be faster for me to do it myself," he used to say. During one of his rare vacations, something went wrong with "his" production program, shutting down the company's operations. The wizard was in the north woods, out of reach of all modern communications; the disaster lasted until he returned.

Psychosocial issues

What, no farewell party? Alas, security does interfere with the more obvious signs of friendliness. However, nothing stops a humane and sensitive employer from encouraging employees to arrange an after-hours party. If a resignation is on good terms, the employer may even arrange a celebration, possibly during working hours and maybe even at company cost.

A firing or a resignation on poor terms has two psychological dangers:

- effects on the individual concerned (embarrassment, shame, anger);
- effects on the remaining staff (rumors, resentment, fear).
- Both kinds of problems can be minimized by
- publishing termination procedures in organization documents provided to all employees;
- requiring all employees to sign a statement confirming that they have read and agreed to the termination procedures;
- consistent application of the termination procedures.

The personal shock of being fired can be reduced by

- politeness and consideration consistent with the nature of the reasons for being fired--although even nasty people should not be subject to verbal or physical abuse no matter how bad their behavior;
- treatment consistent with that meted out to other fired employees (see "legal issues", below);
- generous severance arrangements.

I once had to leave a wonderful company because of reasons beyond the control of the employer and myself. Neither the company nor I wanted to terminate my employment. The owner of the company offered to continue paying my salary until I found a job--and urged me to take all the time necessary to find a satisfactory job. His generosity eased the shock of having to leave my friends and colleagues.

Organizational turmoil can be reduced by

- convening organization-wide or departmental meetings to brief remaining employees on the details of significant termination;
- open discussion, including understanding how people respond to rupture of relationships. The remaining employees may have to suffer grief (a process, not a state).

Grief is a normal and healthy response to disruption of relationships (e.g., death of a loved one, divorce, and even the loss of a co-worker). Some people value social relationships more than other aspects of their work and may be especially affected by firings. Grief involves stages of denial, anger, mourning and recovery. Trying to forestall such responses by denying that people legitimately have feelings is foolish and counter-productive. It is far better to encourage those who are upset to voice their feelings and to engage in constructive discussion.

Image

The way an organization handles job termination affects more than internal relations. It also influences its image in the outside world. Prospective employees will think twice about accepting job offers from an organization that maltreats departing employees. Clients may form a negative impression of a company's stability if it abuses its own people. Investors may also look askance at a firm that gets a reputation for shoddy treatment of employees. Bad employee-management relations are a warning signs of long-term difficulties.

Legal issues

Finally, there's another dimension to employment termination that depends on local laws and the litigation environment. The United States, for example, is said to be one of the most litigious nations on the planet, perhaps because of the high number of lawyers per capita. Some guidelines for preventing legal problems related to firings:

- Build a solid, documented case for firing someone before acting. Keep good records, be objective, and get the opinions of several trustworthy people on record.
- Give the employee clear feedback long before considering firing.
- Offer the delinquent employee all reasonable chances to correct his or her behavior.

Timing is important in employee relations, as it is in almost everything else we do. In particular, if an employee is found to be behaving improperly or illegally, there must be no marked delay in dealing the with problem. Such a person could sue the employee--and individual managers--and argue in court that the very fact that there was a delay in firing him or her was proof that the firing was due to other factors such as personality conflicts, racism, or sexism. A well-defined procedure for progressing through the decision will obviate such problems.

The critical legal issue is consistency. If rules such as those described above for the day of the firing are applied haphazardly, there could easily be grounds for complaining of unfairness. Those to whom the rules were strictly applied would justifiably feel implicitly criticized. How would we feel if we were singled out by having guards check what we took home from our desk--if everyone else got a party and two weeks notice? Such inconsistency would be grounds for legal proceedings for defamation of character. The company might lose and it might win, but what non-lawyer wants to spend time in court?

19 Will This Have to be Done Again?

When I joined Hewlett-Packard (Canada) Ltd. in 1980, I arrived on the job armed with a small, green, hard covered book which I prominently entitled LOGBOOK in big black letters. From my first day as a member of the systems engineering organization, I wrote down what I learned; in a small Daytimer book, I logged how I spent my time. When I met clients, I took notes. When I installed new versions of MPE, I kept a chronological record of everything I did--including mistakes. While I taught courses, I kept a list of questions I couldn't answer right away.

Pretty soon, people began asking me what I thought I was doing- writing a novel?

My colleagues may have been puzzled by what they perceived as a mania for record keeping, but I was equally astonished that record keeping was not a normal part of their way of doing work. The reason I automatically kept records was my years in scientific research, where logbooks with hard covers, numbered pages and even waterproof paper were just usual parts of doing serious work. The idea of doing anything of importance without keeping a concurrent record simply didn't occur to anyone. One could not reproduce an experiment without knowing exactly what sequence one had used in accomplishing the steps. Even adding salts to solutions had to be done in a particular order.

So I just kept on keeping my little green logbooks.

By the time I left Hewlett-Packard in 1984, I had trained a few of the younger support personnel to keep careful records, especially while solving problems. They had learned the advantages of documentation.

Why document?

Documentation, far from being a sterile exercise done to conform to arbitrary requirements of nameless, faceless superiors, should be a vital part of any intellectual exercise. Documentation is simply writing down what we learn: the crucial step in human history that changed traditional cultures into civilizations. By keeping a record independent of any specific individual, we liberate our colleagues and our successors from dependence on our physical availability. Documentation is our assurance that work will continue without us; a kind of immortality, if you will.

We document what we do as a part of systematic problem solving. Writing forces us to identify the problem in words, instead of being content to define it in vague, unclear ideas. Writing down each idea we are in the process of testing helps us notice the ideas we missed the first time we tackled the problem. Keeping notes helps us pay attention to what we're doing.

Documenting what we do also helps us during training--both our own and that of the people we are helping to learn technical skills. Trainees can review their own notes on how to do something instead of relying entirely on someone else's description. If taking notes is viewed as a chance to engage one's mind more thoroughly in what we're learning, it can be fun. When I studied math, I had the habit of using a set of symbols entirely different from those the teacher used; it was harder than mere copying, but I sure learned what was going on.

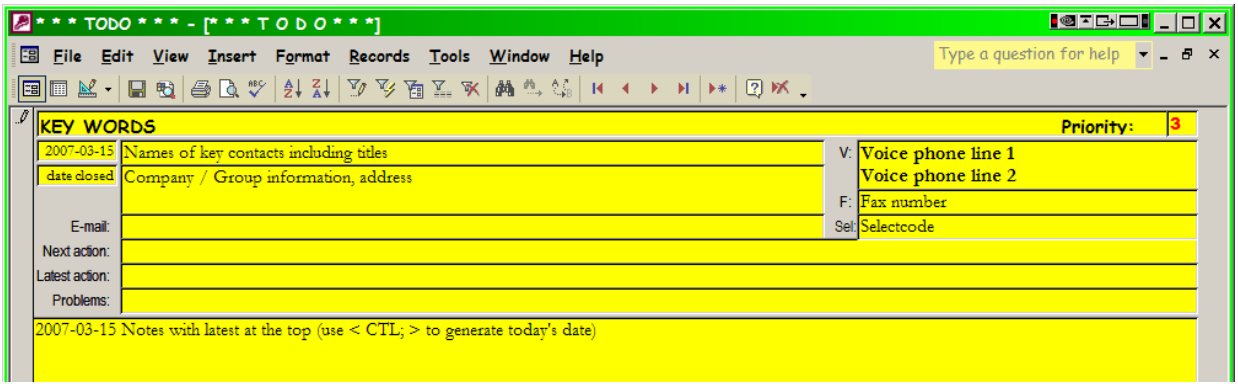
Finally, accurate records can be a boon in legal wrangles. In one case I experienced, upper management seriously considered legal procedures against a supplier for supposed breach of contract. Careful records of exactly when meetings were held and with whom permitted us to analyze the problem and resolve the issues by collaboration instead of by confrontation. Such records, if kept consistently, in good times and bad, can be

accepted in a court of law as evidence--but only if everything points to a steady pattern of record-keeping as events unfold. Records made long after a problem occurs are worthless.

Keep electronic records

The best way of keeping records on specific problems is an easy-to-use database. Here is the layout of a simple file in I used for several years as director of technical support in a large corporate data center and ever since then to keep track of all my projects:

By the time I finished my task of setting up a self-sufficient technical support team in the data center, we had



two thousand entries archived. We had a similar file reserved for system failures and another for summaries of articles from INTEREX proceedings volumes and various other publications. Every software product we requested information about was logged in the files as well, with a pointer to the folder in which specification sheets and correspondence were stored for the particular entry. These records were and are still in constant use to find experiences which may help in solving new problems as they arise.

With easily accessible records, it became possible to solve problems without me. Stored, sharable knowledge meant that it was no longer necessary for staff to depend on my physical presence. I was able to take month-long holidays without being called for help. Part of that involved intensive training of the staff, but a good deal was the direct result of proper documentation.

Liberate yourselves: share your knowledge.

Summary

Documenting what we learn helps us learn better. Documentation of how we solve problems helps us avoid becoming indispensable--and therefore trapped in our current job. Articulating our knowledge by writing it down focuses our minds on what we're doing. Once the information is written down--on paper or online--it can be made more accessible by indexing. Permuted indexes are easy to construct and ensure than key information can be found quickly. Generating a database of problems and their solutions makes pooled knowledge a permanent part of the working environment.

20 High-Pressure Scam

High-pressure sales techniques have been used to scare victims into paying large sums for unwanted products. The following story may help you avoid being a victim.

The story begins a few years ago with an innocent-looking product-information card from a company I shall call Blarney Industries. The card advertised a special anti-static cleaning spray for video display terminals. My boss, the VP of operations, filled in his name and sent the card in.

Some weeks later, my boss got a phone call from Blarney Industries; a friendly salesman explained that he'd be most pleased to send us some samples of the spray for evaluation. My boss said that one can would be sufficient, thank you. Alas, said the salesman, they couldn't send us only one can--they'd send us a box full of 16 cans--but never fear, we could just return the unused cans with no obligation. My boss insisted that he didn't want 16 cans, he only wanted one--and we'd even pay for it, too. Sorry, said the salesman, can't be done; 24 or none. Grudgingly, my boss agreed to receive the box of spray cans for evaluation.

When the box of spray cans arrived, we were surprised to find that they were plain, pale blue cans with no brand name at all; they were just labeled 'CRT ANTI-STATIC SPRAY CLEANER' and had a block of text referring to US government standards. We took a sample out and tried it on a screen. It left a terrible film on the glass which was hard to clean off even with considerable polishing. We decided that we wouldn't need the rest of the cans. At that point, we realized that there were no indications on the cans or on the shipping container to indicate where to return the materials. We shrugged and put the box away.

A few days later, my boss showed me the invoice that had arrived in the mail. The 16 cans were billed at $750--more than $40 each. When the salesman called a few days later, he got an earful from my boss, who told him what he could do with his $40 cans. However, the salesman suddenly turned nasty. "Pay us right now," he said, "or we'll sue you--and I'm sure your company wouldn't appreciate that, now, would it?" Alarmed, my boss handed the caller over to me.

"Sorry, sweetheart," I said, only it was ruder than 'sweetheart', "you don't have a purchase order. Go away."

We didn't hear from them for a week or so, but then a mysterious little box from Blarney addressed to my boss appeared in the mail. It was about 6 inches high and a couple of inches square; it contained a glass mug. What could this be? We put the box away with the spray cans.

A little while later, we got an extraordinary document in the mail. It came from Florida, showed a hand-drawn shield with words something like ACME COLLECTION AGENCY, and threatened us in pseudo-legal language with court action to collect the money supposedly owing to Blarney Industries. We ignored the threats; nothing happened.

The Plot Thickens

I did a little checking out of curiosity. The city phone book listed Blarney--in the same building as our offices. So it was a matter of moments to go downstairs and check the businesses listed on the letter board. No Blarney. I asked the building managers if they knew of Blarney; never heard of them. Had they ever been there? Absolutely not, said the manager with an offended air; he'd been there since the beginning, and there had never been a Blarney Industries office in the building.

I called the number again and noticed a hubbub of phones ringing in the 'office'; on a hunch, I suddenly asked the person on the phone, "Are you an answering service?" "Yes," she answered at once, and then stuttered, "Uh, no, no we're not--well, we're not supposed to say so." And then she hung up.

By this time, the scam was clear. These crooks sent innocent victims a few cans of cheap spray cleaner, invoiced them for outrageous amounts, and threatened them with legal action to persuade a few of them to pay up. Victims might pay if they feared that they'd get more trouble from their managers for getting the company embroiled in a lawsuit than for paying out horrendous amounts for a worthless product. From the crooks' point of view, all they had to do to make money was have more money paid than what they spent in shipping cheap spray. Our best guess was that bulk purchases of no-name foam cleaner might cost a few dollars per can. At that rate, if 5% of the people paid up, Blarney would make a profit.

We called the Better Business Bureau to check our interpretation and found dozens of accusations of high-pressure sales tactics in Montreal, Ottawa and Toronto. No doubt you'll find the same sleazy operators in your part of the world, too. Don't let them fool you: you cannot be forced to pay for materials you didn't order. In any case, the last thing these people want is a court battle. It's not worth it to them; might provide unwelcome publicity--which is what I hope this column is doing.

What was the mug for? We guess it was a ploy to provide further pressure; maybe the crooks would have said accusingly, "Well, you accepted our gift, didn't you? You want us to tell your boss about that?" and so on. We did eventually locate a human being in whose name Blarney Industries was registered in Montreal; we sent him the cans and the mug, but he refused them. So our company hired a bailiff and delivered the stuff outside his apartment door and gave him a notarized statement washing our corporate hands of the mess.

One final comment: it seems that there are lots of schemes like this around. One of my friends had the same experience with photocopier toner; someone sent him more toner than his company could use in a decade--and billed thousands of dollars. On another occasion, someone called me and said in an officious voice, "We're just checking on your photocopier; what model is it?" I asked, "Who are you?" and got a company name I'd never heard of. "I don't have a contract with you," I said--and the person hung up without a word.

Be warned.

21 Data Interconversion

Office automation (OA) is like moonshine whiskey (MW).

Products of both arts are widely used but relatively little appreciated outside their circle of users.

Practitioners have relatively low social standing; children of yuppies rarely announce, "I wanna be an office automation specialist / moonshiner." Nonetheless, specialists in OA and MW both share the respect of those directly involved in requesting the products of their skills.

Practitioners learn their arts mostly by trial and error and word of mouth; there are not yet university degrees in OA or in MW. Partly as a result, credentialism has also not yet invaded these fields; that is, one can become either kind of specialist without having to pass certification exams administered by professional societies. As a result, one can expect to find a variety of work experiences among OA and MW professionals.

Neither group relies on academic or scientific professionals to improve their products. MW workers do not habitually consult chemists and microbiologists to find better conditions for fermentation or to improve their strains of yeast. Unfortunately, OA workers do not habitually consult data processing (DP) or information systems professionals to improve their choice of hardware or solve problems involving software. For example, what would you do if you had to convert data from a Super-X15 word processor (WP) from Mars to, say, MS-WORD on your trusty personal computer (PC)? If you are like many of the OA staffers I have met, you would take one look at the funny hypercubical diskette, decide the hieroglyphics on the seventh surface were bird tracks, and you would ask for a paper copy so you could re-type the documents into your own processor or WP program.

What a pity: an OA worker behaving like a moonshiner. When faced with data in a format your equipment or software cannot interpret correctly, you should at least ask the DP staff if they can help. It turns out that from their point of view, data interconversion is not very difficult. Either they will convert the data easily using available techniques and tools, or they will help you find a professional data interconversion service, or they will write a new program to help you out if the problem warrants the effort. The main point to remember is that as an OA professional, you have a right to ask for help. You are not laboring illegally in a disreputable trade, you are worthy colleagues of these technical folk.

How?

Here are some details about the three options mentioned above. Suppose you have a LOTUS spreadsheet on HP150-style 3.5" diskettes and you want to send them to your PC, which uses 5.25" diskettes. Some folks would immediately give up and re-type data, but for DP people, it's really simple. With a cable and using any of a variety of data communications programs such as HP's ADVANCELINK or Walker, Richer and Quinn's REFLECTION, your DP staff can send the data files from one microcomputer to the other.

The next hurdle is conversion of data from one format to another. For example, you could have MS- WORD documents but want to use them with WORDSTAR, or LOTUS 1-2-3 spreadsheets to work with in VISICALC. The spreadsheet issue also has a relatively simple answer: the data can always be transferred, if necessary by printing them into a file and then reading them into the other spreadsheet. Another option is the Data Interchange Format (DIF) which represents tables in ASCII format; many graphics programs such as the Charting Gallery accept DIF files. Formulae are a bit harder, but even there, with the widespread acceptance of LOTUS 1-2-3 worksheet (.WKS) files as a de facto standard, many programs convert to and from the standard automatically.

Word processing documents are usually easier to interconvert than spreadsheet data. Word processing files consist of two kinds of data: the text ("Dear Abby:") and the formatting (boldface, italic, underline, indenting). Almost all WP programs can save a file in ASCII format, losing all the enhancements in the

process but keeping the content and appearance of the text. WORDSTAR, HPWORD for the HP3000, PCWORD for the HP150 and PC, EXECUTIVE MEMOMAKER, ADVANCEWRITE, and MSWORD can all create and read ASCII files. Some WP programs come supplied with utilities for interconversion. For example, ADVANCEWRITE can read and write Document Content Architecture (DCA) files and DIF files. Indeed, ADVANCEWRITE can also read graphics files from yet another standard data file, the Text Interchange Format (TIF).

There are even utilities running on larger computers such as the HP3000 that can help you. For example, HPDESKMANAGER can convert data among different WP formats: HPWORD, EXECUTIVE MEMOMAKER, HPSLATE, ADVANCEWRITE, and WORD/150 (the older version of PCWORD). HPCONVERTDCA can convert DCA documents to HPWORD. Script files in HPDESKMANAGER can make conversion easier for novice users.

REFLECTION provides data interconversion options in its CONFIGURE TRANSFER menu. The product allows you to convert the typical HP character set, EXTENDED ROMAN, into the more common IBM- style character set, ISO-7. It also allows you to convert tabs to spaces or back and to add or remove CR/LF pairs at end of lines. But more of CR/LF in a few paragraphs.

Services

The mish-mash of data formats in the OA field has spawned a new service for data interconversion. Such facilities buy a wide variety of hardware and software and either buy or write conversion programs. Typically, they all convert to and from some central format; thus one might have a program to change WORDSTAR into MS-WORD and also a program to change AES documents into MS-WORD format. To change from and AES formatt into WORDSTAR, one would not need a special program; two conversions (AES --> MS-WORD --> WORDSTAR) would suffice. Typical costs for such conversion are computed by the diskette, not by the file; a 1.2 Mb diskette might cost about $30 (US) to convert from one format to another. Conservative estimates suggesting that manual conversion of all the data on such a diskette would be at least 10 times more expensive than the commercial service simply in labor costs. Your accountants will explain that true costs would also include capital equipment costs, financing, depreciation, taxes, and costs of owning or renting office space.

Do it yourself

At worst, you can almost always manage to extract the text from a foreign WP file, read it into your own WP program, and massage it into acceptable form yourself. A typical problem in converting ASCII files to WP files is the spaces; some WP programs interpret the ASCII blank as a "fixed blank". As a result, each line is misinterpreted as a single very long word. Furthermore, ASCII files usually end each line with carriage return/line feed (CR/LF) characters, so the receiving WP program "thinks" each line is also a single paragraph. When you try to reformat a paragraph, nothing happens: the line-long "words" have no breaks, and the line-long "paragraphs" cannot be combined. The solution is easy for DP staff: they would say, "Why, let's just convert the ASCII blanks to whatever your WP program considers an acceptable "flexible" blank. Sometimes the WP program itself can do this, but even if it can't, DP personnel can write a conversion utility for such a simple change in a short time, sparing you and your staff many hours of mind-numbing work.

If necessary, DP staff can even provide special conversion of formatting commands if you can help them obtain the technical manuals that describe exactly how boldface, italic, and so on are indicated in both WP formats. The DP staff will write a compiler-like program that reads each character of the input file. Characters are combined into "tokens" following the rules of the WP program. The program then decides if it's a special (non-text) character. If it isn't (that is, if it is just ordinary text), then the program adds the character to a buffer and reads the next character. However, if a character or token is special, the program looks it up in a "look-up table" to see how to convert it; for example, "345" in the source format could mean "begin italic", which might be, "456" in the target format. At the end of each paragraph, the program can then write the converted text and formatting commands into a target file. Although this may all sound complicated, it's the sort of assignment beginning programmers get in school. Such techniques are taught in compiler courses and books.

Last resort

As a last question, what if you can't read the data storage medium at all? What if you really do get a hypercube from Mars? Well, if you can get access to a paper printout somehow, perhaps from the people who sent you the message, all is not yet lost. Perhaps you can get access to an optical character recognition (OCR) unit and convert the printed message into ASCII. Now, this isn't the same as scanning a document to digitize it (as you would do with an HP LaserScan). The OCR unit actually translates printed material into ASCII letter by letter. Good units working on type styles (fonts) they're programmed to recognize can achieve error rates as low as 1 failure in 10,000 characters; PC software typically achieves 99% recognition.

In conclusion, don't let OA turn into moonshine. Work with your DP staff to solve your problems of data interconversion without wasting your time and your organization's money on costly, inefficient, BORING retyping. You have better things to do with your life.